[ORAL ARGUMENT SCHEDULED FOR OCTOBER 15, 2020]

No. 20-5193

IN THE UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

AMERICAN HOSPITAL ASSOCIATION, et al.,

Plaintiffs-Appellants,

v.

ALEX M. AZAR II, in his official capacity as
SECRETARY OF HEALTH AND HUMAN SERVICES,

Defendant-Appellee.

On Appeal from the United States District Court
for the District of Columbia

SUPPLEMENTAL APPENDIX

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Comment on CMS-2019-0109-0002

Submitter Information

Name: Greta Hanson

General Comment

I am an OB/GYN in private practice and have seen first hand how varied costs are for the same service depending on where and who performs it. The extreme differences in charges for the identical surgeries, procedures, exams, imaging, and labs makes no sense and is driving up the cost of health care. Now that so many of us have high deductible plans we are very interested in how much medical care costs. Who benefits from this lack of transparency? Not the patients. large hospital systems and insurance companies only. Why is it so hard to make this information available?

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Submitter Information

Name: Robert Moore

General Comment

Healthcare is about the only service I can think of where nobody ever knows what the price is or will be. I've asked doctors before a procedure how much it will cost and they don't even know. With our high deductible environment, we should know the price of procedures before we decide to go forward or be able to look at other options and/or service providers.

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Document: CMS-2019-0109-2449
Comment on CMS-2019-0109-0002

Submitter Information

Name: Anonymous Anonymous

General Comment

I love my high-deductible HSA insurance, but I really need to have cost information available so I can wisely spend my money. Competition is the best way to improve costs and quality of care. I recall seeing costs posted at a local hospital, and was incredibly pleased to know how much my procedure would cost!

Transparent Prices

Will Help Consumers and Employers Reduce Health Spending

By Brian Blase, PhD

September 27, 2019

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https://galen.org/assets/Blase_Transparency_Paper_092719.pdf

Transparent Prices Will Help Consumers and Employers Reduce Health Spending

By Brian Blase, PhD

EXECUTIVE SUMMARY

Many skeptics of price transparency argue that price transparency tools have relatively low take-up and that most consumers have little incentive to seek out low-cost providers and services. Under the dominant health system structure, the skeptics are generally correct. Most studies show that few patients use transparency tools, and relatively small savings result system wide. However, consumers that do shop, can save a great deal of money. Those who used a New Hampshire price website prior to medical imaging visits saved 36 percent off the original cost, for example. This shows that policy changes to encourage greater consumerism can produce significant benefits to employers, employees, and patients—enhancing their ability to obtain greater value from their health spending.

Importantly, the skeptics neglect a complete view of the ways that price transparency can reform the health care system. Transparency should have four key beneficial impacts:

1. Better informed consumers and patients

2. Better informed employers that help workers shop for value

3. Improved ability for employers to monitor insurer effectiveness and eliminate counterproductive middlemen

4. Public pressure on high-cost providers.

The skeptics fail to consider that price transparency will help American employers, who are collectively the largest purchasers of health care. Price transparency will help employers establish improved payment structures for their employees. For example, under a reference price model, the employer or insurer agrees to pay a set amount they will pay per procedure. Reference pricing creates both a transparent price and provides patients with an incentive to shop as they bear the cost above the reference price. Economists found that a reform by Safeway that linked price transparency with reference pricing led employees to save 27 percent on laboratory tests and 13 percent on imaging tests.

Most employers don't yet offer reference pricing models. Additional price transparency aided by consumer-friendly applications to help employees navigate options should lead to greater employer adoption of reference pricing models and sizeable savings.

If enough people become shoppers, higher-priced facilities will begin to lower prices to avoid losing customers. This happened in California earlier this decade when the state adopted a reference pricing model for state employees. The result: a 9 to 14 percentage point increase in the use of low-price facilities and a 17 to 21 percent reduction in prices.

Both the New Hampshire price website and the California reference pricing system produced 'spillover effects,' meaning that people benefitted who did not shop. They benefit because providers lowered prices for everyone, not just the active shoppers. In California, about 75 percent of these price reductions spilled over to populations that were not participating in the reference pricing model.

Employers can also use increased price transparency to discipline the middlemen—insurers and third-party administrators (TPAs)—whom they have hired to negotiate with providers on their behalf. Commercial rates are often far above hospitals' marginal costs for providing services. According to economist Larry Van Horn, cash prices average nearly 40 percent below negotiated insurance rates. According to the RAND Corporation, Medicare rates average nearly 60 percent below negotiated rates that insurers pay for hospital services in employer plans.

It is increasingly clear that insurers lack the same incentives as employers and consumers to obtain the lowest possible cost for quality care. Insurers and TPAs often receive payments that are a function of total spending, which creates an incentive for them to prefer higher spending.

With transparency, employers can monitor the effectiveness of insurers by comparing different payment rates for providers across insurers and across regions. Transparent prices will help employers eliminate counterproductive middlemen and contract with other entities to develop new benefit designs that will incentivize employees to utilize lower-cost providers, including ones outside of their local region. Since price information is difficult to obtain, transparent prices will reduce barriers that innovators face in developing tools and applications to assist employers in lowering costs.

Finally, transparent prices should put public pressure on high-priced providers to lower their rates. Many charges, including those of tax-exempt hospitals, will likely be an embarrassment when they are subject to sunlight. In the past few months, media reports on noxious collections practices by tax-exempt hospitals have caused them to change these practices, often within days. The same will likely occur when the media starts reporting on some of the rates that providers charge.

Ultimately, price transparency represents a light regulatory approach, particularly considering other legislative proposals that would impose government price-controls throughout the health sector. While price transparency efforts are not sufficient by themselves to reform America's health care system, transparent prices should make other reforms, including employer-driven reforms, easier.

Advancing price transparency to help reform health care

High and growing health care spending and uneven quality of care frustrate consumers, employers, and taxpayers, increasingly crowding out spending on other needs. There is a growing sense that something must be done. All potential policy responses carry a risk of disruption, although some disruption can be warranted when the status quo is untenable. Price transparency is an area being explored by policymakers that carries a significant upside.

On June 24, 2019, President Trump signed an Executive Order on Improving Price and Quality Transparency in American Healthcare to Put Patients First.[1] The order called for the Secretary of Health and Human Services (HHS) to propose a regulation to require hospitals to post standard charge information. On July 29, 2019, HHS included this proposal in the annual Medicare Hospital Outpatient Prospective Payment System (OPPS) rule. The proposed regulation defines two types of standard charges: gross charges and payer-specific negotiated charges. The rule would require the information to be displayed on the Internet in a machine-readable file that includes a description of the item or service and a common billing code. The rule also proposes publicizing payer-specific negotiated charges for common shoppable services in a manner that is consumer friendly.[2] The rule proposes new enforcement tools including monitoring, auditing, corrective action plans, and civil monetary penalties of $300 per day to enforce compliance with the new requirements.

While President Trump and his administration have signaled strong support for efforts to boost health care price transparency, many industry groups, particularly hospitals and insurers, have expressed deep opposition. They claim that negotiated rates are proprietary and that publicizing rates could enable

[1] Executive Order on Improving Price and Quality Transparency in American Healthcare to Put Patients First, The White House, June 24, 2019. See: https://www.whitehouse.gov/presidential-actions/executive-order-improving-price-quality-transparency-american-healthcare-put-patients-first/

[2] According to the rule: "Shoppable" services are services that can be scheduled by a health care consumer in advance. Examples of shoppable services include x-rays, outpatient visits, imaging and laboratory tests or bundled services like a cesarean delivery, including pre-and post-delivery care. Consumer-friendly means the hospital charge information must be made public in a prominent location online (or in written form upon request); that it is easily accessible, without barriers, and searchable. It also means the service descriptions are in 'plain language' and the shoppable service charges are displayed and grouped with charges for any ancillary services the hospital customarily provides with the primary shoppable service.

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price-fixing and put upward pressure on prices—the latter being an odd concern for providers.

Unknown and obscured prices are unique to health care. People know the prices in advance for almost all goods and services they purchase—the items on the grocery store shelves, houses, automobiles, hotel rooms, flights, beauty services, and financial products like life and auto insurance, for example. Because people are shopping in these areas, there are also numerous sites that provide pricing information along with corresponding quality reviews.

In a normal market, suppliers and producers compete on both price and quality. They often advertise their prices, and they attempt to undersell competitors and build a strong reputation so consumers know that they offer reliable products for a reasonable price. In general, prices for certain products or services will tend to be similar for similar products or services (think of a Honda Odyssey, Toyota Sienna, and Dodge Grand Caravan) with price variations accounted for by marginal differences in quality and consumer tastes.

Again, health care is different. Prices[3] for the same or similar services and treatments can vary widely, both among regions, among facilities within a region, and even within a facility, based on the payer.[4]

The problems in health care markets are driven by three main features that are largely absent in other markets. First, most people are not directly spending their own money, so they lack incentives to obtain value from their consumption decisions. With employer-sponsored health insurance, premiums are aggregated, and employers and insurers are in key decision-making roles. This isolates individual employees and consumers from the marginal financial cost of their health care decisions. Second, markets are largely noncompetitive, increasingly dominated by large, integrated hospital systems consisting of inpatient facilities, outpatient facilities, and physician practices. Third, people rely very heavily on doctors for referrals. Since doctors are increasingly part of these consolidated hospital systems, they generally refer patients for services within the system regardless of price. All these features diminish price competition in health care.

[3] In this paper, the term "price" will refer to the rate actually paid for health care goods and services, whether it is a negotiated rate with an insurer or a cash rate if insurance is not used.

[4] Cooper, Zack, Stuart V. Craig, Martin Gaynor, and John van Reenen. 2015. "The Price Ain't Right? Hospital Prices and Health Spending on the Privately Insured." The Quarterly Journal of Economics. 2018; 134(1): 51-107. See: https://academic.oup.com/qje/article-abstract/134/1/51/5090426?redirectedFrom=fulltext

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In health care markets where third-party payment is rare, such as LASIK eye surgery and cosmetic surgeries, prices tend to be transparent with robust competition among providers. Under these conditions, the result is generally what is found in other markets: declining quality-adjusted prices over time, meaning prices generally decline while quality improves.[5] The Surgery Center of Oklahoma, which has posted its prices on a consumer-friendly website for 11 years, has changed its prices four times during that period—lowering them each time.[6] Competition leading to quality-adjusted price declines was a theme of the Trump Administration's report, *Reforming America's Healthcare System Through Choice and Competition* (Choice and Competition report).

> [T]he inflation-adjusted price of LASIK eye surgery declined by 25 percent between 1999 and 2011, even as quality markedly improved.[7] Notably, third-party payers (including the government) generally do not cover the procedure and so ophthalmologists have had to compete directly for consumer dollars.[8] Similarly, though the price of health care grew at double the rate of inflation between 1992 and 2012, the price of cosmetic surgery—for which consumers pay almost exclusively out of pocket—grew at less than half the rate of inflation.[9] These examples also highlight that when consumers are spending their own dollars and shopping accordingly, providers have greater incentives to improve quality and cut costs.

Unfortunately, most of the health sector is not characterized by this success. For Americans to pay less for better care, we need to learn from what works elsewhere and change policy accordingly while making sure consumers have access to necessary care. The remainder of this essay reviews the four key ways where price transparency can help address the core problems within the health

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[5] As an example, in the 1950s, the average American worker needed about three weeks of wages to afford a rudimentary washing machine. Today, the average American worker needs to work about four days for a far superior washer and dryer.

[6] For examples of how price transparency can reduce prices, see: https://www.patientrightsadvocate.org/smith

[7] Herrick DM. "The Market for Medical Care Should Work Like Cosmetic Surgery," National Center for Policy Analysis, Policy report No. 349. Dallas, TX. May 2013. See: https://www.healthworkscollective.com/wpcontent/uploads/2013/06/st349.pdf. Accessed September 28, 2018

[8] Ibid.

[9] Benjamin EJ, Blaha MJ, Chiuve SE, et al., on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. "Heart disease and stroke statistics—2017 update: a report from the American Heart Association [published online ahead of print January 25, 2017]." American Heart Association Journal. 2017 March; 135(10): 5. https://www.ahajournals.org/doi/10.1161/cir.0000000000000485. Accessed August 21, 2018.

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sector to create a direct benefit to Americans:

1. Better informed consumers and patients,
2. Better informed employers that help workers shop for value
3. Improved ability for employers to monitor insurer effectiveness and eliminate counterproductive middlemen, and
4. Public pressure on high-cost providers.

Crucially, these elements together should spur additional competition among providers, largely through new payment structures, such as reference-based pricing and direct contracting enabled by more abundant price information.

Better informed consumers and patients

There are three fundamental problems with patients shopping for health care—an information problem, an incentive problem, and an institutional problem. First, it is often difficult for consumers to obtain prices, although it appears to be easier for those paying without insurance.[10] Second, most consumers lack incentives to choose lower-priced providers. Once consumers meet their deductible, they have little, if any, incentive to be cost conscious as they face identical or similar copayments regardless of where they receive treatment so long as the provider is in-network.

Consumers, in the aggregate pool, are on the hook for the full negotiated rate, but they bear most of that cost through premiums. And each consumer's utilization decisions will minimally impact the average premium for the group. (Importantly, there are ways to design benefits and contract with providers that would encourage greater efficiencies and lower premiums across the group.) Third, patients tend to rely on their doctors to refer them when they need additional care, and sometimes the doctors themselves have an information or incentive problem that keeps them from recommending the highest-value care.

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[10] Beck M. "How to cut your health-care bill: pay cash." Wall Street Journal. February 15, 2016. See: https://www.wsj.com/articles/how-to-cut-your-health-care-bill-pay-cash-1455592277.

High Deductible Health Plans (HDHPs) were created about 15 years ago to help minimize the incentive problem, and their use has significantly grown over the past decade. Increasingly, employers have turned to these plans to reduce costs. For people with these plans, price transparency is valuable to help consumers understand their out-of-pocket costs. Xinke Zhang et al. find that enrollment in HDHPs leads some enrollees to switch to lower-cost providers (evidence of greater consumer engagement).[11] The provider change, along with lower prices for the HDHP compared to the traditional plan, led to a significant reduction in spending (the larger marginal effect was the lower price of the HDHP relative to the traditional plan, rather than from consumers choosing lower-cost providers). They also found that HDHP enrollment led many consumers to choose lower-cost providers for laboratory tests, resulting in a 13 percent reduction in average prices paid for laboratory tests.

Price shopping in health care still appears relatively rare despite increasing cost-sharing and the proliferation of price transparency apps and tools to inform and assist consumers.[12] Some of these tools, which may provide the billed amount or price ranges, are less useful than others that provide the negotiated rate and cost-sharing amounts. Michael Chernew et al. reviewed how privately-insured individuals choose providers for lower-limb MRI scans, which are a standardized service that can generally be scheduled in advance with minimal differences in quality across providers but often large differences in prices.[13] They found that patients generally do not shop despite large price variations and how much they could save by shopping. On average, patients bypassed six lower-priced providers between their homes and treatment locations.

Physician referrals were by far the most important factor for where patients received the MRIs. Chernew et al. found that the median referring orthopedic surgeon sent 79 percent of all her referrals to a single imaging provider and

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[11] Zhang, Xinke, Amelia Haviland, Ateev Mehrotra, Peter Huckfeldt, Zachary Wagner, and Neeraj Sood., "Does Enrollment in High-Deductible Health Plans Encourage Price Shopping?" Health Serv Res. 2018 Aug; 53(Suppl 1): 2718-34. October 23, 2017.

[12] Desai, Sunita, Laura A. Hatfield, Andrew L. Hicks, Anna D. Sinaiko, Michael E. Chernew, David Cowling, Santosh Gautam, Sze-jung Wu, and Ateev Mehrotra, "Offering a Price Transparency Tool Did Not Reduce Overall Spending Among California Public Employees and Retirees," Health Affairs Vol. 36, No. 8. August 2017; Desai, Sunita, Laura A. Hatfield, and Andrew L. Hicks, "Association Between Availability of a Price Transparency Tool and Outpatient Spending," JAMA. 2016; 315(17):1874-1881; Sinaiko, Anna, Karen E. Joynt, and Meredith B. Rosenthal, "Association Between Viewing Health Care Price Information and Choice of Health Care Facility," JAMA Intern Med. 2016; 176(12):1868-1870.

[13] Chernew, Michael, Zack Cooper, Eugene Larsen-Hallock, Fiona Scott Morton, "Are Health Care Services Shoppable? Evidence from the Consumption of Lower-Limb MRI Scans," NBER Working Paper. See: https://www.nber.org/papers/w24869

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that the median referring orthopedic surgeon sent no patients to the lowest cost provider within either 30- or 60-minutes of the patient's home.

Zach Brown assessed the effect of the State of New Hampshire's initiative to post negotiated rates on a website, beginning in 2007.[14] According to Brown, the website allowed any privately-insured consumer in the state to enter insurance information and find the out-of-pocket (OOP) price, the amount paid by insurers, and the total negotiated price across all providers in the state. Brown assessed the impact of the website on prices for relatively simple and standardized outpatient medical imaging procedures (X-rays, CT scans, and MRIs). Initially, the price of each of these procedures varied widely across providers in the state.

Brown found that consumers used the website for about 8 percent of medical imaging visits. As expected, the website primarily benefited individuals who had not yet satisfied their deductible and who thus faced the full price of the service. These individuals saved an estimated $200 per visit, a savings of 36 percent compared to what they would have paid in the absence of the website. Given that these individuals paid the full negotiated rate, the individual captured all of the savings and the insurer captured none. Since most consumers did not use the website, the overall savings are much smaller. Brown's estimates imply that the website resulted in overall savings of 3 to 4 percent. Adding to these findings, shared-savings programs initiated by New Hampshire and Kentucky for public employees, where employees receive payments for choosing lower-cost providers, have both showed promising results so far.[15]

Based on survey data, shopping in health care does appear to be increasing. According to the 2018 UnitedHealthcare Consumer Sentiment Survey, 36 percent of respondents—a random sample of U.S. adults over the age of 18—indicated they used the Internet or a mobile app during the previous year to compare the quality and cost of medical services.[16] That is a substantial increase from 2012, when just 14 percent of respondents indicated they had done

[14] Brown, Zach, "An Empirical Model of Price Transparency and Markups in Health Care," August 2019. See: http://www-personal.umich.edu/~zachb/zbrown_empirical_model_price_transparency.pdf

[15] Rhoads, Jared, "For Public Employees: How health care incentives are saving money in Kentucky," March 8, 2019. See: https://thefga.org/wp-content/uploads/2019/03/RTS-Kentucky-HealthCareIncentivesSavingMoney-DRAFT8.pdf; Beaton, Thomas, "Member Incentives for Lower Cost Health Services Saved Payer $3.2M," January 31, 2018. See here: https://healthpayerintelligence.com/news/member-incentives-for-lower-cost-health-services-saved-payer-3.2m.

[16] UnitedHealthcare, "UnitedHealthcare Consumer Sentiment Survey," September 2018. See: https://newsroom.uhc.com/consumer-sentiment-survey-2018.html

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so.[17] The increase is driven by millennials, with 51 percent indicating that they shop for health care services online.[18]

More people shopping is useful since most health care services, representing a large amount of total health spending, are shoppable. According to the administration's Choice and Competition report, "[t]he vast majority of health care services are routine or elective services that can be organized by markets to enhance patient welfare."[19] The report cited one study that found emergency department spending equaled 6 percent of total health spending,[20] and another study that classified 43 percent of health care spending as "shoppable" with another 11 percent of spending on prescription drugs that is generally shoppable.[21]

Better informed employers that help workers shop for value

Earlier this year, Katherine Hempstead and Chapin White published a short and intriguing essay on how the Amish and Mennonites obtain a clear and simple list of health care prices.[22] The Plain Community Amish and Mennonites make prompt cash payments, and the local health system has established a relationship with them. According to Hempstead and White, "The interactions between providers and patients from the Plain Community are bracingly direct, bypassing health plans, government agencies, banks, credit card companies, collection agencies, and other intermediaries." Hempstead and White conclude that "The reason that price transparency works for the Plain Com-

[17] Ibid

[18] Ibid

[19] "Reforming America's Healthcare System Through Choice and Competition," U.S. Department of Health & Human Services, U.S. Department of the Treasury, U.S. Department of Labor, Dec. 3, 2018. See: https://www.hhs.gov/about/news/2018/12/03/reforming-americas-healthcare-system-through-choice-and-competition.html

[20] Lee MH, Schuur JD, Zink BK. "Owning the cost of emergency medicine: beyond 2%," Ann Emerg Med. 2013;62(5):498-505.

[21] "Spending on shoppable services in healthcare," Healthcare Cost Institute. Issue Brief No. 11. March 2016. See: https://www.healthcostinstitute.org/images/easyblog_articles/110/Shoppable-Services-IB-3.2.16_0.pdf.

[22] Hempstead, Katherine and Chapin White, "Plain Talk About Price Transparency," March 25, 2019. See: https://www.healthaffairs.org/do/10.1377/hblog20190319.99794/full/

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munity is that incentives between providers and consumers are aligned. The community knows that it must shop for care, and that they, either individually or collectively, must pay the prices that they negotiate." Two clear and somewhat intuitive takeaways emerge from this work. First, as referenced above, incentives matter. Second, minimizing the role of the middleman (employers, insurers, and government bureaus) who engage in complex and often secret negotiations may help promote the dynamic consumerism present in the rest of the economy.

Christopher Whaley, Timothy Brown, and James Robinson analyzed a reform effort by Safeway to assess the impact of price transparency as well as price transparency linked with a reference pricing initiative.[23] In August 2010, Safeway, which offered its employees a HDHP with a $1,200 deductible, provided its employees access to an online price transparency tool. This tool showed the negotiated rate and the patient's expected cost-sharing amount, and it also displayed information on provider location, quality, and patient satisfaction. In March 2011, Safeway implemented reference pricing for laboratory tests, and in November 2011, Safeway implemented reference pricing for CT scans and MRIs. Safeway set the reference price at approximately the 60th percentile of the price distribution, which represented the maximum that Safeway's plan would contribute to the service. Spending above the reference price did not count toward the deductible or OOP maximum. In theory, reference pricing creates both a transparent price (solving the information problem) and provides consumers with an incentive to shop and maximize value (solving the incentive problem).

The Safeway initiative allowed Whaley et al. to test the sequential effect of price transparency followed by the application of reference pricing. Consistent with other studies, they found that, "when offered price transparency alone, Safeway employees do not shop."

"However, when subject to a different incentive scheme, reference pricing, approximately a year later, there is substantial price shopping." The reduction in amounts paid was sizeable, approximately 27 percent for laboratory tests and approximately 13 percent for imaging tests. This magnitude was approximately twice the reduction of the effect Zhang et al. found from moving employees to HDHPs. Whaley et al. conclude that "by changing the marginal out-of-pocket prices between high- and low-priced providers [i.e., making high-priced pro-

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[23] Whaley, Christopher, Timothy Brown, and James Robinson, "Consumer Responses to Price Transparency Alone versus Price Transparency Combined with Reference Pricing," April 23, 2019. See: https://www.mitpressjournals.org/doi/full/10.1162/ajhe_a_00118.

viders relatively more expensive than low-priced providers for the employee], reference pricing amplifies the effects of reduced search costs [that results from price transparency].” Thus, the price transparency tools “will capture the attention of consumers, and influence their behavior, only if patients have strong financial incentives to care about prices.”

An important benefit of price transparency is that it enables more employers to offer reference price payment structures for shoppable services. This holds the potential for substantial reduction in spending as employees and their families would have improved information about prices and incentives to choose lower-priced facilities.

Most large carriers now maintain price transparency websites of various quality, but far fewer offer reference pricing or similar types of payment programs. Even with price transparency tools, many employers have been resistant to adopt reference pricing models into their health benefit plans, generally expressing concern that it could increase complexity for workers and leave workers exposed to high out-of-pocket costs.[24] Additional price transparency and more consumer-friendly applications, along with efforts to help employees navigate these decisions, may cause employer resistance to wane.

If enough employees and families change their behavior and become active health care shoppers, higher-priced facilities will likely begin to lower their prices. This was the experience in California when the state adopted a reference pricing model for state employees. As summarized in the administration’s Choice and Competition report:

> When the California Public Employees’ Retirement System (CalPERS), which provides benefits to over 1.4 million enrollees, started using reference pricing, higher-cost providers soon responded by lowering their prices to attract these enrollees (Robinson 2017).[25] CalPERS distributed lists of hospitals that exceeded a certain quality threshold and had different prices for its enrollees. Consumers increasingly used lower-cost providers with no negative impact on quality.[26] CalPERS’ experience

[24] Sinaiko, Anna D., Shehnaz Alidina, and Ateev Mehrotra. “Why Aren’t More Employers Implementing Reference-Based Pricing Benefit Design?” The American Journal of Managed Care, February 2019. See: https://ajmc.s3.amazonaws.com/_media/_pdf/AJMC_02_2019_Sinaiko%20final.pdf

[25] Robinson CR, Brown TT, Whaley C. Reference pricing changes “choice architecture” of healthcare for consumers. Health Aff. 2017;3:524-530. doi: 10.1377/hlthaff.2016.1256.

[26] Ibid.

highlights the potential for realigning incentives using reference-based pricing, to lower cost and increase value in the healthcare system.

The CalPERS reference pricing experience translated into a 9 to 14 percentage point increase in employees and dependents' use of low-price facilities and a 17 to 21 percent reduction in prices.[27]

Whaley and Timothy Brown utilized the CalPERS reference pricing model to assess providers' pricing response for three common outpatient surgical procedures (cataract surgery, colonoscopy, and joint arthroscopy), finding that facilities lowered prices in response to the reference pricing program.[28] Importantly, about 75 percent of these price reductions spilled over to the non-CalPERS population. Whaley and Brown concluded that "this paper is the first to demonstrate that health care providers change their negotiated prices in response to increases in consumer cost-sharing."

Improved ability for employers to monitor insurer effectiveness and eliminate counterproductive middlemen

According to economist Larry Van Horn, average cash prices for health care are nearly 40 percent below negotiated rates.[29] And according to the Rand Corporation, Medicare rates average nearly 60 percent below negotiated rates that insurers pay for hospital services in employer plans.[30] This data and the fact that nearly all hospitals participate in Medicare shows that employers are likely paying rates far above hospitals' marginal costs for providing services.

[27] "Reforming America's Healthcare System Through Choice and Competition," U.S. Department of Health & Human Services, U.S. Department of the Treasury, U.S. Department of Labor, Dec. 3, 2018. See: https://www.hhs.gov/about/news/2018/12/03/reforming-americas-healthcare-system-through-choice-and-competition.html

[28] Whaley, Christopher and Timothy Brown. Firm Response to Targeted Consumer Incentives: Evidence from Reference Pricing for Surgical Services. August 15, 2018.

[29] Remarks by President Trump at Signing of Executive Order on Improving Price and Quality Transparency in American Healthcare to Put Patients First, June 24, 2019. See: https://www.whitehouse.gov/briefings-statements/remarks-president-trump-signing-executive-order-improving-price-quality-transparency-american-healthcare-put-patients-first/

[30] White, Chapin and Christopher Whaley, "Prices Paid to Hospitals by Private Health Plans Are High Relative to Medicare and Vary Widely," 2019. See: https://www.rand.org/pubs/research_reports/RR3033.html.

In addition to the benefits already discussed, transparent health care prices make it easier for employers to monitor insurers. Employers can offer coverage to their workers by self-insuring or by contracting with an insurer to accept the claims risk. Even employers that self-insure (i.e., internalize the cost of claims) generally contract with insurers to set their rates with providers and process claims. Most employers, however, do not know the rates that insurers are negotiating for their employees' care, and many of these employers have difficulty obtaining this information if they try.

Transparency will help deal with the principal-agent problem involved with employers purchasing health insurance. Principals often hire agents who specialize in certain capacities that the principal would rather outsource. Ideally, agents act in the principal's best interests. The principal-agent problem occurs when the agents have incentives that lead them against acting in the principal's best interest. In health care, insurers and brokers may lack the same incentives as employers and consumers to obtain the lowest possible cost for quality care. Employers want lower health care spending because it allows them to increase employee wages and attract a more talented workforce, among other reasons. However, insurers and brokers often receive payments that are a function of total spending, which creates some incentive for them to prefer higher spending. Employers face difficulties monitoring whether insurers are doing an acceptable job negotiating on their behalf.[31]

Transparency efforts will reveal the actual reimbursement rates insurers pay providers and will help employers monitor the agents they have hired. First, transparent prices will show employers or emerging entities that specialize in helping employers sort through price data how much more insurers are paying for the same service or procedure performed in a hospital outpatient department as in an ambulatory surgical center (ASC) within a region. This information will enable employers to determine if they want to structure payments to encourage movement away from outpatient departments to ASCs if the insurer is unable to negotiate lower rates with the hospital.

Second, with transparent prices, employers and these emerging entities will be able to contrast the rates being negotiated by other insurers within the same region and across regions. For higher cost procedures, where it may make sense to bear travel costs, this information should help employers utilize lower-cost

[31] It is certainly true that insurance companies compete with each other to attract business and that much of this competition occurs on lower premiums. However, insurance markets in many areas are quite concentrated, insurers are often reluctant to go toe-to-toe with providers, and insurers likely care more about relative premiums to their competitors and not as much in absolute premiums.

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providers outside of their local markets. This will help combat provider consolidation in certain local markets. For example, there are freestanding surgery centers that post their prices and that have prices many times below the rates that providers are charging in a local market.[32] Increased price transparency will enable employers and entities working on their behalf to better design programs for patients to travel to other locations to receive higher valued surgical care.

Moreover, the threat of consumers leaving a local market for surgeries puts pressure on local providers to bring prices down to marginal cost. According to Dr. Keith Smith, the CEO and managing partner of a price transparent outpatient surgery center in Oklahoma City, a Georgia woman was quoted a price of $40,000 for a procedure at her local hospital but the price was only $3,600 at the Surgery Center of Oklahoma.[33] After alerting her local hospital to the price in Oklahoma, the Georgia hospital agreed to do the procedure for $3,600.

Price transparency may also provide employers with relevant information about potential benefits of directly contracting with providers. Employers appear to be increasing the degree that they contract directly with providers.[34] This is a way for employers to eliminate much of the services provided by the middlemen and to put providers on capitated payment structures. For example, this can include contracting with a physician practice to provide primary care services for the firm's employees. The employer would pay the provider a fixed sum per employee and avoid much of the administrative costs that come with the current third-party billing system. Anecdotally, it appears that employers who have moved to direct contracting have shown savings.[35]

Given the apparent increase in employer demand for lower health costs, the companies and entities briefly referenced above can be expected to take the next step and develop innovative benefit designs to incentivize employees and dependents to use lower-priced providers. Companies looking to offer these services right now (online price transparency tools, reference pricing benefit

[32] Patient Rights Advocate, "Example of Price Transparency Reducing Prices." See: https://www.patientrightsadvocate.org/smith. Accessed September 23, 2019.

[33] Ibid.

[34] Greene, Jay, "In a first for Michigan, Henry Ford Health signs direct contract with GM," August 6, 2018. See: https://www.crainsdetroit.com/article/20180806/news/667836/in-a-first-for-michigan-henry-ford-health-signs-direct-contract-with-gm

[35] Miller, Stephen, "Direct Contracting with Health Providers Can Lower Costs," Society for Human Resource Management, October 12, 2018. See: https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/direct-contracting-with-health-providers-can-lower-costs.aspx

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designs, and referral management) are stymied by the fact that they need to obtain claims data from employers and insurers.[36] This is often extremely difficult and thus represents a sizeable entry barrier. Price transparency reduces this barrier and will make it easier for entrepreneurs to develop both products and benefit designs to help employers and consumers access higher-valued care.

Public pressure on high-cost providers

Greater price transparency and publicity around health care prices will enable researchers to calculate the real-world tradeoffs involved in health care consumption. For example, this will enable calculations for the time that an average employee will need to work in order to finance a particular treatment or procedure if he or she devoted all of his or her income over a period of time to paying for that treatment or procedure.

Quite frankly, some health care prices are unconscionably high. They have been tolerated because of the abundance of third-party payment, which obscures the total cost from the entity (largely workers and taxpayers) that ultimately bears it, and because of the power of interest groups that benefit from the status quo and that are among the biggest employers in many local areas. Sunlight is often the best disinfectant, and price transparency will show what tax-exempt, non-profit hospitals charge as well as the rates charged by several surgical professions that have managed to secure significant bargaining power over time.

This sunlight will likely pressure high-priced facilities to take steps to lower what are often bloated pricing structures. In just the past few months, drawing attention to several hospitals' outrageous billing practices caused hospitals to revise those practices. News articles have reported that several hospitals, including Mary Washington and the University of Virginia, had extremely aggressive collection practices for unpaid medical bills (with charges often based on the inflated chargemaster rates), even for low-income patients.[37] Within a

[36] Christopher Whaley deserves credit for providing this insight in his review of the paper.

[37] Hancock, Jay and Elizabeth Lucas, "'UVA has ruined us': Health system sues thousands of patients, seizing paychecks and putting liens on homes," Washington Post, September 9, 2019. See: https://www.washingtonpost.com/health/uva-has-ruined-us-health-system-sues-thousands-of-patients-seizing-paychecks-and-putting-liens-on-home

few days of the stories being published, both hospitals announced changes to their billing practices.[38]

Creating competitive pressure on providers

Brown's research shows that the overall consumer savings of price transparency in New Hampshire were modest since only about 8 percent of employees utilized the website. However, even with limited take-up, there were spillover benefits to the broader population, i.e., non-website users. According to Brown, "[b]y affecting negotiated prices, price transparency generates spillover effects that benefit all consumers, including those that do not have price information." Brown's modeling suggests that price reductions occur when roughly 10 to 50 percent of individuals are informed about prices. Marginal supply-side effects become less relevant once enough consumers are informed. According to Brown, "[p]rices decline because demand effectively becomes more elastic [i.e., consumers care more about prices and alternatives], allowing insurers to negotiate lower prices with most providers in their network." Specific to the examples he assessed:

> [C]onsumers would choose lower cost providers in their choice set, resulting in per visit savings of $39 for consumers and $281 for insurers relative to no price transparency. Savings would come largely at the expense of provider profits, although some of the savings would also be due to individuals switching to providers with lower marginal cost (e.g. imaging centers and clinics rather than hospitals).

Brown's findings show why high-cost providers likely will oppose price transparency efforts. Of important note, most of the savings for insurers would translate into lower premiums for employees over time.

Brown also finds that increased price awareness decreases price dispersion. Brown hypothesizes that it is possible that price information will have additional dynamic effects that will improve overall system efficiency by encouraging relatively low-cost providers to enter markets. (While entry of low-cost providers into markets is essential, state policies, such as Certificate of Need

s/2019/09/09/5eb23306-c807-11e9-be05-f76ac4ec618c_story.html; Simmons-Duffin, Selena, "When Hospitals Sue for Unpaid Bills, It Can Be 'Ruinous' for Patients," NPR, June 25, 2019. See: https://www.npr.org/sections/health-shots/2019/06/25/735385283/hospitals-earn-little-from-suing-for-unpaid-bills-for-patients-it-can-be-ruinous

[38] Hancock, Jay and Elizabeth Lucas, "'UVA has ruined us.'"

laws and restrictions on providers' ability to deliver care, such as stringent scope of practice or supervisory requirements, can impede this entry and harm consumers. As outlined in the Trump administration's Choice and Competition report, a comprehensive solution to lowering costs while preserving quality will require tackling these policies as well.)

Whaley et al. believe that these dynamic effects of provider price competition were muted in the Safeway experiment since Safeway's workers were geographically dispersed and thus lacked significant leverage in any local market for providers to lower prices. After the CalPERS referencing pricing implementation, Whaley and Brown did find that prices decreased in areas with a large share of state and municipal employees in a market with a significant number of employees affected by reference pricing.

A 2019 paper by Whaley examined the growth of patient access to a leading online price transparency platform, finding that price transparency leads to a small, but significant decrease in laboratory test prices but not to a change in physician office visit prices.[39] The general takeaway is that price transparency by itself can lower spending and prices for shoppable, homogenized services like imaging and laboratory tests, with a bigger price effect when consumers have adequate incentives to consume lower-priced services.

Advancing Price Transparency

With more than 50 recommendations in the Choice and Competition report, the Trump Administration is advancing a health care agenda centered on empowering consumers and injecting competitive forces into the financing and delivering of care. Transparent prices help advance both. Transparent prices will make it easier for consumers to search for value and for employers to establish proven programs like reference pricing models and going outside of a local market to so-called "Centers of Excellence" for expensive, elective services to help and to encourage their employees to shop for value. There is also evidence that consumers, particularly younger consumers, are more comfortable with shopping for care and asking for price information. Third-party administrators and innovators will continue to develop tools and applications to ease consumers' ability to shop between providers.

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[39] Whaley, Christopher, "Provider Responses to Online Price Transparency," May 3, 2019. See: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3383121

Transparent prices also will help employers monitor the effectiveness of insurers by comparing different rates received by providers across payers and across regions. With limited information, employers often now maintain status quo arrangements, with mid-level human resources managers relying on the advice of insurance brokers, who tend to be funded by the insurer and who often are paid a percentage-based commission. Transparent prices could lead employers, along with the assistance of entities specializing in reducing employer benefit costs, to eliminate counterproductive middlemen from the process. Ultimately, greater transparency should constrain prices by placing more competitive pressure on providers.

The notion, advanced by providers and insurers, that negotiated prices are a trade secret and that the status quo should remain in place, is noxious and works for them but not for the rest of society. They're economically justified in fearing sunlight and competition, but that's exactly what is needed to reform health care. Concerns from some economists that collusion could result from price transparency appear unjustified. Local markets right now are characterized by a limited number of providers, particularly hospitals, who engage in repeated interactions. They already tend to have knowledge of each other's payment rates, particularly relative to each other. Moreover, hospitals and other providers already provide consumers with pricing information in the Explanation of Benefits documents when they bill patients.

This analysis focused on the economic and policy reasons to pursue price transparency. If the Trump Administration's price transparency proposals are finalized as proposed, the $300 daily penalty rate will likely not compel hospitals to comply if they are adamantly opposed to providing this type of information. This amount is a rounding error for most hospitals in terms of total revenue they receive. As a result, the administration should consider the appropriateness of the penalty size. However, as explained in this piece, the economic and policy reasons to pursue price transparency are significant.

Finally, price transparency imposes near negligible regulatory costs on hospitals, and it is a light regulatory approach, particularly given the growing and misguided movement to impose Medicare rates on all transactions. Building public pressure to "do something" about high and growing health care costs, particularly hospital prices, will certainly cause some policy response in the coming years. Let's start with requiring the disclosure of prices.

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Brian Blase, PhD was a Special Assistant to President Trump at the National Economic Council focusing on health care policy from January 2017 through June 2019. In this capacity, he helped develop the Trump Administration's health policy agenda and coordinated the implementation of many of those policies. He is now a Senior Fellow with both the Galen Institute and the Texas Public Policy Foundation as well as the president of Blase Policy Strategies. He can be reached at brian@blasepolicy.org.

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healthcare financial management association

September 27, 2019

Seema Verma
Administrator
Centers for Medicare & Medicaid Services
Department of Health and Human Services
Attention: CMS-1717-P
P.O. Box 8013
Baltimore, MD 21244-1850

File Code: CMS-1717-P

Re: Medicare Program: Proposed Changes to Hospital Outpatient Prospective Payment and Ambulatory Surgical Center Payment Systems and Quality Reporting Programs; Price Transparency of Hospital Standard Charges; Proposed Revisions of Organ Procurement Organizations Conditions of Coverage; Proposed Prior Authorization Process and Requirements for Certain Covered Outpatient Department Services; Potential Changes to the Laboratory Date of Service Policy; Proposed Changes to Grandfathered Children's Hospitals -Within-Hospitals

Dear Administrator Verma:

The Healthcare Financial Management Association (HFMA) would like to thank the Centers for Medicare & Medicaid Services (CMS) for the opportunity to comment on the *Medicare Program: Proposed Changes to Hospital Outpatient Prospective Payment and Ambulatory Surgical Center Payment Systems and Quality Reporting Programs; Price Transparency of Hospital Standard Charges; Proposed Revisions of Organ Procurement Organizations Conditions of Coverage; Proposed Prior Authorization Process and Requirements for Certain Covered Outpatient Department Services; Potential Changes to the Laboratory Date of Service Policy; Proposed Changes to Grandfathered Children's Hospitals -Within-Hospitals* (hereafter referred to as the Proposed Rule) published in the Federal Register on August 9, 2019.

HFMA is a professional organization of more than 42,000 individuals involved in various aspects of healthcare financial management. HFMA is committed to helping its members improve the management of and compliance with the numerous rules and regulations that govern the industry.

Introduction
HFMA would like to commend CMS for its thorough analysis and discussion of the many Medicare payment decisions addressed in the 2020 Proposed Rule. Our members would like to comment on the proposals related to:

- Proposed changes to the Inpatient Only List (IPO)
- Separately Payable Drugs Provided by 340B Hospitals
- Proposed Method to Control Unnecessary Increases in the Volume of Clinic Visit Services Furnished in Excepted Off-Campus Provider-Based Departments (PBDs)
- Proposed Ambulatory Surgery Center (ASC) Payment and Comment Indicators

- Proposed Requirements for Hospitals to Make a List of Their Standard Charges Available
- Proposed Prior Authorization Process Requirements for Certain Outpatient Hospital Department Services
- Comment Solicitation on Cost Reporting, Maintenance of Hospital Chargemasters, and Related Medicare Payment Issues

Below, please find specific comments on the items above.

Proposed Changes to the Inpatient Only (IPO) List
CMS is proposing to remove Total Hip Arthroplasty (THA), CPT Code 27130, from the Medicare IPO list for CY20. This would allow the procedure to be performed as an outpatient surgery paid under the OPPS for patients who are healthy enough to not require an inpatient stay. And, like Total Knee Arthroplasty (TKA),[1] we anticipate that within the next two to three years, THA would be covered by Medicare when the procedure is performed in an ASC. **HFMA's members conditionally support CMS's proposal. This support is directly predicated on adequately adjusting the MS-DRG payment and target prices for Lower Extremity Joint Replacement (LEJR) episodes for this significant policy shift.**

THA is a high-volume inpatient procedure. Using publicly available CMS data, HFMA estimates that in FY17, there were over 220,000 THAs performed. The total allowed amount for these procedures was $3.2 billion for MS-DRG 470, Major Joint Replacement or Reattachment of Lower Extremity w/o MCC (the most likely MS-DRG impacted by this policy shift). If this MS-DRG is mis-priced, given the volume of these procedures, it will have a significant negative financial impact on the hospitals where these procedures are performed.

Our members are concerned that THA procedures for healthier patients will be shifted into an outpatient setting, leaving sicker, more costly patients to have their procedures performed in the inpatient setting. The "weight" for MS-DRG 470, like all MS-DRGs, is a blended historical average of all Medicare patients who have this procedure. Under the scenario described above, it will be approximately two years before MS-DRG weights are based on claims experience that incorporates this policy. In the interim, hospitals will be under-reimbursed for providing a medically necessary service to Medicare beneficiaries unless CMS proactively adjusts the weight for MS-DRG 470 to reflect this policy shift.

In addition to repricing the MS-DRG itself, CMS will need to account for this policy shift in LEJR episode target prices by adjusting for projected changes in the number of "outlier" cases, increased use of post-acute care sites of service, and a potential increase in readmissions rates for the patients who continue to have THA procedures performed in the inpatient setting. HFMA's members believe cases fitting the following criteria could be removed from the existing data set to determine the correct MS-DRG weight and episode pricing if CMS decides to implement this policy:

- Cases with no listed co-morbidities listed on the claim or that have a low-risk HCC score
- Short length of stay (two days)
- No institutional post-acute care utilization
- No readmissions

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[1] Assuming CMS finalizes its CY20 proposal to cover TKA when performed in an ASC.

Finally, if CMS moves forward with this policy, we believe CMS will need to monitor and possibly adjust readmissions rates used in the Hospital Readmissions Reduction Program and posted on the Hospital Compare website. We are concerned that differential rates of adoption of performing LEJR procedures across and within regions could potentially skew readmission rates.

Separately Payable Drugs Provided by 340B Hospitals
CMS proposes to continue paying ASP-22.5% for separately payable drugs provided by 340B hospitals. **HFMA, as discussed in its comment letter[2] on the CY18 proposed rule strongly opposes this policy.**

In the proposed rule, CMS seeks comments on how to devise a remedy that ensures 340B providers receive the correct payment for the drugs they have provided Medicare beneficiaries in a budget-neutral manner, in the event that CMS loses its appeal of *American Hospital Association et. al v. Azar et al.*, the United States District Court for the District of Columbia.

HFMA's members suggest providing 340B hospitals with a lump sum settlement that includes the amount for patient coinsurance. Our members believe retrospectively repaying individual claims to 340B hospitals is administratively too burdensome. Further, requiring hospitals to collect an additional coinsurance amount from either Medicare beneficiaries (or their Medigap plans) would not only be administratively burdensome but also create significant confusion for Medicare beneficiaries. We do not believe they should be harmed as a result of a Medicare policy change that was subsequently found to be illegal.

To achieve budget neutrality, HFMA's members recommend reducing payments to non-340B hospitals over a period of five years to recoup the increased payment to 340B hospitals. We believe that a five-year recoupment period will minimize the negative financial impact to these providers.

Moving forward, HFMA's members strongly believe that 340B hospitals should continue to pay ASP+6% for separately payable drugs acquired under the program. The purpose of the 340B program is to assist providers that care for a high number of low-income and uninsured patients. Any reduction of payment to 340B hospitals would create financial stress to safety net hospitals that provide care to these at-risk patients. HFMA strongly believes that any reduction in payment to 340B providers (e.g., to ASP+3% as suggested in the proposed rule) without sufficient supporting data (collected in a transparent manner and calculated using a methodology all stakeholders agree is valid) would be as arbitrary and capricious as reducing payments to 340B providers by ASP-22%.

Proposed ASC Payment and Comment Indicators
CMS proposes in the 2020 OPPS rule to cover TKA, CPT Code 27447, when the procedure is provided in ASCs. **HFMA's members conditionally support CMS's proposal. This support is directly predicated on adequately adjusting the MS-DRG payment and target prices for LEJR episodes for this significant policy shift.** Please see our specific comments related to CMS's proposal to remove THA (above) from the IPO list for our detailed recommendations, as these recommendations apply to TKA procedures as well.

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[2] HFMA Comment Letter to CMS, September 11, 2017.

Proposed Method to Control Unnecessary Increases in the Volume of Clinic Visit Services Furnished in Excepted Off-Campus Provider-Based Departments (PBDs)
HFMA continues to strongly oppose CMS's proposal to pay for clinic visits furnished in excepted off-campus PBDs at the site-neutral PFS-equivalent rate. The proposed rule continues to implement this policy, increasing the reduction from 30 percent of the OPPS rate in CY2019 to 60 percent in CY2020.

HFMA urges the agency to withdraw this proposal from consideration. As U.S. District Judge Rosemary Collyer found in her September 17th ruling in AHA et al. v. Azar[3], CMS lacks statutory authority to reduce payments to excepted PBDs to the level of nonexcepted PBDs, particularly in a non-budget-neutral manner. Congress expressly chose not to confer on CMS authority to reimburse excepted off-campus PBDs at the reduced rates paid to nonexcepted off-campus PBDs – it clearly intended for there to be a material distinction in payment rates between excepted and nonexcepted PBDs.

In addition, the agency's proposal is arbitrary and capricious – CMS has no basis to conclude that PBD services have increased unnecessarily, which is the predicate finding necessary to support its proposed policy. Indeed, the agency's so-called analysis that identifies "unnecessary" shifting of services from physician offices to PBDs completely ignores substantially impactful factors outside of hospitals' control that also result in increases in OPPS volume and expenditures.

Proposed Requirements for Hospitals to Make a List of Their Standard Charges Available
In the proposed rule, CMS expands its prior interpretation of section 2718 of the Public Health Services Act (PHS Act). If finalized, the rule would require all hospitals to make a list of both gross charges and negotiated rates for all services in the hospital chargemaster, as well as a set of shoppable services, publicly available. The rule specifies the manner and format in which the lists are to be made publicly available. Hospitals that do not comply with the requirement may be subject to a civil monetary penalty (CMP) of up to $300 per day.

HFMA is a strong supporter of price transparency as a mechanism to empower patients to make more cost-effective decisions about where to receive care. However, we also recognize the potential for unintended consequences. Among the unique features of the U.S. healthcare marketplace is the existence of a business-to-business marketplace between providers and private health plans. For a typical hospital, this marketplace determines payments that make up approximately one-third of the hospital's total revenue. From a consumer perspective, as a general rule, the more transparency the better. But within a business-to-business marketplace, some healthcare economists and the federal antitrust enforcement agencies have noted that public transparency of negotiated rates could actually inflate prices by discouraging private negotiations that can result in lower prices for some buyers[4]. Providers, for example, may have less incentive to offer lower prices to certain payers if they know other

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[3] American Hospital Association et al v. Alex M. Azar, II, Secretary of the Department of Health and Human Services, Civil Action No. 18-2841 (RMC), U.S. District Court for the District of Columbia.
[4] For a summary of the federal antitrust agencies' concerns regarding provider exchanges of price information, see the U S Department of Justice and Federal Trade Commission, Statements of Antitrust Enforcement Policy in Health Care, Statement 6, Aug 1996.

payers in the market will demand similar rates. They may also have less incentive to offer lower prices if they think this will set off a price war with other providers in the market. Within the privately insured market, these considerations suggest that an approach to transparency that emphasizes out-of-pocket payments for insured patients instead of full transparency of negotiated rates may be preferable[5].

To advance price transparency HFMA has convened multiple taskforces involving participants representing the perspectives of consumers, hospitals, physician practices and health plans to develop operational solutions that will facilitate greater price transparency within the healthcare industry. The resulting white papers and consumer guides[6] provide practical guidance that, if followed, will create an environment where patients and consumers can use data related to their specific out-of- pocket spending, the total price of the episode of care, and quality to make a value-based decision about where to receive "shoppable services."

Despite our fundamental belief in the power of well-organized, clearly communicated financial and quality data to empower patients and consumers to make choices about where to receive care that are aligned with their values and financial interests, **HFMA's members do not support the expanded requirements that hospitals post their payer-specific negotiated charges. The rule, as currently proposed, exceeds CMS's statutory authority, has significant unresolved issues, imposes a material administrative burden on providers and fails to create an environment conducive to consumerism.** Each of these issues is discussed in detail below.

Exceeds Statutory Authority: In expanding the requirement we believe CMS has exceeded Congress's intent in three ways.

1) *Definition of Standard Charges*: 42 U.S. Code § 300gg–18(e) (Section 2718(e) of the PHS Act states:

   *Each hospital operating within the United States shall for each year establish (and update) and make public (in accordance with guidelines developed by the Secretary) a list of the hospital's **standard charges**[7] or items and services provided by the hospital, including for diagnosis-related groups established under section 1395ww(d)(4) of this title.*

   When used as an adjective, the Merriam-Webster dictionary defines **standard** as "regularly and widely used, available, or supplied."

   Further, in Part I, Chapter 22, Section 2202.4 of the Medicare Provider Reimbursement Manual, CMS defines **charges**[8] as:

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[5] For an overview of the potential adverse effects of transparency in business-to-business healthcare marketplaces, see Cutler, D , and Dafny, L , "Designing Transparency Systems for Medical Care Prices," New England Journal of Medicine, March 10, 2011, pp 894-895
[6] HFMA, Healthcare Dollars & Sense.
[7] Emphasis added
[8] CMS, *The Provider Reimbursement Manual, Part 1*

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"Charges refer to the regular rates established by the provider for services rendered to both beneficiaries and to other paying patients. Charges should be related consistently to the cost of the services and ***uniformly applied to all patients whether inpatient or outpatient***[9] *[emphasis added]. All patients' charges used in the development of apportionment ratios should be recorded at the gross value; i.e., charges before the application of allowances and discounts deductions."*

The industry has defined price, charge, and cost as follows[10]:

- Charge*: The dollar amount a provider sets for services rendered before negotiating any discounts. The charge can be different from the amount paid.*
- Price: The total amount a provider expects to be paid by payers and patients for healthcare services.
- Cost: The definition of cost varies by the party incurring the expense:
    - To the patient, cost is the amount payable out of pocket for healthcare services.
    - To the provider, cost is the expense (direct and indirect) incurred to deliver healthcare services to patients.
    - To the insurer, cost is the amount payable to the provider (or reimbursable to the patient) for services rendered.
    - To the employer, cost is the expense related to providing health benefits (premiums or claims paid).

We note that the industry's definition of charges is similar to CMS's definition of charges in the Provider Reimbursement Manual.

CMS's definition of charge in the Provider Reimbursement Manual is longstanding and relatively unchanged since the inception of the Medicare program over 50 years ago. Further, the word "standard," as it is used in Section 2718(e) of the PHS Act has a common meaning that is well understood. Therefore, we believe the congressional staff who drafted the Patient Protection and Affordable Care Act (ACA) chose these specific words intentionally and the congresspersons and senators who voted on it intended for them to be interpreted within the context of a common, well understood meaning.

Despite the well understood meaning of the words "standard charges," in the proposed rule, CMS reinterpreted the definition to have two different meanings:

1) Gross charges: The charge for an individual item or service that is reflected on a hospital's chargemaster, absent any discounts

2) Payer-specific negotiated charges: The charge that the hospital has negotiated with a third-party payer for an item or service

[9] Emphasis added
[10] HFMA, *Price Transparency in Health Care: Report from the HFMA Price Transparency Task Force*, 2014.

HFMA's members believe the definition of gross charges is within Congress's intended meaning of "standard charge." It is clearly aligned with the longstanding CMS definition of charges as found in the Provider Reimbursement Manual.

However, HFMA believes that CMS's recent invention of the phase "payer-specific negotiated charge" redefines the phrase "standard charge" to mean something wholly different from what Congress intended when it specifically included the words "standard charge" in an amendment to the PHS Act as part of the ACA. It more resembles the industry definition of price than either the industry's or CMS's definition of charge. **CMS is expanding the definition of standard charge to include "charges" that vary by third party payer and are therefore not uniform across all patients. As such, HFMA's members do not believe the agency has the statutory authority to finalize this definition and strongly encourage the agency not to do so.**

HFMA's opposition to this proposal is rooted solely in the fact that CMS, in this specific instance, is attempting to expand its authority beyond what Congress intended when it specifically choose the words "standard charges." However, there are other instances where it is appropriate for CMS to reinterpret the Medicare statute based on Congress's clear intent. Inpatient and outpatient outliers are a specific example of where this applies. Sections 1833(t)(5)(A) and 1886(d)(5)(A)(ii) of the Social Security Act both require the use of charges as a proxy for cost for an inpatient discharge or outpatient service so that CMS can make an outlier payment to hospitals based on the cost of the discharge or service provided. In the future, if hospitals can provide CMS with the actual allowable cost of an inpatient discharge or outpatient service, we believe it is appropriate for CMS to no longer base outlier payments on charges as Congress clearly intends for outlier payments to be based on cost, not a proxy for cost (e.g. charges).

2) *Including Services Provided by Employed Physicians and Non-Physicians in the Definition of Items and Services*. In the rule, CMS proposes including services provided by employed physicians and non-physicians in its definition of "Items and Services" provided by the hospital. Section 2718(e) of the PHS Act (provided above) makes no reference to services provided by employed physicians or non-physicians. Therefore, Congress did not intend for CMS to include the charges of employed physicians and non-employed physicians in the definition of "items and services" under Section 2718(e) of the PHS Act. **Because CMS lacks the statutory authority to include the services of physicians and non-employed physicians, HFMA's members strongly encourage CMS not to include the services of employed physicians and non-physicians in its final definition of "items and services."**

Beyond lacking the legal authority to compel hospitals that employ physicians and non-physicians to include the payer specific negotiated charge and gross charge for services provided by employed physicians and non-physicians in the data made publicly available, there is also an issue of comparability.

Not all hospitals employ the same types of physicians and non-physicians. For example, hospital A employs its anesthesiologists. Hospital B's anesthesiology coverage is provided by a freestanding practice that has privileges at the hospital. The free-standing practice has negotiated its own contracts with managed care plans for the services it provides and bills its patients separately from the hospital for services provided by freestanding practice anesthesiologists in hospital B (and other hospitals it partners with). The gross and payer specific negotiated charges made public by hospital A (who employs their anesthesiologists) for major joint replacement or reattachment of lower extremity without major comorbid conditions or complications (MCC) (MS-DRG 470) will, everything else held constant, be greater than at hospital B (does not employ anesthesiologists) because these two "service packages" do not include the same services and are therefore not comparable. As a result, if the proposed rule is finalized, it is likely to cause consumers to mistakenly choose higher cost providers who look less expensive because a key component of the service was not included.

HFMA does not believe this can be remedied by compelling hospitals to include the gross and payer specific negotiated charges for non-employed physicians and non-physicians in the amounts posted. First, this would foist an incredible administrative burden on both hospitals and their physician partners. Second, it would make hospitals responsible for the accuracy of data provided to them (or not provided to them at all) by a third party that they could not verify. And finally, the payer specific negotiated charge is the result of a private negotiation between health plans and physician practices. We do not believe it is appropriate that hospitals should be able to see the amounts that health plans pay community physicians who may practice at the hospital, but also in many circumstances compete with hospital employed physicians by providing similar services.

However, if CMS chooses to ignore Congress's intent under Section 2718(e) of the PHS Act and the comparability issues described above by including the services of employed physicians and non-physicians the final rule, the agency needs to provide several key clarifications so that hospitals can meet the new requirements in a timely manner.

First, in many instances, the charges for employed physicians and non-physicians are not included in the hospital's chargemaster. If a hospital does not include charges for employed physicians and non-employed physicians in its chargemaster, is it required to make those charges publicly available?

Second, many hospitals own off-campus provider-based clinics and freestanding physician practices. Are hospitals required to include the charges for services provided by employed physicians and non-employed physicians in these settings in its public charge posting? The proposed rule clearly states "that the proposed definition of 'hospital' would not include entities such as ambulatory surgery centers (ASCs) or other non-hospital sites-of-care from which consumers may seek health care items and services. For example, nonhospital sites may offer ambulatory surgical services, laboratory or imaging services, or other services that are similar or identical to the services offered by hospital outpatient departments."

While we believe that CMS does not intend for hospitals to include charges for services provided in off-campus provider-based clinics and hospital-owned freestanding practices in the requirement, we ask CMS to confirm that is correct in the final rule.

Third, what gross and payer specific negotiated charge should hospitals make publicly available in instances where, for the same service, the physician component of the service is sometimes provided by an employed physicians, sometimes provided by a physician employed by a freestanding practice who has privileges at the hospital?

3) *Ability to Assess Civil Monetary Penalties to Noncompliant Hospitals*: The proposed rule cites 2718(b)(3) of the PHS Act for its authority to assess noncompliant hospitals with a CMP of up to $300 per day. This provision only applies to section 2718(b) – entitled, "Ensuring that Consumers Receive Value for Their Premium Payments" – which pertains to the medical loss ratio rebate provisions.

   Beyond the specific statutory construction of section 2718, that 2718(b)(3) of the PHS Act only applies to the provisions in section 2718(b) is evidenced by an exchange between a CMS staffer and a caller on the November 13, 2018, Hospital Open Door Forum. When a caller asked CMS staff about what penalties would be assessed if hospitals did not comply with the standard charge posting requirement, the staffer responded that the hospital would be out of compliance with the law. When the caller clarified her question to what specifically the penalty was for non-compliance, the CMS staffer repeated his response—and did so without asserting that CMS has *any ability to assess CMPs* on noncompliant hospitals.

   Therefore, HFMA's members do not believe that CMS has the statutory authority to assess CMPs for noncompliance and strongly recommend it not finalize this provision. Section 2718(b)(3) of the PHS Act existed for almost 10 years when the Open Door Forum call referenced above transpired. At that time, CMS did not claim any enforcement authority related to 2718(e). HFMA knows of no congressional action that revised that specific section that occurred subsequent to the November 2018 Open Door Forum. If CMS persists in finalizing this change, we believe it needs to detail the specific documents that it believes illustrates Congress's intent to apply 2718(b)(3) to 2718(e).

***Significant Unresolved Technical Issues*.** If CMS persists in finalizing this proposal despite its lack of statutory authority to do so, there are multiple technical issues where CMS will need to provide hospitals with specific guidance. These include:

1) *Creating "Service Packages" for Outpatient Services*: The rule requires hospitals to create "service packages" that include both the primary service and any ancillary services. For some service packages, this will be relatively straightforward. For others, the ancillary services required by one patient will be different from the ancillary services required by another.

   This is the same challenge CMS faces when it rebases ambulatory payment classification (APC)weights for outpatient services. In any given year, CMS typically only uses approximately half (91 million out of 175 million for the CY19 final rule) of outpatient claims processed by fiscal intermediaries to develop the relative weights.[11] The specific issue is that for claims with multiple APCs (i.e., multiple "service packages") it is often impossible to determine what ancillary services are related to the multiple primary services that trigger APC (and the related payment). And CMS has advantages over individual hospitals as it attempts to create "Service Packages" for APC weight setting. It is able to analyze over 175 million individual claims using sophisticated software to identify common utilization patterns to attribute ancillary services to primary services. Individual hospitals will have neither sufficient claims volume nor access to sophisticated software to replicate CMS's methodology and create service packages.

In reality, very little is standard from one patient to another for more complex shoppable services. Therefore, if CMS elects to finalize the proposed rule it needs to provide guidance or frameworks to help hospitals define outpatient service packages and attribute ancillary services to specific primary services.

2) *Determining the Actual Payer-Specific Negotiated Rate*: While hospitals have a specific negotiated rate with their third-party payers, there are multiple scenarios where the negotiated rate may differ from the actual rate the hospitals receive. Examples of these scenarios include, but are not limited to, instances where the hospital has entered into a shared savings/shared loss contract with the third-party payer, the contract with the third-party payer includes a quality bonus, the contract includes a volume discount if the number of members of a specific health plan (or contract within the health plan) exceeds a pre-defined threshold, or the contract has an outlier provision for extraordinarily high cost cases.

   HFMA recommends that these types of discounts not be included in the negotiated rate that is posted, if CMS finalizes its proposal. We believe including these types of discounts will significantly increase administrative complexity and the cost to comply with the rule. However, if CMS persists in requiring these discounts be incorporated into the negotiated rate, it needs to provide specific guidance as to the timing and manner in which this should occur.

Imposes Material Administrative Burden. In the proposed rule, CMS estimates that complying with its reinterpretation of standard charge posting requirement under 2718(e) of the PHS Act will only require 12 hours per hospital, costing each hospital approximately $1,000 or $6 million nationally.

HFMA's members strongly dispute this estimate of administrative burden. Based on estimates by HFMA's members – who will ultimately be responsible for helping their hospitals comply with this requirement –the average time required to comply is 150 hours. Using CMS's estimate of labor costs from the proposed rule, the actual cost of complying with the reinterpreted requirement is $12,716 per hospital per year or $76 million nationally, annually.

While we did not adjust CMS's weighted average hourly wage estimate, we believe the most glaring omission from the estimate of administrative burden is clinical staff time. Our members believe it will be

[11] Medicare CY 2019 Outpatient Prospective Payment System (OPPS) Final Rule Claims Accounting

necessary to involve physicians and other clinicians in determining the mix of specific HCPCS/CPT codes that accurately represent an average "service package" for a given service. Because HFMA has not adjusted the weighted average hourly rate to reflect the addition of physicians/clinicians to the team that is responsible for implementing the negotiated charge requirement, it is likely that even this estimate does not fully capture the administrative burden of this new requirement.

The proposed standard charge posting requirement involves multiple commercial payers for each hospital. And each payer could have a different payment methodology for the same service. For instance, some payers negotiate by payment by revenue code, some by CPT, and some by ASC groupers. Further, many commercial payers will have multiple contracts with different prices for the same services based on the what's been negotiated with an employer (or group of employers).

While hospitals have this information in a contract management system for services provided in hospital outpatient departments, it's frequently not in the same table. So, the process of creating one standardized table with all of the hospital's negotiated rates for each individual service is far more involved than the proposed rule envisions. Staff from IT, managed care and clinical areas will need to determine how to display all of these disparate contracts in a "single digital file" for the machine-readable version.

Finally, as discussed above, the rule requires hospitals to create "service packages" that include both the primary service and any ancillary services. For some things, this will be relatively straightforward. For others, the ancillary services required by one patient will be different from the ancillary services required by another. This will require a significant time commitment from clinical staff across each of a hospital's service lines to ensure that the definition of a "service package" is as clinically accurate and representative of an "average" case as possible. Given the complexity of this undertaking, it is unlikely that it can be completed by January 1, 2020. And it will cause the redeployment of significant clinical and analytic resources away from quality improvement and cost reduction efforts for an administrative task that will ultimately – as discussed below – not achieve the administration's goal of creating an environment where consumers have the information necessary to shop for health care services.

<u>Fails to Create an Environment Conducive to Consumerism</u>. Even if CMS moves forward with its ill-advised requirement that hospitals post their negotiated rates, it will not make it easier for consumers to shop for services. What CMS is proposing will be too unwieldy for consumers to use.

First, from a financial perspective, what matters most to patients as they make their decision about where to receive care is their out-of-pocket expense, or cost sharing. For insured patients, this depends on the negotiated rate, the benefit design and a patient's progress toward meeting their deductible. Therefore, for insured patients, information about what another plan is paying for a specific service is extraneous. In the moment that they need care, it has no bearing on what their out-of-pocket costs are and will likely cause confusion when it is posted on a hospital's website along with information for their plans.

Second, consumers will have to visit multiple hospital websites to actually shop. Even if the information is posted in a consumer-friendly manner, as envisioned in the proposed rule, it will be time consuming to wade through the extraneous data (all health plans and the individual contracts for each health plan as discussed above). Given that many health plans have multiple contracts, we believe there is a high risk that consumers will pick price data from the same plan, but a different contract, and accidentally end up misinformed.

Third, even after successfully navigating this cumbersome data-gathering exercise, they still won't have any idea about their specific out-of-pocket costs – which is what matters most to consumers at the point of decision making – unless they understand their health plan's benefit design and know exactly what their status is relative to their cost-sharing requirements.

Finally, even if they did all of this and collected the right price data, understood their benefit design, and know their status relative to their cost-sharing requirements, they are still missing key information that will allow them to make a value-based decision. First, the proposed rule does not provide them with access to price data for potentially cheaper options in freestanding settings. Second, the proposed rule does not make service-specific quality data available to consumers where valid measures exist.

Based on the consensus recommendations of HFMA's Price Transparency Taskforce, HFMA's members believe there is a better approach to providing actionable information to consumers that will allow them to make value-based decisions about where to receive "shoppable" healthcare services for both insured and uninsured patients.

Price Estimates for Insured Patients: For insured patients receiving in-network services, the patient's health plan is the most appropriate source of price information related to the service(s). Health plans will, in most instances, have the most up-to-date data related to the patient's annual deductible and other cost-sharing requirements. This allows for the most accurate estimate of the patient's out-of-pocket responsibility. The plan can either provide the information directly to the patient, through a patient portal, for example, or the provider can partner with the plan to provide the information described below. UC Health in Denver, Colorado,[12] is one example of a health system that has partnered with multiple health plans to provide its patients with real-time price estimates.

Any price estimate provided should include the following four items to allow a patient to make a value-based decision about where to receive care.

1) *Total estimated price of the service*. This is the dollar amount for which the patient is responsible (deductible, coinsurance, copayment) plus the amount that will be paid by the health plan or, for self-funded plans, the employer. This should be provided at the unit level for which payment will be calculated for the specific, anticipated service. For example, if the patient is seeking an estimate from their health plan for a joint replacement surgery paid on a fee-for-service basis, then the amount paid by the employer/health plan and patient cost sharing should be detailed for each typical component of the service (e.g., the hospital (surgery), orthopedic surgeon, physical therapist, etc). Alternatively, if the plan/employer is paying for the service on the basis of a bundle, then the estimate should detail the payment from the plan and the patient's related cost sharing at the level of the bundle. In both scenarios, anything that is typically required for the episode of care, but not included in the estimate, should be called out so that the member is aware of this additional anticipated expense. The amount will necessarily be an estimate for several reasons. First, the patient may require additional services not included in the estimate. Second, the physician may code and bill for a service different from the service for which the

[12] https://www.uchealth.org/billing-and-pricing-information/

patient sought an estimate. To address these issues, best practice typically involves displaying the total cost of care for the episode as a range with the median cost identified, as opposed to providing the patient with a singular estimate.

2) *Network status*. The information provided should give a clear indication of whether a particular provider is in network. It should also offer details on where the patient can try to locate an in-network provider, such as a list of in-network providers that offer the service. Finally, information on the benefit structure for out-of-network services should be included to help the patient/member determine their cost-sharing responsibility if they elect to receive care from an out-of-network provider. If an estimate for an insured patient is provided by the hospital, the hospital should clearly indicate if anyone involved in the care is an out-of-network provider.

3) *Out-of-pocket responsibility*. Another essential element is a clear statement of the patient's estimated out-of-pocket payment responsibility, tied to the specifics of the patient's health plan benefit design, including coinsurance and the amount of deductible remaining to be met (as close to real time as possible).

4) *Quality and Other Relevant Information*. Information related to the provider or the specific service sought (e.g., clinical outcomes, patient safety or satisfaction scores) should be included where it is available and applicable. This information should clearly communicate what has been measured and to whom the measurement pertains (e.g., to the facility, the physician, etc.).

Price Estimates for Uninsured Patients. For patients who are uninsured or elect to seek care out of network, the provider is the most appropriate source of price information. Similar to insured patients, the estimate should be provided at the most appropriate level of service based on whether the provider is offering a service bundle (e.g., includes the hospital, hospitalist and surgeon costs for a joint replacement) or just a component of the necessary care (e.g., providing only an estimate of costs related to the hospital component of the knee replacement surgery). There are several basic considerations that should be communicated when price estimates are provided to uninsured patients or patients receiving care out of network.

1) *Identify the estimate's limitations*. Prices in most instances will take the form of an estimate; that is, provide a price for a standard procedure without complications. The estimate should make clear to the patient the services included in the price and how complications or other unforeseen circumstances may increase the price.

2) *Identify inclusions and exclusions*. Providers should clearly communicate to patients what services are and are not included in a price estimate. If any services that would have significant price implications for the patient are not included in the price estimate, the provider should try to provide information on where the patient could obtain this information. As an example, this would include providing the contact information for an anesthesiologist who will be involved in a surgical case.

3) *Quality and Other Relevant Information*. Providers should give patients other relevant information, where available. Some states have begun to make both price and quality data available on public websites. A number of public and private organizations also offer public access to data on patient outcomes, safety and patient satisfaction or credentialing information on providers who have met certain quality benchmarks. The price estimate that a provider gives to patients can reference and provide links to various reliable websites where the provider knows relevant information is available.

Finally, HFMA strongly recommends hospitals that provide good faith estimates to their patients should be exempt from posting payer-negotiated rates publicly. Additionally, critical access hospitals and sole community hospitals should be exempt from this requirement, due to the resources required to maintain compliance.

Proposed Prior Authorization Process Requirements for Certain Outpatient Hospital Department Services

Effective January 1, 2020, CMS proposes that providers must submit a prior authorization request for any service on its list of outpatient department services requiring prior authorization. The five categories of proposed services are: blepharoplasty, botulinum toxin injections, panniculectomy, rhinoplasty and vein ablation.

HFMA's members anticipate that CMS will use a third-party authorization vendor. The resulting new process will increase the administrative burden on providers. **HFMA's members believe CMS can achieve its policy goal of eliminating accidental payment for cosmetic procedures, while minimizing the administrative burden, by developing a more robust National Coverage Determination. rather than prior authorization.**

HFMA looks forward to any opportunity to provide assistance or comments to support CMS's efforts to refine and improve the 2020 OPPS. As an organization, we take pride in our long history of providing balanced, objective financial technical expertise to Congress, CMS, and advisory groups.

We are at your service to help CMS gain a balanced perspective on this complex issue. If you have additional questions, you may reach me or Richard Gundling, Senior Vice President of HFMA's Washington, DC, office, at (202) 296-2920. The Association and I look forward to working with you.

Sincerely,

Joseph J. Fifer, FHFMA, CPA
President and Chief Executive Officer
Healthcare Financial Management Association

<u>About HFMA</u>

HFMA is the nation's leading membership organization for more than 42,000 healthcare financial management professionals. Our members are widely diverse, employed by hospitals, integrated delivery systems, managed care organizations, ambulatory and long-term care facilities, physician practices, accounting and consulting firms and insurance companies. Members' positions include chief executive officer, chief financial officer, controller, patient accounts manager, accountant and consultant.

HFMA is a nonpartisan professional practice organization. As part of its education, information and professional development services, HFMA develops and promotes ethical, high-quality healthcare finance practices. HFMA works with a broad cross-section of stakeholders to improve the healthcare industry by identifying and bridging gaps in knowledge, best practices, and standards.

Survey Snapshot: Is Transparency the Answer to Rising Health Care Costs?

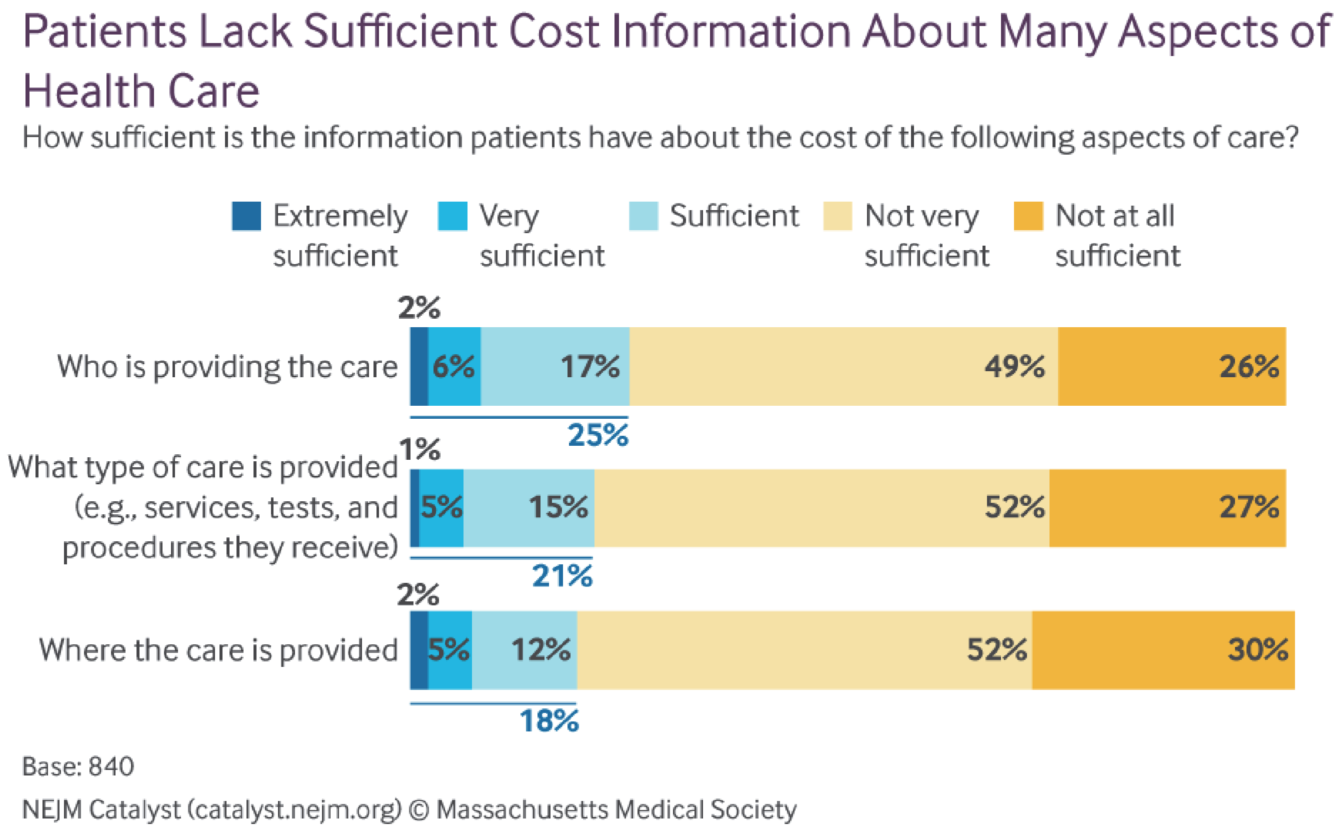
Insights Report · **March 20, 2019**

Jon Bees

NEJM Catalyst

Rising health care costs remain one of the top challenges facing the industry, with patient behavior often placed under the microscope in the search for solutions. While there are a number of different patient strategies for driving improvement, increasing cost transparency often tops the list.

In a survey of NEJM Catalyst Insights Council members in November 2018, for example, 71% say that the top change needed to support patients/consumers in lowering total health care costs is to provide more transparency about the true costs and quality of services. Not surprisingly, the majority of respondents (61%) also say patients lack enough information to affect the cost of their own health care–related decisions.



From the New Marketplace Insights Report: Patients Lack Information to Reduce the Cost of Care. Click To Enlarge.

While many in the industry believe that increasing transparency is a necessary first step, there is also widespread recognition that this would only scratch the surface of what is a complex problem.

> *While transparency might drive some change, and is likely necessary, it is not sufficient to affect significant change in the provision or cost of care."*

"I think it is the out-of-pocket costs that drive decisions for patients, so I don't know that transparency alone would change things," says Thérèse Franco, MD, SFHM, hospitalist and research fellow at the Center for Health Care Improvement Science at the Virginia Mason Medical Center in Seattle.

"There needs to be at least some change to the cost structure. This likely involves changes in provider, payer, and patient behavior. Therefore, while transparency might drive some change, and is likely necessary, it is not sufficient to affect significant change in the provision or cost of care."

A number of structural constraints act as headwinds for controlling costs. For example, most patients are only concerned about their out-of-pocket costs, and believe there is little incentive for them to worry about the total cost of care because often someone else is paying. For providers and payers, the fee-for-service model often leads to cost inefficiencies, which is why so many in health care are looking to value-based care as a solution.

"I do not believe that more information is the answer," says William Mayer, MD, CPE, Chief Clinical, Medical, and Quality Officer at St. Mary's Healthcare, a member of Ascension Health in Amsterdam, New York. He says that, while increasing transparency is certainly necessary, improving health care delivery is where the industry needs to focus its cost containment efforts.

The best way to control cost in any industry is to link cost directly to the purchaser. Will we do that? Unthinkable. Society has developed a concept that health care is a right. All of us will pay for health care. The cost is inescapable."

"The answer is more about changing the way health care is delivered. When the care becomes more value-based, and less defensive, the costs will take care of themselves. There is too much incentive to do more testing and care. Providers are incentivized to operate, catheterize, dialyze, and give chemo to patients. Testing and consults are ordered to protect themselves, as well. Addressing these two issues would result in significant cost savings."

Charles Thayer, MD, Chief Medical Officer at Morton Hospital, a Steward Family hospital in Taunton, Massachusetts, agrees that structural issues beyond patient control play a role in the industry's cost inefficiencies and also raise philosophical considerations such as whether health care is a patient's natural right.

"The best way to control cost in any industry is to link cost directly to the purchaser," says Thayer. "Will we do that? Unthinkable. Society has developed a concept that health care is a right. All of us will pay for health care. The cost is inescapable."

"The more insulation there is between cost and consumer, the more inefficient the pricing is. In our system, the cost is nearly entirely insulated from the consumer. We rely on intermediaries to manage and insulate cost."

While the industry's structural challenges will take some time to resolve, increasing patient transparency is a relatively simple solution that, when used strategically, can offer incremental improvements to costs.

> *The answer is more about changing the way health care is delivered. When the care becomes more value-based, and less defensive, the costs will take care of themselves."*

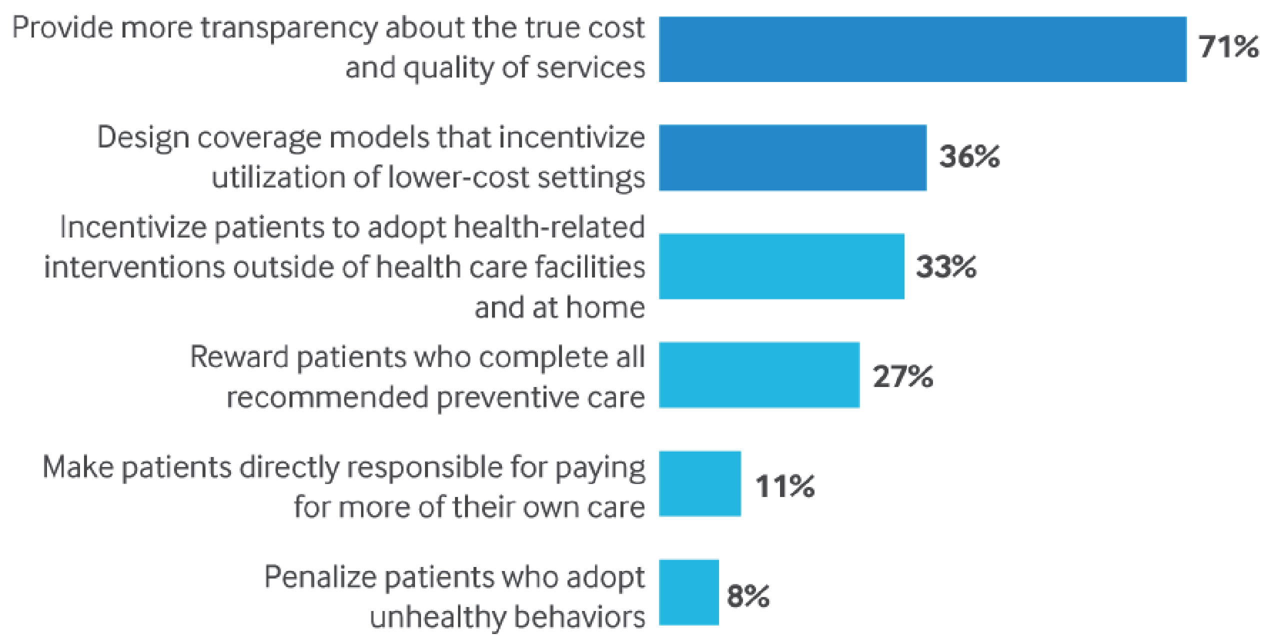
"One of the big issues for patients is the complexity involved," says Franco. "A little bit of simplicity would go a long way." She says that patients need more transparency around the financial implications of seeking care in the wrong settings and stresses the necessity of getting screenings such as colonoscopies and mammograms.

Perhaps the most important target for transparency initiatives is educating patients to the reality that, ultimately, they are not just responsible for out-of-pocket costs, but they are also responsible for the total cost of care that is reflected through higher insurance premiums and deductibles.

Franco says, "I don't think the general population understands the way that delaying care and receiving more urgent care later drives up the total cost of care, ultimately increasing out-of-pocket deductibles and insurance costs. Maybe this is where transparency can play a bigger role."

Transparency Is the Main Change Needed to Support Patients in Lowering the Cost of Care

What are the top two changes needed to support patients/consumers in lowering total health care costs without compromising quality?



Base: 840 (multiple responses)

NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society

From the New Marketplace Insights Report: Patients Lack Information to Reduce the Cost of Care. Click To Enlarge.

While survey respondents say that transparency about the true cost and quality of services (71%) is the top change needed to support patients/consumers in lowering total health care costs, it's worth noting that the second-tier responses focus on the use of incentives. These include: designing coverage models that incentivize utilization of lower-cost settings (36%), incentivizing patients to adopt health-related interventions outside of health care facilities and at home (33%), and rewarding patients who complete all recommended preventative care (27%).

> *What it's going to take is everybody working together and rowing in the same direction. The problem is, even if you can get health professionals engaged, how do you get the patients when many don't have much skin in the game?"*

Thayer says that a combination of transparency initiatives and incentives will likely work best. “Increasing transparency for patients is good and necessary, but they also need to be incentivized to choose the right behaviors.”

According to Mayer, getting rising health care costs under control will require all industry participants — patients, providers, and payers — to do their part. Not just patients.

“What it’s going to take is everybody working together and rowing in the same direction. The problem is, even if you can get health professionals engaged, how do you get the patients when many don’t have much skin in the game? There is a wide disparity in how patients pay for their care; some pay a great deal, while others pay next to nothing. This can dictate behavior.”

Jon Bees
Contributing Writer, NEJM Catalyst

DISCUSS

HIDE 3 RESPONSES

Sorry, comments are closed for this item.

Phyllis

Seems to me that one way to decrease health care costs dramatically is to move to 100% not-for-profit insurers. The insurance industry has grown into a lucrative business at the cost of provider satisfaction and autonomy and at the cost of patient-centered care. I’m not sure increasing transparency will curb costs in a meaningful way. W

March 30, 2019 at 8:09 am

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Transparency: A Needed Step Towards Health Care Affordability

By Steve Wetzell

MARCH 2014 STUDY

Introduction

Transparency is a vital component of an efficient and effective health care system. As concerns about the cost and quality of health care in the United States continue to grow and large employers explore innovative ways to manage their health care benefits in a rapidly changing environment, the need for greatly improved transparency is widely recognized for its ability to foster improved management of the cost and quality of the U.S. health care system.

The recognition of the importance of health care transparency is not a new phenomenon. Both private purchasers and policymakers have long sought to make better information available to consumers regarding the relative cost and quality of care throughout the health care supply chain. However, in spite of decades of effort, the tools and information available in the market today fall far short of what is needed by both consumers and employers.

The need for robust transparency is growing. First, the rapid adoption and growth of consumer directed health plans that encourage beneficiaries to choose providers and treatments based on relative cost and quality makes it even more critical that they have the information needed to compare health care alternatives using a trusted source of user friendly cost and quality measures.

Second, the movement towards public and private exchanges further exacerbates the need for vastly improved transparency in health care. The Affordable Care Act is largely based on the premise that consumers will discipline the market, resulting in lower costs and improved quality. This simply cannot happen if consumers don't have the tools to make informed and rational choices regarding health plans, providers, or treatment alternatives.

Third, as states and the federal government continue to struggle with rising health care costs, it is becoming more and more important that real price transparency be achieved. Real transparency would allow private purchasers and policymakers to fully understand the consequences of government actions such as dramatic reductions in payments to the health care supply chain for serving individuals covered by publicly funded programs.

What is Transparency in Health Care?

Health care, like any other product or service, can and should be measured based on relative cost and quality. The results, in turn may be shared with those who consume and purchase health care to create a more competitive and accountable marketplace. Measures of relative cost and quality can be applied throughout the supply chain. In a fully transparent market, measures that disclose the relative cost, quality and customer experience for all elements of the health care supply chain would be publicly available. The following table illustrates what full transparency what those key elements are.

Key Elements of a Fully Transparent Health Care Marketplace	Cost Measures	Quality Measures	Customer Experience Measures
Health care exchange vendors	✓	✓	✓
Insurers and health plan administrators	✓	✓	✓
Pharmacy benefit managers (PBMs)	✓	✓	✓
Hospitals	✓	✓	✓
Doctors	✓	✓	✓
Other providers and facilities (*i.e.*: chiropractors, mental health providers, nursing homes, ambulatory surgery centers)	✓	✓	✓
Treatments	✓	✓	✓

Transparency enables and drives many changes that are essential to reforming the U.S. health care system. First and foremost, it holds the health care supply chain accountable for its performance. In addition, it enables consumers and group purchasers to make more fully informed choices of health plans, providers and treatments. It also helps employers and other group health care purchasers design benefits to drive business to the best alternatives through benefit designs and other tools such as creating tiered or limited networks featuring the best performing providers.

Transparency for every element of the health care supply chain is essential. Policymakers and employers need to be aware of the relative performance of both public and private health care exchanges as this new market develops. Employers, government and consumers all have a vested interest in the need to compare relative cost and quality when choosing hospitals, doctors and other caregivers. Further, as new medical treatments, technologies and prescription drugs enter the market, it is important to understand the relative effectiveness and cost of these alternative therapies. In sum, full transparency provides robust, publicly reported measures across the entire spectrum of the health care supply chain.

To be effective, disclosure of the relative cost and quality of all elements of the supply chain must be uniformly reported using standard measures. This would allow stakeholders to compare performance on an apples-to-apples basis. Measures must also be based on scientifically valid methodologies that draw from reliable sources of data, including both administrative or claims data, as well as clinical data. Patient reported measures are also a key element of a fully transparent marketplace. Publicly reported measures must also be provided on a timely basis, in a form that is easily understood by end users, including employers and consumers.

Further, it is important that employers offer benefit designs that make the variance in provider performance more relevant to consumers, which in turn will create increased demand for transparency by the American public. Offering benefit designs such as consumer driven health plans and tiered or limited networks will be essential in helping advance a robust transparency agenda.

Why is Transparency in Health Care Important?

It is well documented that the U.S. health care system is performing at a suboptimal level, with high costs and significant variation in the quality of services it delivers. Recent data published in the *New York Times* using a study conducted by the International Federation of Health Plans not only highlights the cost issues the nation faces, but also dramatically illustrates just how much U.S. health care costs exceed those of other developed nations for common medical procedures and drugs. It also illustrates just how informative improved access to information on the cost and quality of health care can be. The study shows how U.S. health care costs compare to other nations.

Average Costs for Common Procedures in the U.S. Compared to Other Nations[1]

Normal Delivery	Colonoscopy	Hip Replacement	MRI Scan
Avg. U.S. Price $2,397	Avg. U.S. Price $1,185	Avg. U.S. Price $40,364	Avg. U.S. Price $1,121
France $583	Switzerland $655	Spain $7,731	Netherlands $319

(1) Source: New York Times; June 1, 2013 - based on results of study conducted by the American Federation of Health Plans

As the data show, improved transparency can help consumers, group purchasers and policymakers obtain price and quality information so they can be informed buyers and hold the market accountable. This in turn allows them to make informed choices of health plans, providers, and treatments. Without public accountability for both price and quality, consumers and group purchasers lack the critical information needed to create a rational marketplace in which those who provide superior value are rewarded with more business, and those who don't suffer the consequences. To many, this is an obvious need, yet the market continues to strongly resist offering information that allows for comparison of even the most basic elements such as how much Provider A charges compared to Provider B. And limited information is available comparing the relative quality of various alternatives in the supply chain.

Improved transparency can directly benefit employers as they seek to more effectively manage their health care resources in a variety of ways.

1. Inform their public policy agenda: Access to information on relative health care costs and quality is essential to supporting employers as they develop their public policy agenda. For example, employers can assess if market based reforms are having the desired effect to reduce costs and improve quality, or if they should advocate for regulatory alternatives to address market failures. This might even include consideration of seeking rules that would allow large employers to have

access to the same fees that Medicare pays providers if that proves to be a more cost effective alternative to having private plans negotiate provider reimbursement on their behalf.

2. Support improved benefit design strategies: Without access to information on cost and quality, employers cannot make informed and rational decisions on benefit design features, such as offering limited or preferred provider networks and designated centers of excellence for high cost and complex procedures. Some employers are even beginning to discuss adopting what is called "reference based pricing." Through this approach, the employer establishes a fixed allowance for a given procedure (for example, a joint replacement). The beneficiary then shops for a provider with that allowance. For this approach to be effective, it requires vast improvements over the level of transparency that exists today. Without access to the information they need, beneficiaries enrolled in consumer driven health plans or approaches such as referenced based pricing cannot make informed decisions, even if they have a financial incentive to use the best performing providers.

3. Stimulate competition based on value: With access to information on the relative performance of health plans and the rest of the health care supply chain, employers will be much better equipped to choose plans and providers who truly deliver the best value. This will enable the right kind of competition that is lacking in the U.S. health care system today.

4. Advance provider payment reform: It is widely accepted that one of the greatest problems affecting the U.S. health care system is the prevalence of fee for service payment systems that reward the volume of services instead of outcomes. Employers and other payers need access to provider-specific information on both cost and quality to develop revised payment mechanisms that reward the right behavior on the part of providers.

Health care providers also benefit from improved access to appropriate price and quality information. Currently, providers generally do not know how their cost and price structure stacks up against their competitors. They also lack sufficient information regarding how their quality compares to their peers and competitors. Lacking this knowledge, they are effectively left to navigate the difficult challenge of better managing their costs and improving their quality without a compass that gives them an idea of how they compare to their industry.

Lack of adequate transparency also enables price discrimination. For example, while not universally agreed upon, many studies have illustrated that private payers (employers and private health plans) pay a higher price for certain health care services in part because Medicare and Medicaid, through government regulated pricing, can mandate lower fees as a condition of providers participating in those programs. Further, private payers also pay more to cover the cost of the uninsured in the form of uncompensated care. Providers who are not reimbursed for caring for the uninsured also shift these costs to private payers. Lacking full price transparency, it is difficult to fully quantify the impact of this cost shifting, allowing providers to offset reductions in payments from public programs and the uninsured by imposing higher fees on private payers – a form of hidden tax that ultimately comes out of employee wages and benefits.

Lack of transparency also enables price discrimination based on factors such as geography and size. For example, a consumer or employer may pay substantially more for a given service in a market lacking competition, either due to excessive consolidation in the supply chain, or in geographically isolated locations lacking competitive alternatives. And, unknown to consumers and purchasers, larger suppliers may be able to command higher fees through increased negotiating power and market dominance. Data regarding the cost of hospital outpatient services billed to Medicare recently released by the U.S. Department of Health's Center for Medicare and Medicaid Services clearly illustrates how much health care prices vary from region to region.

Average Billed Hospital Outpatient Charges to Medicare Among Select U.S. States (2)

Eye Tests	Biopsy	Endoscopy	Ultrasound	MRI Scan
Maine $70	Wisconsin $491	North Dakota $355	North Dakota $203	Montana $1,342
Colorado $483	Alabama $5,162	Florida $11,768	California $1,611	California $3,504

(2) Source: CMS; Summary of 2011 Medicare Outpatient Payments to Hospitals; June, 2013

Information on the relative quality of care is just as important as price transparency in creating a disciplined and efficient market. Numerous studies have documented the quality gaps in the U.S. health care system, including a landmark 1998 Institute of Medicine study that concluded that as many as 98,000 Americans die annually due to preventable medical errors. Not only are American health care consumers purchasing health care with a blind eye towards price, they are also unable to select providers and treatment alternatives based on which choice will likely yield the best health outcomes. The lack of health care transparency creates not only price discrimination, but also quality discrimination. Factors such as geographic location, ethnicity, and income level may all result in variations in the quality of care received.

What is the Current State of Health Care Transparency?

While there are a significant number tools and vendors available in the market today, significant gaps remain towards achieving full cost and quality transparency. Based on the current state of the marketplace, the HR Policy staff has prepared the following assessment of the current state of transparency for key elements of the health care supply chain.

Current State of Health Care Transparency Among Key Elements of the Supply Chain

	Access to Quality Data	Access to Pricing Data	Measure Availability	Public Reporting of Results
Exchange Vendors	Poor	Poor	Poor	Poor
Health Plans	Good	Poor	Good	Good
Hospitals	Fair	Poor	Fair	Fair
Pharmacy Benefit Managers	Poor	Poor	Poor	Poor
Physicians	Poor	Poor	Fair	Poor
Treatments	Poor	Poor	Poor	Poor

As this chart illustrates, while some progress has been made, much remains to be done in order to achieve the degree of transparency that is ultimately needed to meet the needs of employers and consumers. Following is a brief summary of the current state of transparency for each of these key supply chain elements.

Exchange Vendors

Because public and private exchange vendors are just beginning to emerge, it is not surprising that the current state of transparency for this market segment is lagging. However, government, employers and consumers will want access to information on the performance of both public and private exchange vendors as they grow in importance and prevalence. This will likely be a priority for both the public and private sector over the coming years.

Health Plans

Health plan transparency is probably the most advanced of any industry segment at this time. To their credit, the health plan industry has done much to advance public reporting of their performance through NCQA and their HEDIS data and measurement set. However, the industry is lagging in reporting cost information, especially as it relates to the cost of health care providers for whom they pay medical claims. It resists disclosing key provider contract terms and in some cases resists giving employers full access to their own claims and administrative data. Addressing these issues should be a major priority for employers.

Pharmacy Benefit Managers (PBMs)

The PBM industry has lagged behind the health plan industry in taking proactive efforts to develop and report consensus measures on quality. And many would argue that the PBM industry is among the least transparent in disclosing cost information. Specifically, the industry relies on contracts based on discounts off of average wholesale price (manufacturer's suggested retail price) when comparing the prices that employers will pay for prescription drugs. Correcting this highly flawed methodology and requiring PBMs to disclose the actual price they pay for drugs should be a high priority for employers.

Hospitals

Hospitals have a more advanced level of transparency compared to physicians and treatments. The American Hospital Association (AHA) has helped advance transparency in the industry. Hospital measurement and reporting has also been a relatively high priority for the government, with HHS and CMS placing a fairly high degree of emphasis on advancing hospital transparency. A standard patient satisfaction survey, called H-CAHPS, exists. However, significant gaps in measuring and reporting quality exist and measures comparing cost lag behind efforts to measure and report quality.

Physicians

Transparency for physicians has lagged behind that for health plans and hospitals. HHS and some private entities have taken modest steps to advance this agenda. However, physicians tend to have more limited resources to support transparency initiatives. There is also wide variance in the size of physician practices, as well as dozens of medical specialties to be addressed. Still, physician level reporting will be critical to make transparency relevant to consumers. This is yet another area that will require significant effort.

Treatments

It is not surprising that transparency for treatments also lags behind other industry segments such as health plans and hospitals. While the FDA collects extensive data through clinical trials before approving new drugs and medical devices, this information is not available in a consumer friendly format. Further, virtually no consumer friendly information exists comparing treatment alternatives such as whether a patient should have angioplasty or bypass surgery when seeking treatment for blocked coronary arteries. While particularly challenging, this is another area of development that is of particular importance to health care consumers.

Given current conditions, what conclusions can be drawn from the current state of the market, and what are the implications for what large employers should do to fill the gaps? In sum:

- There is a growing recognition of the need for transparency, but the gap between what is available and what is needed is significant.
- Industry leading efforts such as those being advanced by HHS, NCQA and The National Quality Forum are making significant contributions towards identifying a consensus set of standard measures. However, employers will need to pursue other venues to fill gaps in existing measurement sets.
- The government will play an expanding role in advancing transparency, but it will continue to be subject to considerable resistance and lobbying pressures by industry interest groups. The government will likely continue to place a disproportionate emphasis on carrier performance and transparency.
- Robust data warehousing capabilities exist for claims and administrative data. However, access to clinical data is still somewhat limited and will likely remain that way until electronic medical records have been more fully introduced.
- The market is most mature for measuring and reporting the performance of health plans and hospitals. However, the primary emphasis has been on quality indicators, and there is a significant amount of work needed to address cost transparency for plans and hospitals.
- The rest of the supply chain lags behind health plans and hospitals with more even work to be done to achieve cost and quality transparency.
- There is an emerging vendor market entering this space that holds significant promise. However, whether or not these vendors can deliver the level of transparency that is ultimately needed to address the market and political headwinds is a critical question.

Conclusion

As this paper shows, transparency is an untapped resource in the effort to rein in health care costs. There is significant upside to improving transparency throughout our health care system, and it is regrettable that we have not yet made more progress in this area. Fortunately, we may be at a moment in history where the buy side of the health care market can seize the initiative to rapidly advance transparency. However, without sufficient passion and resources to pursue the challenging goal of achieving the degree of transparency, employers will continue to achieve limited results if they act alone. We need a more significant national effort to promote a market-based solution to address the challenges facing the U.S. health care industry.

Failure to achieve the transparency needed to create a properly functioning market will reinforce the persistent movement to a solution that relies more and more heavily on government regulation and oversight of the U.S. health care market, which could ultimately place employers in the limited role of just "paying the bill."

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Does Price Transparency Improve Market Efficiency? Implications of Empirical Evidence in Other Markets for the Health Sector

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CRS REPORT
Prepared for Members and
Committees of Congress

Summary

Consumer advocates, proponents of wider use of market incentives in the health care sector, and some policy makers have called for greater price transparency. These measures might include posting prices in an accessible form or regulations constraining price discrimination (different prices charged to different customers). Price transparency implies that consumers can obtain price information easily, so they can usefully compare costs of different choices. Price transparency may also mean consumers understand how prices are set and are aware of price discrimination. In health care markets consumers often have difficulty finding useful price data. In particular, few consumers have a clear idea of what hospital stays or hospital-based procedures will cost, or understand how hospital charges are determined.

Many empirical studies have investigated how changes in price transparency have affected various markets. Most of this evidence, largely relating to advertising restrictions and lower search costs on the Internet, suggests that price transparency leads to lower and more uniform prices, a view consistent with predictions of standard economic theory. If this evidence could be applied to the health market, it would suggest that reforms that increase transparency would reduce prices. In cases involving NASDAQ and Amazon.com, public reaction created pressure to change pricing strategies. A few studies, involving intermediate goods in one case and less clearly identified advertising effects in others, found that transparency raised prices.

However, the special characteristics of the health market make it difficult to directly apply empirical evidence gathered from other markets. These characteristics include limits on competition among hospitals, complicated products that vary in quality, intermediate agents (physicians) who make choices, and third-party payment of costs through insurance. The dispersion of prices for similar health care procedures is high, which suggests that these markets are not working well with respect to price outcomes, as would be expected in ordinary competitive markets. In addition, prices paid by different types of payers vary dramatically. On average, patients without insurance or who pay their own bills pay much more relative to what private insurers, Medicare, and Medicaid pay.

Despite these complications, greater price transparency, such as accessibly posted prices, might lead to more efficient outcomes and lower prices. Some markets where lifting advertising restrictions led to lower prices also involved complicated products such as eye care, suggesting that the complex nature of health care may not be a barrier to benefits from price transparency. Internet comparison shopping sites also appear to have lowered prices for many products. Better price information might allow patients, either directly or through their physicians, to obtain better value for health care services. Several states and health insurers now provide online data on hospital costs. These price transparency initiatives, at least so far, have had little visible effect on pricing. Public pressure, which in some cases has caused hospitals to curtail aggressive bill collection tactics, might change hospitals' and health care providers' pricing behavior. This report will be updated as events warrant.

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Introduction

Price transparency helps consumers obtain price information easily, which allows them to make useful comparisons of costs of alternative choices. Price transparency may also mean that consumers understand how prices are set and are aware of any price discrimination (different prices charged to different customers). In health care markets consumers often have difficulty finding useful price information. In particular, few consumers have a clear idea of what hospital stays or hospital-based procedures will cost, or understand how hospital charges are determined. Prices charged by hospitals vary significantly across hospitals and vary within hospitals across categories of patients.

Transparent prices play a key role in the efficient allocation of goods and services. Under certain conditions, the decentralized and self-interested decisions of firms and households in a price system yield resource allocations that avoid waste and that match what suppliers make and what consumers want, which is how economists define efficiency. Financial economics researchers typically define markets as efficient when prices reflect all available information and when prices adjust swiftly as new information arrives. If buyers and sellers do not know what prices are, then some mutually agreeable trades will fail to occur, thus creating inefficiencies. If buyers can see and compare prices for the same good offered by different sellers, the buyers then save money by choosing the cheapest vendor. If goods are similar but not identical, buyers then can compare prices and qualities offered by different sellers and pick whichever offer suits them best. The buyers' ability to choose an offer that suits them best puts tremendous pressure on all sellers to lower prices, improve quality, or both. Without such competitive pressure firms that are less efficient or that are earning excess profits can remain in the market, and prices will be higher than they would otherwise be.

Lack of transparent prices may also contribute to price discrimination, which can cause different customers to pay higher prices, an outcome that may be acceptable in some markets but may lead to undesirable consequences in others. For example, if the customers with the least bargaining power also tend to be those with the least ability to pay, such discrimination may be deemed particularly undesirable.

Barriers to price transparency include both explicit restrictions on information (such as government restrictions on price advertising or concealment by firms of prices or price-setting approaches, including negotiated prices) and costs of search by consumers. The simplest theories suggest that more information about prices should decrease prices and also bring prices closer together, but certain theories predict that more price information could raise average prices, and advertising might raise prices by increasing demand or brand identification.

The first section of this paper briefly reviews the empirical studies of the effect of changes in price transparency on prices and quality of goods in a variety of industries. Most of this evidence relates to markets where buyers are the final end users of the good, and the bulk of evidence suggests that more transparent prices lead to lower prices and transactions costs. This section includes examples of direct effects of price transparency acting through normal market mechanisms (as in the case of lifting advertising restrictions or reducing search costs) as well as instances in which publicity about pricing strategies altered firms' behavior. (An appendix contains a more detailed discussion.)

The second section addresses the extent to which this evidence might be applicable to the health care market. It addresses certain special characteristics of the health care market which may reduce the importance of prices as signals, for example, the complicated nature of health care, the intermediation of physicians in making health care choices including choosing hospitals, and the presence of third party payment (e.g., insurance companies).

The third section then turns to a closer examination of how prices are actually set by hospitals and the evidence that exists on price dispersion both across hospitals and across patient categories.

The fourth section discusses some initiatives undertaken by governments, insurers, and interest groups to improve information about prices and to regulate price discrimination.

The final section draws the pieces together, suggesting that while it is difficult to determine the consequences of greater consumer price transparency, it is reasonable to believe that greater transparency would improve outcomes.

Empirical Evidence on the Effects of Price Transparency

Isolating the effects of price transparency from other determinants of price is empirically difficult, and the literature contains a variety of approaches used to identify these effects. A more detailed discussion of this extensive literature is presented in the appendix.

Some examples of the effects of price transparency relate to the effect of publicity about pricing practices that may be viewed as inappropriate and that may lead to fears of regulatory involvement or consumer backlash. One such example relates to NASDAQ. In 1994, William Christie and Paul Schultz, two Vanderbilt University financial economists, noticed that NASDAQ dealers almost never quoted prices using odd eighths (i.e., 1/8, 3/8, 5/8, and 7/8) for many high-volume stocks of companies such as Microsoft, Intel, and Apple. This practice effectively created a quarter dollar minimum spread between sellers' asks and buyers' bids, which increased the trading profits of dealers. The day after these economists issued a press release about their findings the practice was abandoned, and spreads for several major stocks fell by about half.[1]

Some other examples of transparency in financial markets suggested transparency lowered prices. When Island, an electronic communications network, ceased displaying limit order data in 2002, trading costs rose; when Island resumed a year later, trading costs fell. Another study found prices more volatile after hours than during regular market hours when trades are immediately reported.

A second example of the effect of publicity involves the case of Amazon.com, the internet seller. Amazon, according to reports, used characteristics gathered about individual customers from the Internet itself (such as whether a customer was new to the site, what browser the customer was using and what the customer purchased in the past, etc.) to charge different prices to different individuals. Once this strategy was publicized, the protests led Amazon to cease the pricing variations and apologize.[2]

Another case study focused on the intermediate market. In 1993, the Danish Competition Authority required that all ready-mixed concrete contracts be made public, which it hoped would stimulate greater competition. Instead, average prices rose by 15%-20% and other factors such as changing demand conditions played no discernable effect.[3] There are two possible explanations

[1] William H. Christie and Paul H. Schultz, "Did NASDAQ Market Makers Implicitly Collude?," *Journal of Economic Perspectives*, vol. 9, summer 1995, pp. 199-208.

[2] Robert M. Weiss and Ajay K. Mehrotra, "Online Dynamic Pricing: Efficiency, Equity and the Future of E-commerce," *Virginia Journal of Law & Technology*, vol. 6, no. 11 (2001), available at http://www.vjolt net.

[3] Svend Albaek, Peter Møllgaard, and Per. B. Overgaard, "Government Assisted Oligopoly Coordination? A Concrete Case," *Journal of Law and Economics*, vol. 45, December 1997, pp. 429-443.

for this unexpected increase in prices with publicity. First, public prices may make collusion among sellers easier. Rivals can observe sellers who undercut their competitors, and may be able to mete out punishments in various ways. Second, price transparency may alter the strategic incentives of sellers, inducing them to become tougher bargainers.

A larger body of studies estimates the effects of restrictions on advertising and posting of prices. Most of these studies involved comparing jurisdictions that banned certain types of advertising, primarily for vision exams and eyeglasses. Some studies focused on the effects of restrictions on the advertising of prescription drugs and alcoholic beverages and restrictions on posting gasoline prices. (It is important with advertising, which can increase demand for branded products, to examine cases where some outside authority, in this case the government, restricts advertising.) Two studies examined the effects of local advertising of food prices, one examining the effects of the 1978 newspaper strike in New York City and another where researchers provided advertising via direct mail. Although studies of quality are more difficult to undertake, two studies examined these effects: one study examined the effect of mandatory fat content labeling and another the effect of requiring restaurants to post hygiene quality grade cards. Almost all of these studies found that more information on prices and quality lowered prices, improved quality, or both.

The final part of the appendix discusses the relatively new and growing body of studies on the effect of better price information and lower search costs through computers and the Internet. Studies have examined a wide range of items: automobiles, books and CDs, airline tickets, and life insurance. The evidence was mixed for cars and for books and CDs, but showed reductions in prices for airline tickets and insurance. These studies suggested that consumers using comparison sites did pay lower prices and later studies, as the Internet became more common, more frequently pointed to lower prices. Part of the difficulty of studying the effect of the Internet is that Internet sellers may offer benefits to customers compared to conventional sellers, so that the evidence on price comparison sites, which appeared to reduce prices and price variation, may be more relevant than comparing prices of Internet and conventional sellers.

Considering all of the evidence of price transparency, the majority of the empirical studies tend to find that greater price transparency, including advertising and reduction in costs of finding information through the Internet, leads to lower and more uniform prices.

What Are the Implications for Health Care Markets?

Can the evidence from other markets be used to analyze the effects of greater price transparency in health care markets, or provide guidance about what measures might best be considered? While the special features of the health care market that distinguish it from other markets are well known among health economists, researchers and policy makers have sought ways to capture the potential gains from increasing efficiency in the health care sector by the introduction of market-like reforms. Whereas published prices in other markets provide important signals of the true economic value of goods and services in other parts of the economy, the impenetrability of many health care billing practices creates a barrier to rational decision making and analysis.

Prices in the health care markets reflect physician charges, hospital pricing, prescription drugs, costs for medical devices and diagnostics, as well as other types of health care goods and services. Certain market characteristics of industries that provide many of these products are important in analyzing the effects of price transparency: they are subject to quality differences (and are thus not entirely homogeneous products); the product may be one whose nature and benefits are not easily understood by the customer; sellers charge different prices to different customers and customers pay different (and often small) shares of the costs because of insurance; and within specific geographic areas there may be few providers, at least in the case of hospitals.

These aspects of the health care market not only mean that prices will vary but they also (in many cases) complicate the consumers' understanding of expected prices or their response to price differences; they also may mean that it is difficult for prices to bring about economic efficiency (for example, because of lack of competitive markets). All of these aspects of the health care market therefore may mute the effects of transparency on prices.

Prices clearly vary in the health industry, and why they vary is relevant to the implications of price transparency. The discussion below reviews basic aspects of pricing that lead to different prices in a market and are relevant to discussing barriers to the effect of transparency on prices in the health market. The first section discusses two reasons that different prices persist for the same product: product differentiation and price discrimination. As we shall see, both characteristics exist in the health care market. Secondly, the cost structure of an industry may lead to market power that allows different prices to be charged. Following that discussion, some specifics of the health care market and how they relate to pricing characteristics are discussed. Many of these characteristics are directly related to the role of price in consumers' decisions. Finally, the empirical evidence on price transparency presented in the first part of this report is examined in light of these issues.

Why Do Different Prices Persist? Differentiated Products and Price Discrimination

The "Law of One-Price," which states the same good will sell for the same price, is a simple consequence of buyers' ability to pick the most advantageous offer. In many situations, however, prices will vary. This may happen because two goods are not identical. For example, a store in a more convenient location can charge more than a store in an out-of-the-way location. Spending time in a resort during peak season is different than spending time in the same resort during low season. Conversely, as the real estate maxim states, if the price of an apartment with a view is the same as an otherwise similar apartment without a view, then there really isn't a view. Moreover, products that otherwise seem quite similar may be differentiated, if no more than in consumers' minds, by brand, and certainly a great deal of advertising appears directed at differentiating similar products, which permits suppliers to increase prices and profits. Because health care depends on location, quality, and patient characteristics it is not a homogeneous product, and so some price differential is expected.

Some sellers may gain larger profits by charging different prices to different groups of consumers. For this to happen, firms must have some market power, meaning that they can raise their average selling price by cutting back on the amount they sell. If the seller can identify different groups that differ in their sensitivity to price changes, and if buyers cannot resell or use arbitrage, then firms will earn higher profits by charging groups with lower price sensitivity a higher price.[4] For instance, airlines know that business travelers are usually less sensitive to prices than leisure travelers. By imposing "Saturday night stayover" requirements for cheaper fares, airlines are able to charge higher prices to business travelers who want to sleep in their own beds on weekends.

Firms can price discriminate in a number of ways.[5] Consumer electronics manufacturers offer mail-in rebates in order to charge higher prices to customers who either value their time highly or

[4] In economic theory charging different groups different prices is called "third-degree" price discrimination. First degree price discrimination occurs when sellers have information on the price sensitivity of individuals, and second degree price discrimination occurs when sellers use quantity discounts.

[5] For one list of marketing techniques designed to charge different prices to different customers, see F. M. Scherer and David Ross, *Industrial Market Structure and Economic Performance* (Boston: Houghton-Mifflin, 1990), pp. 491-494.

who are poorly organized, and who therefore fail to obtain those rebates. Car dealers charge different prices for identical cars, an outcome of the bargaining process.

Price discrimination often benefits some classes of consumers: those who would probably pay higher prices under uniform pricing. If airlines could not charge business passengers higher fares, leisure travelers would certainly have to pay higher fares. Some price discrimination schemes, such as college financial aid, are often justified on the grounds of fairness, although they can also be explained by the desire to maximize profits. Hospitals before the Medicare Act often sought to justify charging different rates to different customers on the grounds of fairness, although some economists who examined the issue at the time were skeptical.[6] Hospitals in the current health finance environment—dominated by large insurers and managed care firms on the private side and Medicare and Medicaid on the public side—typically attempt to charge more to uninsured patients who have less ability to negotiate, even though uninsured patients are more likely to have lower incomes than insured patients.[7]

Cost Structures and Pricing

The structure of costs within an industry has important effects on the nature of pricing. Firms with market power, which often arises from cost structures, will have some ability to set prices differently from cost, and may be more resistant to competitive pressures that result from price transparency.

Firms will have limited market shares and will face strong competitive pressures to keep profit margins low when firms have

- fixed costs that are small relative to operating costs that can be added or cut in the short run (variable costs), and
- unit costs that increase as output increases.

On the other hand, if fixed costs are large relative to variable costs or if firms use an increasing returns technology, then uniform pricing may be difficult to maintain, especially if the firm cannot store its output.[8] Economic theory suggests that industries that have high fixed costs and which sell perishable goods or services face strong pressures to charge different customers different prices and compete in markets subject to unstable prices.[9] Increasing returns can often be found in industries with network characteristics. For example, a phone connection is more valuable within a large network than within a small one because more connections are possible. Learning-by-doing effects are another example of increasing returns.

In addition, many hospitals provide indigent care for which they are not wholly compensated. Such hospitals must find other ways to finance this care, which often involve cross-subsidies. In these conditions, a simple flat-rate price system may not be a viable strategy for hospitals. Therefore, imposing greater transparency of health care prices may require closer attention to cross-subsidies and uncompensated training and care.

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[6] R. A. Kessel, "Price Discrimination in Medicine," *Journal of Law and Economics*, vol. 1, 1958, pp. 20-53. Kessel examines physicians' fees and argues the setting of higher fees for those with more means to be a standard case of price discrimination to maximize profits.

[7] This point is analyzed in more detail in the section entitled "Price Variation by Payer."

[8] Technically, fixed costs and increasing returns create non-convexities in a firm's production function. This will cause gaps in the firm's supply curve, so that supply and demand curves might not intersect. In this case, there is no market equilibrium. Experimental evidence suggests that pricing can be extremely erratic in such cases.

[9] Lester G. Telser, "Competition and the Core," *Journal of Political Economy*, vol. 104, no. 1, 1996, pp. 85-107.

The hospital industry has some natural monopoly or natural oligopoly characteristics. A natural monopoly exists where incremental costs fall as output rises through the relevant range of output for a market. A natural monopoly would suffer losses if it set prices equal to incremental cost, which is a standard condition for socially efficient pricing. Therefore, a natural monopoly must be supported by some subsidy or must charge prices above incremental cost, which from an economic perspective causes inefficiencies and market distortions. Industries with natural monopoly characteristics are often regulated, and prices are often set administratively through rate-of-return type regulations. The outputs of industries regulated under rate-of-return procedures, however, are much simpler than the set of outputs which hospitals provide. For example, electric power distribution, which generally has been subject to rate-of-return regulation, deals with a single commodity which is uniform in its physical characteristics.[10]

Entry of new firms in an industry with natural monopoly characteristics is inefficient because at least some firms will be forced to operate at inefficiently low levels. For example, entry of a new hospital might cause the average number of empty beds in a market area to increase, which increases average prices. Because of the hospital industry's natural monopoly characteristics, state and federal regulators have often imposed restrictions, such as Certificates of Need, on entry of new hospitals. Theoretical models have been developed to better understand the tradeoffs between the gains in competitive pressure and the loss of scale economies.[11] In *U.S. v. Carilion Health System* a federal district court accepted the argument of two hospitals that wished to merge that higher market concentration would lead to lower prices, and rejected the Department of Justice's claim that the merger would raise prices, providing an illustration of a case where the scale economy argument prevailed.[12]

Special Characteristics of the Health Care Markets

Health care markets differ from markets for standardized commodities described in economics textbooks in several important ways. The special features of health care have had a strong effect on the evolution of health care markets. Five key features of health care markets are discussed below; in general, they point to price being a less important signal than it typically is in other markets. Prices could, however, become more important with a shift to insurance types such as Health Saving Accounts where consumers confront higher prices at the margin.

Health Care Is Complicated

By its nature, health care cannot be easily standardized, making price dispersion difficult to monitor. Different diseases affect different people in different ways, and treatments that work for one patient may fail to help another. Patients may not know what disease or condition is affecting them, and may have difficulty in articulating what is wrong with them and what they would like treatment to accomplish. Hospitals are sometimes described as "job shops" to emphasize their dissimilarity to assembly lines. Thousands of different types of procedures may be performed in

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[10] Even if electricity is physically homogeneous, costs of generation and demand for power vary by time of day. Nonetheless, electric power, even if differentiated by time of day, is much more homogeneous than outputs provided by the health sector.

[11] Rabah Amir, "Market Structure, Scale Economies, and Industry Performance," working paper University of Southern Denmark at Odense, August 2000, available at http://www.econ ku.dk/wpa/pink/2000/0008.pdf

[12] U.S. v. Carilion Health System, 707 F. Supp. 840 (Western District of Virginia, 1989). For an economic and legal analysis of this case see David Eisenstadt, "Hospital Competition and Costs: The Carilion Case (1989)," in John E. Kwoka and Lawrence J. White, eds., *The Antitrust Revolution: The Role of Economics* (New York: Harper Collins, 1994).

an average general hospital, and even specialized hospitals must be equipped to face a wide range of conditions and complications.

Because hospitals produce many different outputs with many of the same inputs, allocating costs to particular outputs or to specific patients can be somewhat arbitrary. There is no unambiguous way to allocate the costs of employing nurses, pathologists, accountants, and billing clerks to specific procedures or patients. Hospital management strategies that seek to assign such costs to specific "profit centers" appear to rely more on rules of thumb than on precise economic calculations.

Physicians as Agents

Because patients cannot always know what they want, physicians must serve as their agents. In most cases, physicians will make a preliminary diagnosis, recommend which specialists will be seen, and determine whether a patient is admitted to a hospital or not. It is true that ethical and professional guidelines stress that physicians must act in the best interests of the patient. Still, physicians may be swayed directly or indirectly by insurers, pharmaceutical companies, hospitals, and peers in ways that might not benefit patients. While the vast majority of physicians feel a strong professional compunction to provide the best care possible, they also face pressure to reduce costs to patients or insurance companies. The problem of agents considering their own interests, along with those on whose behalf they act, exists in this market as well as many other markets.[13]

Patients Pick Physicians and Hospitals Pick Physicians

Because patients rely upon physicians as their agents, patients often do not choose which hospital they enter. Rather, patients choose a physician, and the physician's admitting privileges determine where the patient goes. Hospital credentials committees decide which physicians get admissions privileges based on a physician's training, residency program, malpractice record, and other relevant information. Although some physicians have admitting privileges at more that one hospital, the available evidence suggests that most physicians admit the bulk of their patients to one hospital.[14] A patient needing an operation may have some choice of hospital if her physician provides referral to more than one surgeon. While this provides the patient with some choice, the patient rarely has detailed information about cost and quality, and is rarely in a position to make an informed choice.

If a patient wishes to go to a certain hospital, then the patient must select a physician with privileges there. Insurance companies offer physician directories which list hospital affiliations, and hospitals often sponsor "physician-finder" services that feature "their" M.D.s. Therefore, patients may have sufficient information to figure out which physicians they would need to choose in order to go to a particular hospital in the event of some medical condition. (Emergency admissions are generally sent to the nearest hospital with an emergency room or to a hospital which specializes in trauma cases.) In some cases they may have information on quality through studies that rank hospitals. The fact remains, however, that patients are usually in a poor position

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[13] The principal-agent problem, as it is referred to in economics, occurs in many contexts, including corporate managers acting on the behalf of stockholders and tenants making decisions that affect owners of property.

[14] Douglas R. Wholey and Lawton R. Burns, "Convenience and Independence: Do Physicians Strike a Balance in Admitting Decisions?," *Journal of Health and Social Behavior*, vol. 32, no. 3 (September 1991), pp. 254-272.

to choose a hospital which best suits their needs because they lack the right information and because they are shielded from information about cost differences among hospitals.

Other People's Money Pays for Most Hospital Care

Hospitals get slightly less than a third of their revenue from Medicare, another third from private insurers and slightly more than a sixth of their revenue from Medicaid.[15] While public or private insurance protects patients from the financial consequences of a hospital stay, insurance also makes patients insensitive to prices. By the time a patient reaches a hospital deductible, out-of-pocket payment limits for most insurance policies may have been reached for many patients. In particular, for the most complicated episodes (which account for a disproportionate share of hospital costs), most patients may be fully covered or fully bankrupt. In either case, price plays little or no role in either choice of treatment or location of treatment.

Patients may indirectly choose their hospital and nature of their care through their choice of insurance plan, and as noted above, through their choice of physician. Many plans using Preferred Provider Organization (PPO) approaches restrict policy holders' choice of hospital, or impose financial penalties for using hospitals outside the PPO network. One plan may be cheaper than another because it is able to drive a harder bargain with hospitals or because it can restrict the cost or amount of care which policy holders receive. While consumers can obtain information about features of different insurance plans, that information arguably is often incomplete and confusing.

Patients Have Poor Information About Hospital Quality and Costs

Patients may also be in a poor position to choose their own hospital because they have little access to information about hospital prices and quality or are not familiar with the information that is available (such as hospital ratings). As with any other good or service, a good decision about hospital selection must be supported with adequate information on costs and quality. Hospitals in most states are not required to make public individual prices for items, and other resources for comparative pricing information are limited. Aetna, for example, has provided price information for physician services in selected areas, but this information is available only to its subscribers.[16]

The impenetrability of hospital bills is legendary. Hospital bills for privately insured patients routinely run for pages and contain hundreds of individual items. Hospital billing and coding have become arcane arts, practiced by highly specialized clerks and consultants. Insurers and government analysts have access to files that can be used to generate meaningful average costs, but this information is not available to patients.

Compounding the problems patients face, they generally have access to little useful information about health care quality. In part this is due to the inherent complexity of medical care and the difficulty of defining and measuring quality. Consumers can quickly judge the quality of most goods they buy on a daily or weekly basis, and make changes in shopping routines accordingly. In some cases, such as obstetrics, word-of-mouth and reputation may lead patients to reasonably well-informed choices among hospitals. In general, however, hospital stays are for most an

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[15] Uwe E. Reinhardt, "The Pricing of U.S. Hospital Services: Chaos Behind A Veil of Secrecy," *Health Affairs*, vol. 25, January/February 2006, pp. 57-69.

[16] Testimony of Robin Downey, Vice President and Head of Product Development, Aetna, in U.S. Congress, House Committee on Ways and Means, Subcommittee on Health, *Hearing on Price Transparency*, 109th Cong., 2nd sess., July 18, 2006. The expansion to the Washington area was reported in January W. Payne, "The Secret's Out: Aetna Members Gain Access to Care Price, Quality Data," *Washington Post*, August 22, 2006, pp. F1, F4.

infrequent event and not many patients have enough experience or connections to compare experiences in a range of different hospitals.

Large corporations, insurance companies, and government agencies have developed extensive databases containing information reflecting the quality of health care. The development of large electronic databases has opened the possibility of creating quality indices based on sophisticated statistical methods. Presently, however, these data are largely unavailable to consumers. Traditional approaches to quality monitoring in health care focus on "zero/one" indicators. Physicians are licensed, and others are barred from providing medical care. Hospitals are accredited and providers are certified for Medicare reimbursement. Such measures, however, serve only to set lower bounds.

Providing consumers with more useful data on outcomes may improve health care quality.[17] Of course, outcome data must include risk adjustments, so that statistics reflect the fact that healthier patients will on average have better outcomes. For example, the United Network for Organ Sharing, established by Congress in 1984, collects data on all transplant operations in the United States. Risk-adjusted outcome data for each transplant center are available at http://www.unos.org. Public availability of risk-adjusted outcome data puts pressure on surgeons and transplant centers to improve performance. New York State has published risk-adjusted average mortality rates for cardiac surgery since 1991. Once New York State started publishing average mortality rates, patients at a top-performing hospital or surgeon reportedly had about half the chance of dying as did those who picked a hospital or surgeon from the bottom-performing 25%.[18] Massachusetts maintains a website with death rates for coronary artery bypass graft (CABG) operations for specific hospitals and surgeons. This site lists the number of procedures performed by specific surgeons for several other types of operations.[19] Pennsylvania published a report on cardiac surgery that listed hospital-specific data on average charges, average payment by commercial insurers and Medicare, and risk-adjusted mortality and readmission rates. This report also listed surgeon-specific data on risk-adjusted mortality and readmission rates for CABG procedures.[20] Data presented in the report showed little connection between average charges and adjusted mortality rates.[21]

Summary: Special Characteristics of Health Care Markets

If the market satisfies conditions of the model of perfect competition, which imply that consumers are fully informed and can choose the lowest price, prices will converge to the cost of producing the last unit of output and goods will be distributed efficiently.[22] More generally, the "Law-of-One-Price" asserts that consumers' ability to choose the most advantageous offer will ensure that the same good will sell for the same price. To the extent that transparent pricing helps markets rapidly converge by bringing prices in line with incremental costs, it promotes economic efficiency.

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[17] For a more extensive analysis of the potential of giving consumers with useful outcome data see Michael E. Porter and Elizabeth O. Teisberg, *Redefining Health Care: Creating Value-Based Competition on Results* (Allston, Mass: Harvard Business School, May 2006).

[18] Ashish K. Jha and Arnold M. Epstein, "The Predictive Accuracy of The New York State Coronary Artery Bypass Surgery Report-Card System," *Health Affairs*, vol. 25, no. 3, 2006, pp. 844-855.

[19] These data reports are available at http://www mass.gov/healthcareqc.

[20] Pennsylvania Health Care Cost Containment Council, "Cardiac Surgery in Pennsylvania 2005," June 2007.

[21] Reed Abelson, "In Health Care, Cost Isn't Proof of High Quality," *New York Times*, June 14, 2007.

[22] Efficiency here means no waste in production and that all gains from trade are exhausted.

Many markets do not satisfy conditions of the model of perfect competition. If consumers are poorly informed, or hindered from taking their most advantageous option, prices might not converge to efficient levels, if they converge at all. While such problems can arise in markets for simple goods, the problems are exacerbated for more complex goods and services, such as health care. Several aspects of health markets, including natural differentials in the product due to differences in quality and patient characteristics and the widespread practice of price discrimination, limit the effects of price transparency. In addition, other important characteristics interfere with price signals and competitive pricing outcomes: the product is complicated, physicians rather than consumers tend to determine the product purchased, patients generally do not directly pick hospitals, many costs are covered by third parties, and patients have poor information about costs.

In sum, health care patients often have only a limited and indirect ability to choose which hospital they will be treated in the event of some medical episode. Choosing a different hospital may require a change of physician or of insurance plan. Even if patients could switch among hospitals more easily, their incentives to search for cheaper hospital care are dulled by third-party payment, and patients typically lack price and quality data that would be necessary for them to make a fully informed choice. Much of the difficulty in instituting market-like reforms in the health care sector stems from the nature of health care itself, and from the ways health care institutions have evolved to deal with special features of health care. Improvements, while possible, would probably be neither quick nor easy.

These characteristics, however, all point to some important conclusions. Prices as signals are diluted and muted in the health care market as compared to many other markets. That muting of price signals tends to suggest that improvements in price transparency may be less effective in the health care market than in other markets and that this problem is particularly serious with hospital pricing. At the same time, the lack of understandable price information in the health care market may suggest significant room for improvement. To understand this last issue, it is important to be clear about just how complex and dispersed hospital pricing is, an issue considered in the following section.

Hospital Pricing

As the previous section suggests, the barriers to direct consumer choice are high for hospitals, and it is for hospitals that many initiatives, discussed below, have been made to improve information and transparency. Hospital costs are also a major portion of health care costs, accounting for 31% of the $2 trillion of costs in 2005.[23] To interpret and apply the evidence on price transparency requires a more specific understanding of how hospitals set prices. This section provides an overview of how hospitals set and administer prices. This section also investigates the variability of hospital prices.

Nuts and Bolts

Every hospital maintains a "chargemaster," a document which lists prices for each item and procedure offered by the hospital.[24] A chargemaster may contain about 10,000 to 20,000 separate items. By comparison, the U.S. tariff schedule has about 10,000 separate rate lines, and a regular

[23] Centers for Medicare and Medicaid Service, Office of the Actuary, National Health Statistics Group.

[24] Uwe E. Reinhardt, "The Pricing of U.S. Hospital Services: Chaos Behind A Veil of Secrecy," op. cit.

supermarket sells about 15,000 items.[25] A Lewin Group study of hospital pricing practices found that few hospitals in its sample conducted systematic reviews of their chargemasters.[26] Many hospitals stated that their charges had little relation to costs, although hospitals that were larger, urban, or which conducted substantial amounts of research were more likely to report some link between costs and chargemaster prices. Supplies and pharmaceutical charges appeared to be reviewed more regularly and were more likely to be related to costs. Most hospitals in the Lewin sample charged higher markups on less-expensive items.

Prices listed on the chargemaster bear little resemblance to what is actually paid. On average, insurers and patients paid hospitals about 38% of their “charges” in 2004.[27] Medicaid pays about 17% of total hospital revenues.[28] Medicaid payment arrangements differ by state. All states use a prospective payment system for Medicaid hospital reimbursement, with most either paying a flat fee according to diagnosis related groups (DRGs) or paying a flat per diem rate. All states also make special payments to hospitals for unusually high-cost cases, and most make payments to hospitals that serve low-income or medically needy populations.[29]

Medicare pays a flat fee for inpatient care based on the average relative cost of a case within one of about 600 DRGs. A DRG weight, reflecting the relative cost and complexity of a given diagnosis code, is multiplied by a monetary conversion factor. Medicare payments are adjusted to reflect differences in regional labor costs and some other local factors. Other adjustments are made for outliers (extraordinarily complex cases with exceptionally high costs) and “disproportionate share” adjustments made for hospitals that serve a larger than usual portion of indigent patients. DRG weights are recalculated to account for changes in technology, practice patterns, and other trends. Congress typically adjusts the monetary conversion factor each year. From time to time, the Medicare Payment Advisory Commission (MEDPAC) proposes technical changes in the definition of DRGs and in payment and adjustment details.

Private insurers are responsible for about a third of the hospitals’ revenues (hospital revenues were $612 billion in 2005).[30] Private insurers’ payment arrangements vary: some pay a fixed portion of charges, some pay negotiated per diems or pay flat fees according to DRGs. Private insurers typically use Medicare’s list of DRGs, but may assign their own weights. Medicare’s calculations of DRG weights use claim experiences of Medicare beneficiaries, who are older than the average private health plan policy holder, and so may not reflect relative costs for younger patient populations. Private insurers vary in their ability to extract discounts from hospitals, and arrangements between insurers and hospitals are tightly guarded trade secrets.

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[25] U.S. International Trade Commission, *Simplification of the Harmonized Tariff Schedule of the United States*, Investigation No. 332-388, Publication 3318, June 2000; Food Marketing Institute Facts and Figures website, available at http://www fmi.org/facts_figs/superfact htm.

[26] Allen Dobson, Joan DaVanzo, Julia Doherty, and Myra Tanamor, “A Study of Hospital Charge Setting Practices,” Lewin Group report no. 05-4, December 2005, available at http://www medpac.gov/publications/contractor_reports/Dec05_Charge_setting.pdf.

[27] Uwe E. Reinhardt, “The Pricing of U.S. Hospital Services: Chaos Behind A Veil of Secrecy,” op. cit., p. 57.

[28] Ibid., p. 61.

[29] Some specialized hospitals, such as psychiatric hospitals, are often reimbursed differently than general hospitals. For a detailed description of Medicaid hospital reimbursement policy, see CRS Report RL32644, *Medicaid Reimbursement Policy*, by Mark Merlis.

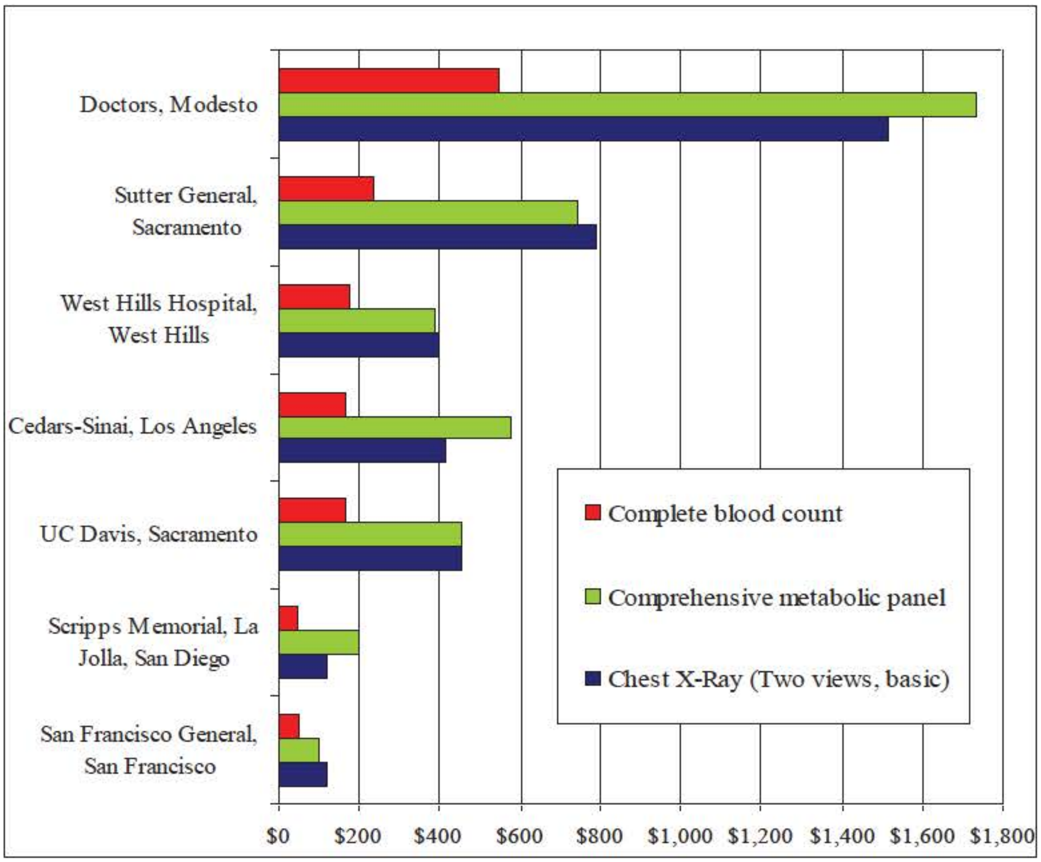
[30] Ibid., for the share. Total hospital costs are from the Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Unit.

According to many analysts familiar with health care finance, Medicare and Medicaid payments on average fall short of the fully allocated costs associated with patients in those programs.[31] Thus hospitals must shift costs to private insurers, increase efficiency, or reduce services to balance their books. As a result, payments for a particular patient's case will reflect not just the complexity of the case and the resources used, but also depend on the negotiating prowess of the patient's insurer.

Price Variation Among Hospitals

Prices for specific items may vary wildly from one hospital to the next, as **Figure 1** and **Figure 2** show. For instance, a comprehensive metabolic panel, which costs $97 at San Francisco General, costs $1733 at Doctors Hospital in Modesto, about 18 times more expensive. To some extent disparate prices reflect different markup formulae, which act to allocate hospital overhead costs among items.

Figure 1. Hospital Charges for Selected Diagnostic Tests



Source: Reproduced from Lucette Lagnado, "California Hospitals Open Books, Showing Huge Price Differences," *Wall Street Journal*, Dec. 27, 2004, p. A1. Data obtained from individual hospitals.

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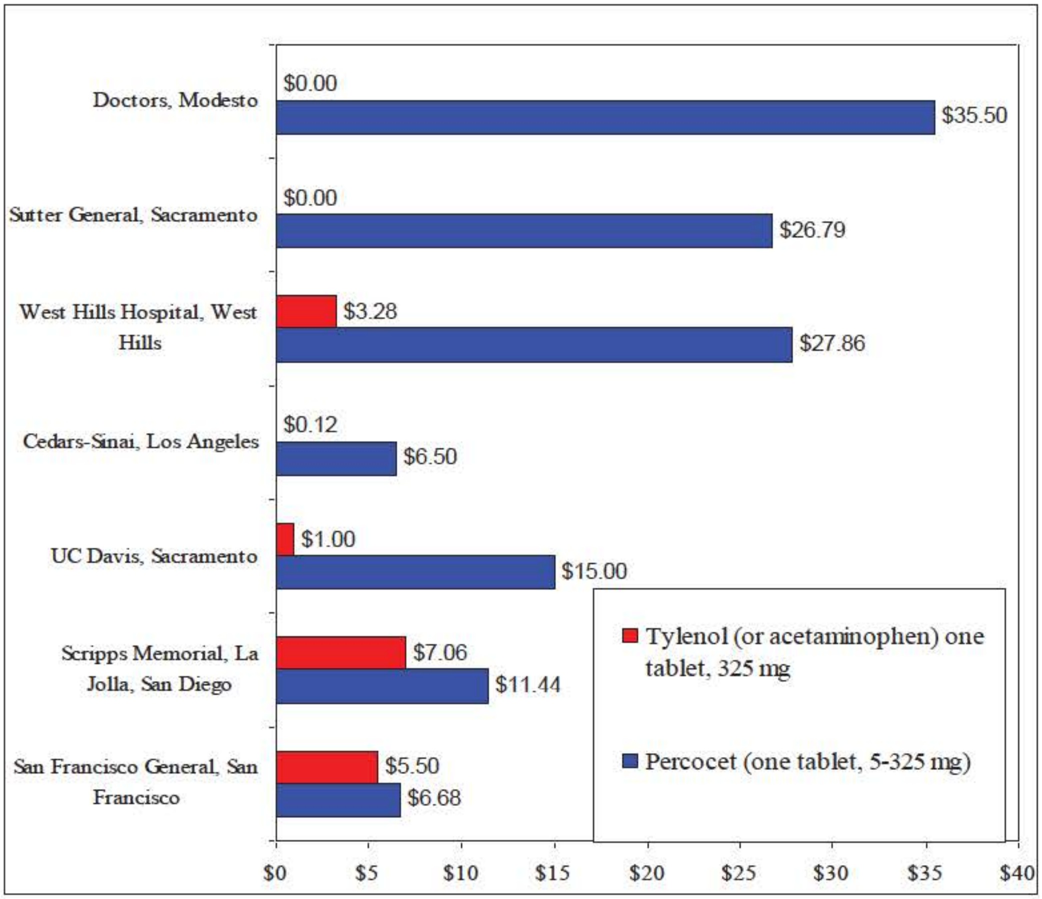
[31] Allen Dobson, Joan DaVanzo, and Namrata Sen, "The Cost-Shift Payment 'Hydraulic': Foundation, History, And Implications," *Health Affairs*, vol. 25, no. 1 (2006), pp. 22-33.

Figure 2. Hospital Charges for Two Common Analgesics



Source: See source for **Figure 1**.

Table 1 presents data on average costs and charges by type of payer for three hospitals, all located in urban areas. In each case, the average charges for managed care patients were about 20%-30% above average operating costs as reported to the Centers for Medicare and Medicaid Services (CMS). By contrast, average charges for uninsured patients were substantially higher.

Table 1. Average Costs and Charges for Selected Hospitals, By Type of Payer

	O'Connor Hospital San Jose, CA	St. Louise Regional (Catholic) West Gilroy, CA	Palm Beach Gardens Community Hospital (Tenet Healthcare) Palm Beach Gardens, CA
Avg. Operating Cost per Patient per Day	$1,631	$1,376	$1,501
Collected from Managed Care	$1,940	$1,773	$1,774
Billed the Uninsured	$5,951	$5,508	$7,414
Cost-to-Charge Ratio	.258	.289	.205
Collection Rate from the Uninsured	97%	96%	32%

Source: Heartland Institute analysis of Centers for Medicare and Medicaid's Medicare Cost Reports data for 2002. Reproduced from Randy Suttles and Merrill Matthews, Jr., "Hospital Pricing: Separate and Unequal," *Health Care News*, September 1, 2003.

Table 2 presents payment-to-cost ratios by type of payer for community hospitals from 1991 to 2000. The mix of services that each type of payer funds differs, which precludes direct comparisons of payment rates across payers. Nonetheless, these data underline the point that the relationship between costs and payments differs among payers. Average Medicare payments since the mid 1990s nearly match hospital costs, while Medicaid payments, on average, fall short of covering costs. The ratio of payments to costs is highest for private payers (i.e., private insurers and managed care firms), although that ratio fell significantly during the 1990s. The ratio of payments to costs is lowest for uncompensated care, although many hospitals receive subsidies from state and local governments, not reflected in **Table 2**, that serve to defray expenses associated with uncompensated care.

Data in **Table 2** lump all uninsured payers together, although these payers include indigent patients, from whom much smaller payments may be received, and non-indigent patients. We were unable to locate aggregate data that would separate these two groups. However, an illustration based on aggregate California data, provided in testimony by Glenn Melnick, shows the importance of this distinction. The average chargemaster price for an appendectomy in 2002 was $18,229; the indigent uninsured paid $1,783, the Medicare payment was $4,805, the managed care payment $6,174, and payments by the non-indigent uninsured was $8,143.[32] The payment from the non-indigent, indeed, did fall below the list price, and may reflect both ad hoc discounts and failure to collect the payment. Even so, the uninsured non-indigent paid a third more than the managed care patients and 70% more than Medicare patients for this procedure. Melnick also points out that the list price remains important not only because some uninsured patients are charged the list price, but also because of stop-loss provisions in contracts (where list is paid above a threshold), lack of contracts with all third party providers, and out-of-network use. He also points out that increasing revenues is an incentive to charge a high list price.

[32] Testimony of Glenn Melnick, in U.S. Congress, House Committee on Ways and Means, Subcommittee on Health, March 9, 2004.

Table 2. Hospital Payment-To-Cost Ratios By Type of Payer, 1991-2000

Year	Medicare	Medicaid	Uncompensated Care	Private Payers
1991	88.4%	81.6%	19.6%	129.7%
1992	88.8	90.9	18.9	131.3
1993	89.4	93.1	19.5	129.3
1994	96.9	93.7	19.3	124.4
1995	99.3	93.8	18.0	123.9
1996	102.4	94.8	17.3	121.5
1997	103.6	95.9	14.1	117.6
1998	102.6	97.9	13.2	113.6
1999	101.1	96.7	13.2	112.3
2000	100.2	96.1	12.1	112.5

Source: MEDPAC analysis of American Hospital Association data. Reproduced from Table B-11 in Medicare Payment Advisory Commission, Report to the Congress: Medicare Payment Policy, March 2002. Data for years 2001 and after are unavailable.

Some hospitals have been strongly criticized for charging uninsured patients, who typically have less ability to pay for care than insured patients, far higher prices. In some apparently isolated circumstances, news stories detailing some hospitals' attempts to use aggressive collection methods against uninsured patients purportedly caused those hospitals to cancel those debts.[33]

Although some hospitals and hospital associations have argued that some federal regulations prohibit hospitals from offering discounts and fee waivers on a case-by-case basis,[34] the Centers for Medicare and Medicaid Services (CMS) contends that no federal law prevents hospitals from reducing or waiving charges for an indigent uninsured patient so long as such reductions or waivers conform to the hospital's indigency policy. Moreover, the CMS Inspector General has stated that it is "highly unlikely" that hospitals that waived charges to indigent uninsured patients would run afoul of the federal anti-kickback statute.[35]

More detailed analysis of hospital charge and cost data shows that uninsured and self-pay patients are charged, when confronted with the full list price, on average, about 2½ times more than what insurers pay hospitals, and about three times Medicare-allowable costs.[36] The gap between what uninsured and self-pay patients pay and what insurers pay hospitals appears to have widened since the mid 1980s.

[33] Randy Suttles and Merrill Matthews, Jr., "Hospital Pricing: Separate and Unequal," *Health Care News*, September 1, 2003, available at http://www heartland.org/Article.cfm?artId=12775.

[34] Metropolitan Chicago Healthcare Council, Report of the Task Force on Charity Care and Collection Practices of the Illinois Hospitals Association and the Metropolitan Chicago Healthcare Council, September 11, 2003, available at http://www.pfho.org/HousingInitiatives03/charity%20care-hospitals.pdf.

[35] Centers for Medicare and Medicaid Services, "Questions On Charges For The Uninsured," available at http://www.cms hhs.gov/AcuteInpatientPPS/downloads/FAQ_Uninsured.pdf.

[36] Gerard F. Anderson, "From 'Soak The Rich' To 'Soak The Poor': Recent Trends In Hospital Pricing," *Health Affairs*, vol. 26, no. 3 (May/June 2007), pp. 780-789.

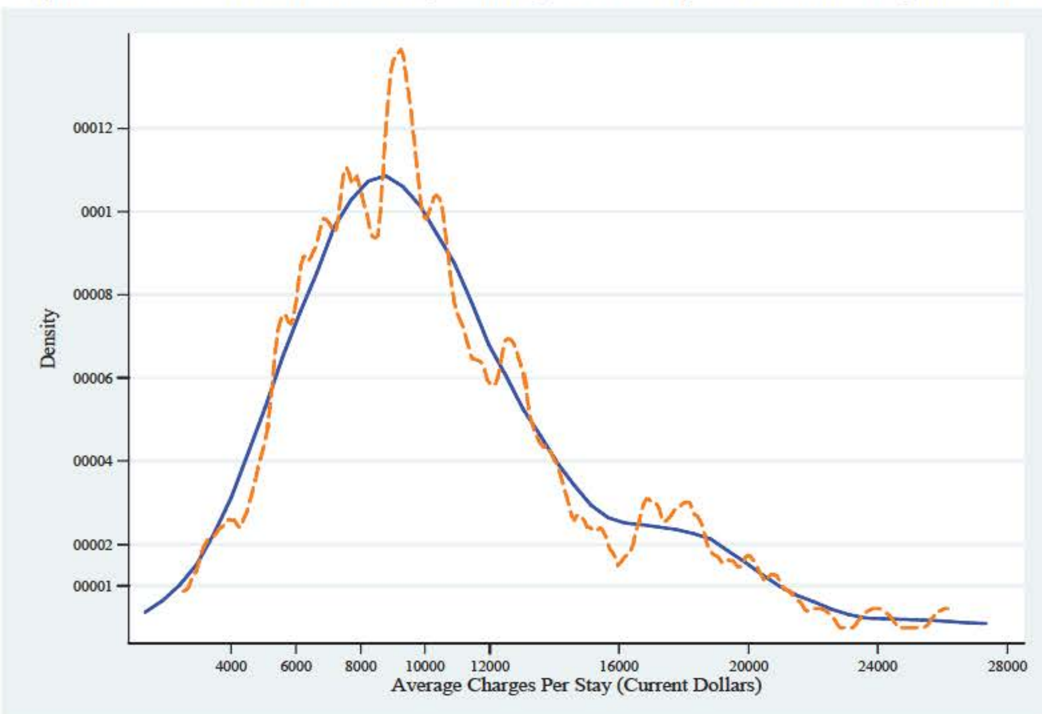
How Does Hospital Price Dispersion Compare To Other Markets?

Chargemaster prices charged by different hospitals for the same procedure can vary wildly, as noted in **Figure 1** and **Figure 2**. Actual charges for specific procedures, which are generally lower than chargemaster prices, also vary widely, although information on them is unavailable. Chargemaster prices are nevertheless important, because they are prices billed to uninsured patients who do not have discounts, and are the starting point for discounted prices.

Figure 3 shows the distribution of average charges per stay for normal vaginal birth for California hospitals in 2004, which aside from newborn care is the most common DRG.[37] (The discrete data are converted into a smoothed curve using a technique called kernel density estimation.) Average charges at the mode of the smoothed distribution lie between $5,000 and $10,000. The distribution has a fat right-hand tail, indicating more variation on the high side of charges than on the low side.

Figure 4 shows average charges per stay by hospital for heart failure and shock in 2004. Unlike the conditions which occur at birth, heart attack victims have substantially less time to plan their hospital stay. Indeed, the typical heart attack victim has no time to select a hospital or to consult with his physician about treatment options. Further, because of variation in the time spent in hospitals, the variation of total charges per episode is much greater in the case of heart attacks, with a handful of hospitals having average charges above $500,000.

Figure 3. Distribution of Average Charges Per Stay for Normal Vaginal Birth

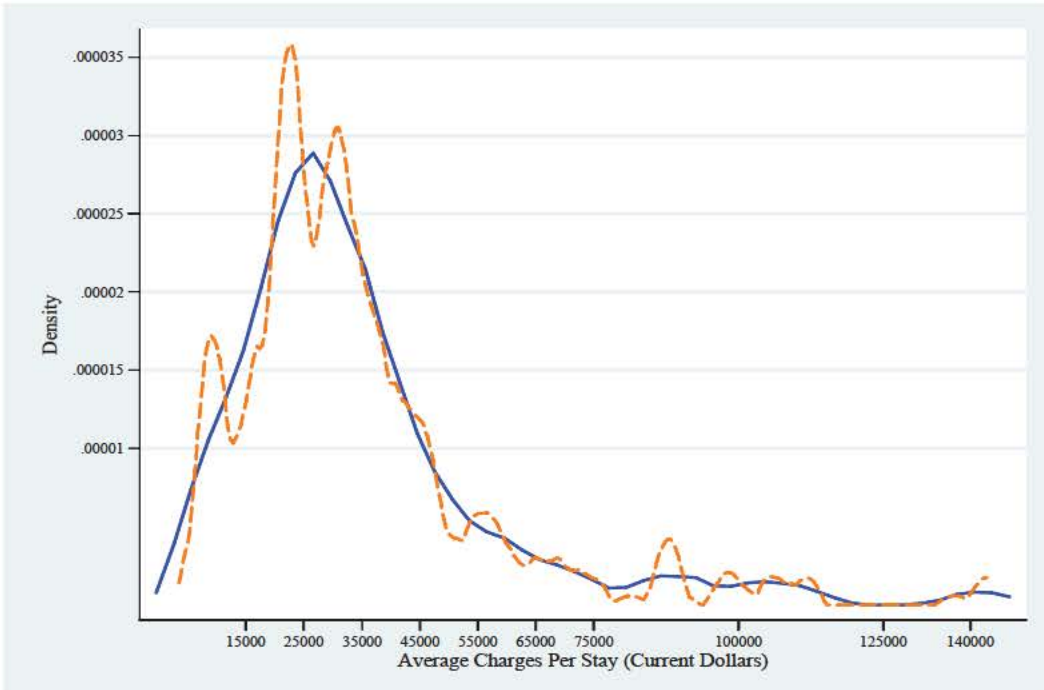


Source: State of California, Office of Statewide Health Planning and Development, Healthcare Information Division. Data are smoothed using two related methods, one yielding the jagged line and the other the smooth line. Both lines represent kernel density estimates. For the jagged line the kernal halfwidth is set at $300. For the

[37] Details of the California price transparency initiative are discussed below. Because of the way Kaiser-Permanente health plans are structured, Kaiser hospitals did not report charges and are therefore excluded from the analysis.

smooth line the kernal halfwidth is set to minimize mean square error for Gaussian distributions. Unit of observation is the hospital.

Figure 4. Distribution of Average Charges Per Stay for Heart Failure



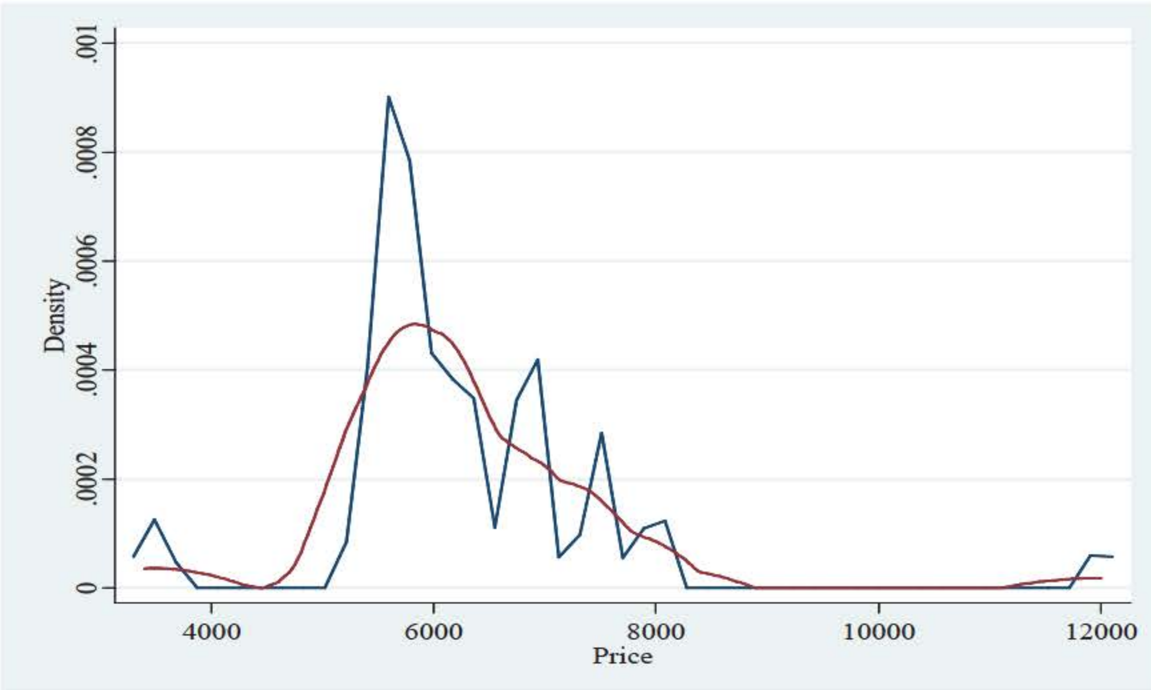
Source: See source for **Figure 3**. Dotted line represents kernal density estimator with halfwidth of $1,500.

Implications of Hospital Price Dispersion

Does evidence on the effects of price transparency in other markets, which by and large supports the view that better information on pricing reduces prices, imply that greater price transparency would affect health markets in the same way, despite the specific structures and characteristics of the health care market? Of course, how the examples are applied depends on how pricing information is provided. For example, allowing the public to examine charge books and data on actual average charges at a hospital's finance office provides more limited access than posting that information on the Internet. Additional information could be conveyed by providing information on the pricing of complete, but typical, procedures as well. (Selective reporting could provide opportunities for hospitals to game the system by lowering costs on the reported procedures and raising costs on others.) Even more information could be conveyed by also reporting prices for the different categories of patients (Medicare, Medicaid, uninsured, or insured by specific health plans).

One caution is that prices of goods commonly sold on the Internet also show substantial price variation, although the degree of price dispersion may be less than for average daily hospital charges. For example, **Figure 5** shows prices for a Samsung HP-R6372 high definition television found using two common Internet price search engines, Froogle.com and Pricescan.com. The mode of the smoothed distribution is slightly less than $6,000, which is slightly less than the mode for daily average charges for normal vaginal birth. However, the right-hand tail of the distribution of TV prices is not nearly as fat as the distribution of average daily charges for normal vaginal birth. (Note: horizontal scales differ for each figure.) Only one seller listed a price for the Samsung TV above $8,000, and 37 of 47 sellers posted prices between $5,500 and $7,500. By contrast, 10 of 251 California hospitals charged more than $9,000 per day and 33 charged less than $3,000 per day.

Figure 5. Price Distribution for a Samsung HP-R6372 HDTV



Source: Searches conducted at http://www.froogle.com and http://www.pricescan.com on August 9, 2006. Price distributions smoothed using same methods as described in **Figure 3**.

A formal way of comparing variability of distributions with different averages is to compute coefficients of variation. **Table 3** presents statistical estimates of price variability for two of the most common types of hospital episode as well as for a similarly expensive consumer good, namely, a particular HDTV. The coefficient of variation is a dimension-free measure, and thus is an appropriate tool for comparing different distributions.[38] As expected, the coefficients of variation for average hospital charges for normal birth and for heart attacks are substantially greater than for the Samsung television.

The comparison of HDTV prices advertised by retailers and average charges per day for a given DRG is not an "apples-to-apples" comparison. Prices advertised by retailers do not necessarily represent actual sales prices. Posted prices on the Internet may vary considerably, even if prices at those websites that make most of the sales vary less.[39] To the extent that most units are sold by sellers with prices near the minimum posted price, sales-weighted measures of price variability will be less than unweighted measures.

[38] The coefficient of variation is the standard deviation divided by the mean (average). Among hospitals that reported charges for both procedures the coefficient of variation for charges per stay for Heart Failure and Shock (DRG 127) was 0.678 and 0.420 for Vaginal Delivery w/o Complicating Diagnoses (DRG 373).

[39] Erik Brynjolfsson and Michael D. Smith, "Frictionless Commerce? A Comparison of Internet and Conventional Retailers," *Management Science*, vol. 46, April 2000, pp. 563-585.

Table 3. Variability of Average Hospital Charges and Samsung HDTV Prices

		Averag e	Standard Deviation	Coefficient of Variation	N
Vaginal Delivery w/o Complicating Diagnoses	per day	$5,280	$1,933	0.366	242
	per stay	$10,350	$4,286	0.414	
Heart Failure and Shock	per day	$5,696	$3,451	0.606	393
	per stay	$36,840	$31,273	0.849	
Samsung HP-R6372 HDTV		$6,254	$1,253	0.200	47

Source: See preceding figures. Data are for 2005.

We checked whether combined average daily charges for mother and baby varied less than average charges for normal vaginal birth alone, which could occur if different hospitals allocated charges to mother and baby differently. The coefficient of variation for the sum of average daily charges for normal newborn and normal vaginal birth, however, was about the same (.356) as for normal birth alone (.366). The coefficient of variation for average stay charges for the sum of normal birth and normal newborn care (.416) was nearly the same as for normal birth alone (.414).

These illustrations are just examples of pricing variability and do not constitute a statistically valid universe. Nevertheless, they do indicate considerably more price variability for medical procedures than for an expensive consumer durable that might be expected to show much more variation than more frequently purchased commodities. They also show much more variation for an unanticipated procedure (heart failure) than for an anticipated one (birth). They are suggestive, therefore, of a considerable amount of price variability in hospital costs.

Price Transparency Initiatives of Governments, Insurers, and Interest Groups

Several states have enacted regulations intended to enhance price transparency in the health sector in general, and hospital pricing in particular. Several private insurers also allow policyholders access to online tools that allow some price comparisons for medical procedures.[40] California has required hospitals to provide a variety of pricing data to the public, discussed in more detail below. Average hospital charges per day and per stay for selected DRGs are available on state government websites sponsored by Arizona, California, Florida, Maryland, and Massachusetts.[41] Other states, such as Iowa, New Hampshire, and Wisconsin, in cooperation with state hospital associations, provide some pricing information.

Aetna has published price information for physicians and hospitals in the Cincinnati area, and recently extended this program to other parts of the country. Other insurers, including Cigna,

[40] National Conference of State Legislatures, "State Legislation Relating to Disclosure of Hospital and Health Charges," April 2007, available at http://www ncsl.org/programs/health/Transparency htm#Table1.

[41] The National Conference of State Legislatures has links to the state websites, along with many private insurers' websites: http://www ncsl.org/programs/health/Transparency htm.

Humana, United HealthCare, and Wellpoint have created websites that provide price comparison data for certain procedures.[42]

Hospitals also submit data to the Centers for Medicare and Medicaid Services (CMS), which compiles annual Medicare Cost Reports (MCR). The MCRs contain extensive information about hospitals' cost structures and finances. These reports, which are quite large and complex, are available for download on the CMS website. The website HospitalVictims.com provides cost data for individual hospitals derived from Medicare Cost Reports, suggesting that hospitals with high charge-to-cost ratios be avoided, or that the patient negotiate for a discount.[43] It suggests that a high charge-to-cost ratio is evidence of a significant amount of price discrimination and a likelihood that the uninsured patient will be charged a high price.

Initiatives to impose price transparency requirements on hospitals, such as allowing the public to inspect chargemaster data or have access to average daily charges data, were motivated in part by a desire to allow consumers to make informed choices about selecting hospitals. Better information on prices, according to this view, would increase competitive pressure on hospitals, slowing the growth of hospital prices and reducing price variability. These initiatives are relatively new and do not yet appear to have had significant effects on the level and dispersion of medical costs.

In August 2006, Executive Order 13410 called for greater transparency of quality and price information and for more widespread use of information technology in federal health care programs using compatible data standards.[44] The executive order also directed federal agencies to develop health care quality measurement programs. The National Coordinator for Health Information Technology within the U.S. Department of Health and Human Services oversees these initiatives, although other offices also have major responsibilities.

The executive order directed federal agencies to "make available ... to the beneficiaries or enrollees of a Federal health care program (and at the option of the agency, to the public) the prices that it, its health insurance issuers, or its health insurance plans pay for procedures to providers." It was reported that the Bush administration earlier in 2006 declined to release Medicare claims data to the Business Roundtable, which had requested them.[45] The Business Roundtable is an association of chief executives of very large corporations. Whether the order signifies a change in policy or there was another reason for not releasing these data remains unclear.

The effects of the executive order on pricing information are unknown, including how widely available the information is, since the implementation of the order is in its early stages. But it is an example of another government initiative to provide more information about pricing.

In some areas, the initiatives outlined by the Executive Order parallel ongoing efforts. Several federal agencies have already taken some measures to provide federal health care users with better price and quality information. For example, the Federal Employees Health Benefit Program (FEHBP) provides a website that compares premiums, plan details, and customer satisfaction

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[42] Ibid.

[43] See http://www hospitalvictims.com/.

[44] Executive Order 13410, "*Promoting Quality and Efficient Health Care in Federal Government Administered or Sponsored Health Care Programs*, August 22, 2006. Additional information is available at the Department of Health and Human Services's "Value-Driven Health Care" website: http://www hhs.gov/transparency/fourcornerstones/ index html.

[45] Robert Pear, "Employers Push White House to Disclose Medicare Data," *New York Times*, April 11, 2006.

measures for all plans.[46] Changes made in response to the order appear minor.[47] CMS (Centers for Medicare and Medicaid Services) now publishes summarized inpatient price data for the 30 most common elective DRGs for individual hospitals. These data are taken from Medicare Provider Analysis and Review (MEDPAR) data, which has been collected since 1991. However, locating this information on the CMS website may be difficult for consumers since the website covers a range of material.[48]

Medicare's "Hospital Compare" website, accessed via the Medicare.gov site, allows beneficiaries to see data that compares how closely different health care providers follow accepted treatment protocols.[49] Whether such initiatives give consumers enough relevant information in an easily accessible way, whether patients and their families would be able to locate such information, and whether such information would motivate patients to make major changes in their treatment plans is unclear. One consulting firm concluded that while a previous version of the Hospital Compare website "does an average job of presenting the quality information, it lacks the robust data found in commercially available products and leaves consumers fumbling with insufficient help."[50] In June 2007 a redesigned HospitalCompare website was launched that allows limited comparisons of hospital mortality rates for heart failure and heart attacks with national mortality rates.[51] However, nearly all hospitals were judged to have mortality rates "no different than the U.S. national rate." Out of almost 4,500 hospitals, only 17 were recognized as "above average" in treating heart attacks and only seven were rated "below average."[52]

On the other hand, more information about health care provider quality and pricing is becoming available on the Internet, and these sources will continue to evolve. A major review of information available on websites that provide hospital price and quality information expressed concern that some consumers might be confused rather than enlightened by the reported data, but also noted that momentum continues to build for making health care data more easily available to consumers.[53]

The following section of this report presents an analysis of the California price transparency initiative's effect on the dispersion of hospital prices.

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[46] http://www.opm.gov/insure/health/

[47] The Office of Personnel Management's efforts to implement these initiatives are described on its website, available at http://www.opm.gov/insure/health/executiveorder.asp.

[48] http://www.cms hhs.gov/HealthCareConInit/02_Hospital.asp#TopOfPage

[49] http://www.cms hhs.gov/HospitalQualityInits/25_HospitalCompare.asp

[50] Katy Henrickson, Hospital Comparison Tools Scorecard Summary: Centers For Medicare And Medicaid Services: Key Findings From "The Forrester Wave: Hospital Comparison Tools, Q4 2005," October 13, 2005, available at http://www forrester.com/Research/Document/Excerpt/0,7211,37929,00 html.

[51] Hospital Quality Alliance, "HQA Adds Enhanced Hospital Quality Information to 'Hospital Compare' Web Site," June 22, 2007, available at http://www fah.org/issues/quality_initiative/ HQA%20Adds%20Enhanced%20Hospital%20Quality%20Information%20to%20Hospital%20Compare%20Web%20Site.pdf.

[52] Michael S. Gerber, "Hospitals Are Beyond Compare: Data on Cardiac Care Show Almost No Differences Nationwide," *Washington Post*, July 3, 2007.

[53] Delmarva Foundation, *The State-of-the-Art of Online Hospital Public Reporting: A Review of Fifty-One Websites*, Report Prepared for the CMS Hospital Three State Pilot Project, July 2005. Available at http://www.delmarvafoundation.org/newsAndPublications/pressReleases/2005/08_18_05.pdf.

Does Price Transparency Reduce Price Variability? Some Preliminary Results

The California hospital price transparency initiative, according to analysis of available data, has had negligible or no observable effect on hospital prices.

In September 2003, California legislators passed Assembly Bill 1627,[54] which required hospitals (except for certain small and rural hospitals) to make chargemaster data public by July 1, 2004, either in electronic form or by allowing onsite inspection.[55] Sponsors of this bill contended that these reporting requirements would prevent hospitals from "gouging" customers and would make patients into better-informed consumers.[56] In July 2005, hospitals had to begin submitting chargemaster data to the Office of Statewide Health Planning and Development Healthcare Quality & Analysis Division (OSHPD). In 2004 and 2005, hospitals also had to list charges for 25 common services or procedures. In 2006, hospitals were required to submit data on average charges for 25 common diagnosis-related groups (DRGs). The state of California makes these data available online.

If patients became better-informed customers, most economists would expect that hospitals that raised their prices more would lose patients, unless there were offsetting increases in the quality of medical care or level of amenity.[57] That is, if customers are sensitive to and aware of prices, increases in hospital prices would be negatively related to changes in hospital admissions, other things equal.

If consumers were becoming more sensitive to price as a result of greater price transparency, then one might expect to see stronger effects for procedures for which patients can plan ahead. Expectant mothers planning for a normal vaginal birth can compare what various hospitals have to offer and their prices, unlike victims of sudden medical emergencies. **Figure 6** shows the distribution of average daily charges (adjusted for general inflation) for normal vaginal birth at California hospitals in 2003, 2004, 2005, and 2006. Over this time period, the modal (i.e., most frequent) nominal price drifts upwards because average daily charges have been rising faster than the general price level. The distribution of prices shows no signs of convergence.[58]

[54] Helen Sanderson, "Cost of Care: New Law Lets Patients Examine Hospital Price Lists," *North Coast Weekly*, August 11, 2005, available at http://www northcoastjournal.com/081105/cover0811.html.

[55] The *Wall Street Journal* article, referenced in **Figure 1** above, was based on these chargemaster data. For further details on these requirements, see the State of California's Office of Statewide Health Planning and Development Healthcare Information Division's website at http://www.oshpd.ca.gov/HID/Products/Hospitals/Chrgmstr/FAQ html#Q2.

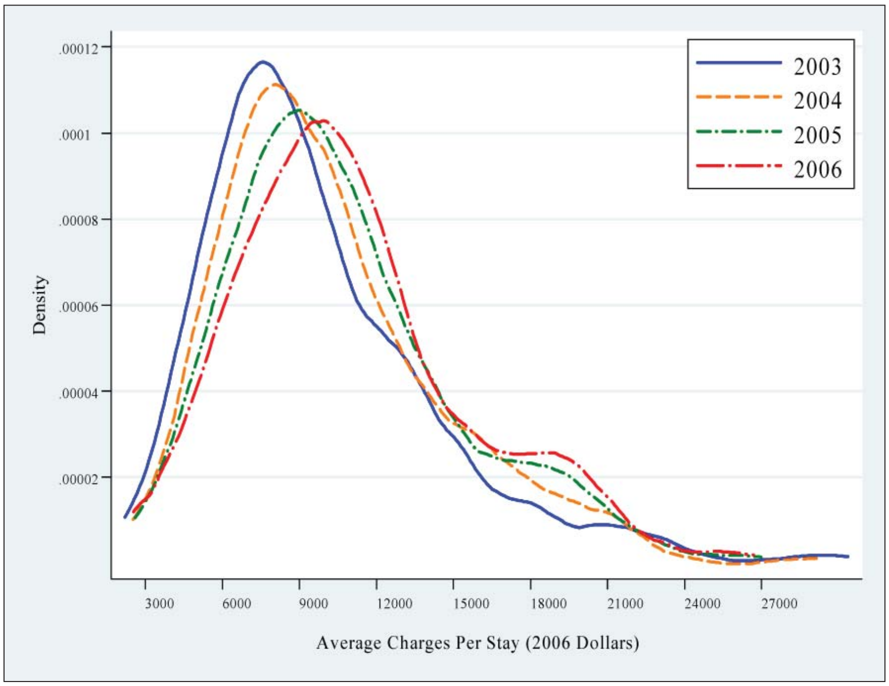
[56] California State Assembly, "Bill Analysis for Assembly Bill 1627," available at http://info.sen.ca.gov/pub/03-04/bill/asm/ab_1601-1650/ab_1627_cfa_20030527_173625_asm_floor html

[57] This also presumes that demand factors, such as demographics and income, were held constant. Changes in these factors over the period analyzed here are likely small relative to changes in hospital prices.

[58] The same analysis was performed for average charges per stay, rather than average daily charges. The results were nearly identical.

004781

Figure 6. Distribution of Average Charges Per Stay For Normal Birth, 2003-2006

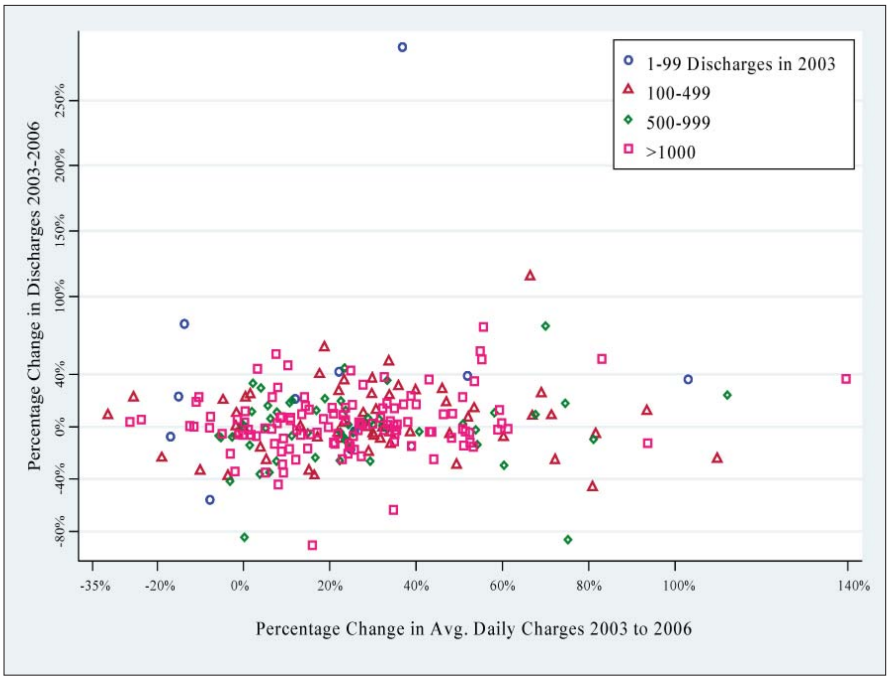


Source: State of California's Office of Statewide Health Planning and Development, Healthcare Information Division

Note: Kaiser hospitals submitted no average charge data, and so are excluded. GDP Price Index used to convert charges into 2006 dollars. Also see notes for **Figure 3**.

004782

Figure 7. Scatter Plot for Changes in Avg. Daily Charges and Discharges for Normal Birth (DRG 373)



Source: State of California's Office of Statewide Health Planning and Development, Healthcare Information Division.

Notes: GDP Price Index used to convert charges into 2006 dollars. Kaiser hospitals, which submitted no average charge data, are excluded.

Hospitals that had increased average daily charges for normal vaginal birth, on average, did not lose patients. **Figure 7** (above) presents a scatter plot with percentage change in hospital discharges on the vertical axis and percentage change in average daily charges on the horizontal axis. Different plotting symbols divide hospitals into four categories defined by the number of (normal) births in 2003. If expectant mothers avoided hospitals that raised their prices, then a downward-sloping relationship would be evident between the two variables. Regression analysis shows a statistically significant, albeit small, positive relationship between changes in average charges and changes in hospital volume for normal births over the 2003-2006 period.[59]

Several explanations are possible for the lack of a discernable relationship between changes in average charges and changes in hospital volume. Differences in perceived quality or care or amenity levels may matter more than price for many patients, especially if insurance coverage insulates them from prices. Patients' relationships with their physicians and those physicians' relationships with hospitals might reduce patients' sensitivity to hospital prices. Alternatively, patients may care about prices, but might be unable, unwilling, or disinclined to examine online price data. Finally, changes in prices might correlate to offsetting changes in quality or amenity levels. Distinguishing among these explanations would require more sophisticated data. However, the available evidence, while preliminary, suggests that the California price transparency initiative so far has had little observable effect where it might have been expected to have the greatest effect.

How Would Greater Price Transparency Affect the Health Care Sector?

The experience of the Danish Competition Authority, noted above (in the section titled "Empirical Evidence on the Effects of Price Transparency"), suggests that imposing price transparency in negotiations between sellers and buyers of intermediate goods does not necessarily lead to sharpened competition or lower prices. At the same time, some evidence suggests that information about the process of setting prices, including practices of price discrimination, may produce a change in pricing, as in the NASDAQ and Amazon cases. Much of the remaining evidence also suggests that transparency lowers prices and makes them more uniform.

The evidence cited on price transparency involves two types of effects: a response through publicity effects and a response through normal market mechanisms. The price discrimination that occurs in hospitals—brought about partly by government policies with respect to Medicare and Medicaid, partly due to bargaining power of insurance companies (and the desire to set high list prices to leave room for discounting),[60] and partly through providing free care for the indigent—leads to potentially high prices for a small segment of uninsured individuals. As more of these pricing differences are revealed and spotlighted, public opinion might force a reduction in cross subsidies (charging some patients higher prices to cover the costs not fully applied to other patients).[61] Indeed, such a response has already occurred. An example is the case of the state

[59] One outlier was excluded. An indicator variable for Tenet Healthcare hospitals, which Bill 1627's sponsors claimed had aggressively sought to increase hospital prices, was statistically insignificant. Regression results available upon request.

[60] See the discussion in Lucette Lagnado, "California Hospitals Open Books, Showing Huge Price Differences," *Wall Street Journal*, December 27, 2004, p. A1.

[61] Cross subsidies are intra-firm transfers that support some activities or lines of business using net revenues earned in other activities or lines of business.

of Minnesota, which entered into a voluntary agreement with most of its hospitals to limit the charges for uninsured patients. Under the agreement, uninsured patients with $125,000 or less in annual income would pay no more than the amount paid for the procedure by the private insurance company that provided the greatest amount of the hospital's revenue.[62]

The Minnesota example suggests that publicity can affect pricing. What about the effects through normal market mechanisms? The survey of evidence included cases where price transparency did not affect prices, or in some instances, led to higher prices. In addition, many of the studies analyzed goods that lack the special characteristics of health care. These shortcomings do not, however, necessarily mean that price transparency in the health sector would not be beneficial.

First, the ready-mix concrete example, in which price information resulted in higher prices also involved for-profit businesses, which presumably were attempting to maximize profits. This example may not apply to many hospitals that are non-profit and may have different behavioral responses.[63]

Second, the evidence from the advertising studies includes not only simple uniform goods such as alcoholic beverages and gasoline, but complex differentiated products such as vision exams, where quality matters. And while insurance pays much of the cost of medical care, the studies summarized above also included examples of price reductions for prescription drugs after direct advertising to consumers, whose prices are also subject to third party payment.[64] In these cases as well, the evidence suggests that prices fell after advertising was permitted, without deterioration in quality.

Third, evidence from the Internet suggested that price comparison sites may help reduce commodity prices, including differentiated commodities that are subject to bargaining (automobiles). Over time, price comparison websites have become more sophisticated and are playing an increasingly important role in consumer behavior in many markets.

Internet Price Comparison Sites

The Internet has begun to affect the availability of price information in the health care sector, although this does not appear to have influenced a large proportion of consumers. According to the *New York Times*, 32 states require hospitals to publish price information.[65] Some new websites

[62] Minnesota Hospital Association and Office of Minnesota Attorney General Mike Hatch, "Hospitals Step Forward to Sign Voluntary Agreement with Attorney General's Office on Billing and Collection Practices," June 2, 2005.

[63] Objectives of not-for-profit hospitals are an important area of research in health economics, and although there has been a presumption that any surplus might be used for charitable care, evidence on that issue is mixed. While providing a complete review is beyond the scope of this report, see for example, Richard G. Frank and David S. Salkever, "The Supply of Charitable Services by Nonprofit Hospitals: Motives and Market Structure," RAND Journal of Economics, vol. 22, autumn 1991, pp. 430-440; and Edward C. Norton and Douglas O. Staiger, "How Hospital Ownership Affects Access to Care for the Uninsured," RAND Journal of Economics, vol. 25, spring 1994, pp. 171-185. Mark Pauly once described hospitals as "doctors' workshops," whose decisions were made with an eye to maximizing the welfare of physicians. Since that time hospital administrators reportedly have become more professional and more powerful. See Mark Pauly, Doctors and Their Workshops: Economic Models of Physician Behavior, (Chicago: Univ. of Chicago Press, 1980). In any case, non-profits' objectives may differ from those of for-profit firms. Some evidence suggests that non-profits maximize output or revenues; e.g., Richard Steinberg, "The Revealed Objective Functions of Non Profit Firms," RAND Journal of Economics, vol. 17, winter 1986, pp. 508-526.

[64] John F. Cady, "An Estimate of the Price Effects of Restrictions on Drug Advertising," *Economic Inquiry*, vol. 44, December 1976, pp. 493-510; Steven W. Kopp, "Direct-To-Consumer Advertising and Consumer Prescription Prices," *Drug Information Journal*, vol. 30, 1996, pp. 59-65.

[65] Michael Mason, "Bargaining Down That CT Scan Is Suddenly Possible," *New York Times*, February 27, 2007.

provide consumers with data on health care costs. For example, Vimo http://www.vimo.com provides information on average list prices and average negotiated prices charged by hospitals for specific procedures. One company, My Medical Control, provides a negotiation service for consumers through its website http://www.mymedicalcontrol.com. A consumer forwards a bill, via the website, to a claims adjuster who negotiates a reduced rate with the provider. This company then deducts a 35% fee and returns the remainder to the consumer. At present, such websites have little observable effect on health care markets. In the future, however, such sites could have large effects.

The Carol.com website allows consumers to compare prices and offerings of health providers in the Twin Cities region of Minnesota, and in addition it allows them to book services. The intention of the website's creators is to follow the example of web-based booking services such as Expedia.com, which have transformed the travel industry in the past decade. Many state governments have opened their own sites that allow consumers to compare prices or provider characteristics.[66]

The effect of information on quality is much more difficult to obtain, and it is hard to make a judgment based on the available evidence. As noted above, the United Network for Organ Sharing publishes risk-adjusted outcome data on its website http://www.unos.org. Some other organizations, also noted above, also publish some data reflecting quality of health care.

Will the Health Sector Change Like Other Industries?

One of the most important differences between hospital care and other commodities is that typically patients pick physicians and physicians pick hospitals. Although this characteristic means that direct consumer pressure to hold down prices (or at least have a sensible pricing system) is more difficult, it does not mean that physicians would not become more sensitive to differences in costs among various hospitals on behalf of their patients, particularly if their patients raise questions about these costs. Not everyone in a market is required to be attentive to price for pressure to be exerted at the margin. Moreover, publicity about price differentials may result in voluntary compliance by hospitals. Nevertheless, this aspect of the delivery of hospital services makes it more difficult to apply evidence from other markets to the expected outcome of introducing more price transparency in health care markets.

Changes in the airline industry might provide some insight into how increased price transparency and competition could affect the hospital industry. While the air travel and hospital industries have important structural differences, airlines, like hospitals, have high fixed costs and offer a non-storable product. Before the Airline Deregulation Act of 1978 (P.L. 95-504), airlines competed largely on the basis of amenity levels rather than on price. The Airline Deregulation Act restricted the Civil Aviation Board's price administration powers, and led to the abolition of the board in 1984. After deregulation, several new airlines entered the market, while several major airlines went bankrupt and exited the market. Increasing competitive pressure led airline companies to cut back amenities to passengers and led to contentious negotiations with labor unions that resulted in sharply reduced wages in many cases.[67] Employees with highly specialized skills, such as pilots and mechanics, appeared to fare better in resisting wage and salary reductions compared to other employees. Air service to some small cities, supported by implicit cross subsidies, ceased, while service to some other small cities expanded, in part because some

[66] Many of the state government health comparison and information sites are listed at http://www healthtransformation net/cs/leading_examples.

[67] U.S. Government Accountability Office, *Airline Deregulation: Reregulating the Airline Industry Would Likely Reverse Consumer Benefits and Not Save Airline Pensions*, GAO-06-630, June 2006.

airlines found ways to serve such markets at lower cost. Lower fares (in real terms) led to an enormous expansion in air travel and increases in air travel employment. Some relatively new airlines, such as Southwest Airlines, prospered and expanded, while other airlines struggled, including several major carriers that declared bankruptcy.

Were price transparency to improve, and if consumer choice in health care were to become more sensitive to price differentials, then economic analysis would suggest that these effects would increase pressure on hospitals to become more productively efficient, that is, to use fewer inputs to produce the same or greater output. Cost-cutting measures would put pressure on health sector salaries and wages, which some occupational groups would resist more successfully than others. Services, such as indigent care, now in part supported by implicit cross subsidies, could face cutbacks unless direct subsidies to support such services were increased. Innovative providers, however, may find ways to expand access to health care by the indigent using more efficient and cheaper methods. Some prices might fall, along with amenity levels. Lower prices, in turn, could expand access to health care, and to the extent that demand for medical procedures is sensitive to price, could expand the volume of medical services provided. Some existing health care providers, especially those unable to change their cost structures and operating procedures quickly, would be at a comparative disadvantage to more nimble providers. Such changes would produce both winners and losers, just as airline deregulation produced winners and losers. Increased price transparency, however, to the extent that it allowed health care markets to function more efficiently, would be expected to generate more gains than losses.

Appendix. Review of Empirical Studies on Price Transparency

Pricing Reforms in Financial Markets

The effects of price transparency on how financial markets function depend on how those markets are set up. Financial exchanges are structured as auction markets or dealer markets.[68] In an auction market, such as the New York Stock Exchange (NYSE), investors send orders to a specialist, who coordinates trading for a particular stock. Investors can send market orders, which are to be executed immediately for the best possible price, or limit orders, which instruct a broker to buy a stock at a set price or to sell a stock at a set price. The specialist executes market orders by matching them with orders from the other side of the market, or by buying or selling on his own account. Limit orders that are not executed are entered into the specialist's order book. In a dealer market, such as NASDAQ, orders for a particular stock flow to market makers who then post bids (i.e., prices at which buyers are willing to trade) with asks (i.e., prices at which sellers are willing to trade) via an electronic market. In NASDAQ each stock must have at least two market makers, and for major stocks there may be 30 or more market makers.

Price transparency can mean several things in financial markets. The most basic form of price transparency is the timely reporting of executed trades. A second form of transparency is information about outstanding limit orders listed in a specialist's order book. Order book information can signal impending price movements, and a trader with special knowledge about outstanding orders can make profits. For example, an order book with many buy orders just above the market price and very few sell orders may signal that the market price is about to rise, and a specialist who buys before that rise occurs will reap profits. A third form of transparency concerns information about how dealers or specialists handle orders. A dealer often has some discretion in how and when orders are executed and may sometimes exploit that discretion to earn profits at the expense of the investor who placed the order.

Past NASDAQ pricing practices illustrate the importance of the third form of price transparency. In 1994, William Christie and Paul Schultz, two Vanderbilt University financial economists, noticed that NASDAQ dealers almost never quoted prices using odd eighths (i.e., 1/8, 3/8, 5/8, and 7/8) for many high-volume stocks of companies such as Microsoft, Intel, and Apple. This practice effectively created a quarter dollar minimum spread between sellers' asks and buyers' bids, which increased the trading profits of dealers. The day after these economists issued a press release about their findings the practice was abandoned, and spreads for several major stocks fell by about half.[69]

Economists often argued that collusion is difficult or impossible with large numbers of traders. A more careful argument is that collusion depends on the ability to make explicit or implicit agreements, and maintaining agreements may be more difficult for larger groups. Should a large

[68] For a more detailed description of the structure of modern financial markets, see Hans R. Stoll, "Electronic Trading in Stock Markets," *Journal of Economic Perspectives*, vol. 20, no. 1 (winter 2006), pp. 153-174.

[69] William H. Christie and Paul H. Schultz, "Did NASDAQ Market Makers Implicitly Collude?," *Journal of Economic Perspectives*, vol. 9, summer 1995, pp. 199-208. The U.S. Department of Justice (DOJ) concluded that the even-eighths convention was "vigorously enforced through industry-wide peer pressure, and intimidating telephone calls to, and refusals to deal with, market makers who did not quote bid and ask prices in conformance with the convention." See the DOJ "Competitive Impact Statement," U.S. v. Alex Brown & Sons Inc., et al., U.S. District Court for the Southern District of New York, pp. 16-17. Also see U.S. General Accounting Office, *Security Market Operations: The Effects of SOES on the Nasdaq Market*, GAO/GGD-98-194, August 1998.

group of sellers collude, each seller has strong incentive to increase his or her market share by making small reductions in price. If a seller can reduce its price and increase sales without other sellers noticing, then it will reap extra profits. For example, many members of the Organization of Petroleum Exporting Countries (OPEC) have been suspected of making hidden side deals which allow them to sell more oil than their OPEC quotas specify, which may have led to softened oil prices.

In the case of NASDAQ, it appears that a very simple rule—no trading on odd eighths—created artificially high trading spreads, which allowed dealers to reap higher profits. Young traders reportedly were cautioned not to narrow inside spreads by using odd-eighths, and traders who violated the no-odd-eighths convention may have been subject to intimidation or isolation. In addition, securities dealers rely on trades with other dealers to rebalance their inventories of stocks in order to minimize financial risks associated with sudden price movements. If other dealers refused to trade with a dealer who violated the pricing convention, then that dealer would be exposed to higher levels of financial risk. Furthermore, the practice of "preferencing" among NASDAQ dealers, which involves guaranteeing flows of orders to preferred dealers or dealer subsidiaries, meant that order flows were less sensitive to spreads. A dealer who violated the pricing convention in order to attract order flow would therefore gain little additional market share because of existing "preferencing" arrangements, which in turn reduced incentives for dealers to compete by narrowing spreads.

While no evidence was found that this pricing convention was the result of an explicit collusive agreement, that convention enhanced traders' profits for many years.[70] While investors and regulators were not aware this pricing convention existed, transparency of dealers' prices, which were visible on trading monitors, made enforcement of the pricing convention possible. All other dealers could immediately observe if any dealer violated the no-odd-eighths convention.

While prices of stocks and other equities are publicly published, bond prices are less transparent, which has put small investors at a distinct disadvantage relative to large trading institutions. Trading of stocks is highly centralized, but except for U.S. Treasury securities, most bond trading occurs "over the counter."[71] In the past decade transparency of bond prices has improved. In particular, the Trade Reporting and Compliance Engine (TRACE), which was launched by the National Association of Security Dealers (NASD) in July 2002, reports bond trades within 15 minutes, and covers a large portion of the fixed income and bond market.[72] Before the introduction of TRACE, some argued that improved transparency of prices would come at the cost of reduced market liquidity, meaning that some large bondholders or dealers would trade less frequently in order to protect proprietary pricing information. However, the expansion of trading volume has improved or maintained market liquidity.[73]

Because large traders may gain some proprietary advantage from keeping the traded prices of bonds hidden, the advance of bond price transparency has been slow. The European Union's "Markets in Financial Instruments Directive," which comes into force November 1, 2007,

[70] Ibid.

[71] Testimony of Vanguard Group Principal Christopher M. Ryon, in U.S. Congress, Senate Committee on Banking, Housing, and Urban Affairs, "An Overview of the Regulation of the Bond Markets," hearings, 108th Cong., 2nd sess., June 17, 2004.

[72] Annette L. Nazareth, SEC Commissioner, "Remarks Before the TBMA Legal and Compliance Conference," U.S. Securities and Exchange Commission, New York, New York, February 7, 2006.

[73] M. Goldstein, E. Hotchkiss, and E. Sirri, "Transparency and Liquidity: A Controlled Experiment on Corporate Bonds," Babson College working paper, 2005, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=686324.

requires traders to provide real-time trading data for a wide range of financial instruments and markets.

Finance researchers contributing to the new "market microstructure" literature have taken several approaches to analyzing the effects of price transparency. The market microstructure approach looks at how individual traders act in financial markets.[74] In addition to the well-known Christie and Schultz work on NASDAQ, other research has found other ways to examine the effects of price transparency. An electronic communications network named Island discontinued displaying limit order data in three exchange-traded funds (ETFs) in which it played a dominant role from September 2002 to the end of October 2003 rather than comply with a regulatory mandate. During this time period ETF prices adjusted less quickly and trading costs rose. When Island resumed displaying limit order data, trading costs fell.[75] Another study compared trades before, during, and after the regular trading day to examine the effects of price transparency. Trades made during the regular trading day are immediately reported and available to all investors. Much less information is available about trades that occur before or after regular hours, and because trade volumes are much smaller, there are fewer prices to report. Barclay and Hendershott found that prices are more volatile after hours, suggesting that pre-open and after-close markets are less efficient than markets during regular trading hours.[76]

In some cases existing firms have beat back efforts to improve transparency in order to keep a strategic advantage over would-be entrants. For instance, following Mexico's 1994 financial crisis the World Bank sought to create a credit registry, which would list all assets pledged as collateral by borrowers.[77] A credit registry allows any lender to see what a loan applicant has already pledged in collateral, thus giving potential lenders a better opportunity to price risk. Incumbent banks strongly opposed creation of the registry because they could already obtain information about lenders, while less established lenders could not. Although a credit registry would have expanded and strengthened Mexico's financial system, it was thwarted by banks who feared a more competitive environment.

"Dynamic Pricing" at Amazon.com

The Internet seller Amazon.com's "dynamic pricing" experiment illustrates how marketing strategies can affect prices and create a consumer backlash. Dynamic pricing is a term that has come to be used to refer to a particular type of price discrimination. Price discrimination usually takes the form of sorting customers into groups with different price sensitivity based on their purchasing behavior.[78] For instance, for airline fares a Saturday night stay-over requirement

[74] For surveys of the market microstructure literature, see Bruno Biais, Larry Glosten, and Chester Spatt, "The Microstructure of Stock Markets," Institut d'Économie Industrielle (IDEI) working paper #253, Toulouse, France, May 28, 2004; and Ananth Madhavan, "Market Microstructure: A Survey," *Journal of Financial Markets*, vol. 3, no. 3, August 2000, pp. 205-258.

[75] Terrence Hendershott and Charles M. Jones, "Island Goes Dark: Transparency, Fragmentation, and Regulation," *Review of Financial Studies*, vol. 18, no. 3, 2005, pp. 743-793.

[76] Michael J. Barclay and Terrence Hendershott, "Price Discovery and Trading After Hours," *Review of Financial Studies*, vol. 16, winter 2003, pp. 1041-1073.

[77] Raghuram G. Rajan and Luigi Zingales, "The Road to Prosperity: Saving Capitalism from Capitalists," *World Bank Transition Newsletter* vol. 14, July/August/September 2003, pp. 1-3.

[78] The Robinson-Patman Act (15 U.S.C. §13) prohibits some forms of price discrimination for the purpose of destroying competition. Many lawyers, however, consider it difficult to win cases based on this act. The U.S. Supreme Court (FTC v. Ruberoid Co., 343 U.S. 470, 72 S. Ct. 800, 96 L. Ed. 1081 [1952]) contended that the language of the act was "complicated and vague in itself and even more so in its context."

separates price-insensitive business travelers from price-sensitive tourists. Price discrimination typically raises prices for some groups and lowers them for others. In 2000, two episodes of differential pricing by Amazon were publicized; the second episode involved the sale of DVDs. Amazon, according to reports, used characteristics gathered about individual customers from the Internet itself (such as whether a customer was new to the site, what browser the customer was using and past purchases, etc.) to charge different prices to different individuals.

Amazon stated that it was simply conducting tests, but nevertheless apologized and promised not to do it again.[79] The same availability of information that permits individualized pricing also makes it much easier to expose such price differentials, as occurred with the Amazon case. Once this strategy was publicized, the protests led Amazon to cease the pricing variations and apologize. This example illustrates that a consumer backlash against differential pricing affected pricing behavior and provides evidence that people generally disapprove of price discrimination based on individual characteristics.[80]

Ready-Mixed Concrete: Intermediate Markets May Run Differently

Antitrust authorities and consumer groups have often advocated price transparency on the grounds that consumers could more easily make comparisons among sellers, which would sharpen competition among sellers. Competition generally leads to greater efficiency and lower prices. Price transparency, however, can change the workings of markets in unexpected ways, which can lead to higher prices. For example, in 1993, the Danish Competition Authority required that all ready-mixed concrete contracts be made public, which it hoped would stimulate greater competition. Instead, average prices rose by 15%-20% and other factors such as changing demand conditions played no discernable effect.[81]

There are two possible explanations for this unexpected increase in prices. First, public prices make collusion among sellers easier. Rivals can observe sellers who undercut their competitors, who may be able to mete out punishments in various ways. Second, price transparency may alter the strategic incentives of sellers, inducing them to become tougher bargainers. Hviid and Møllgaard, motivated by the Danish concrete case, developed a model in which different buyers negotiate with a seller of an intermediate good.[82] Some buyers are better informed than others, which makes them tougher bargainers. If less-informed buyers can observe prices negotiated by more-informed buyers, then the seller will become less willing to offer lower prices to the informed buyers. This happens because the seller understands that by offering an informed buyer a better price creates an obligation to offer less-informed buyers a better price. Thus, in this model greater price transparency, in the sense that less-informed buyers are allowed to see prices negotiated by informed buyers, can actually increase *average* prices. The underlying logic resembles that of price discrimination, where different prices are charged to different groups of consumers, with lower prices for those who are more sensitive to price. In this model buyers differ in their bargaining power, whereas in standard price discrimination models consumers

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[79] This event has been discussed in many articles; see, for example, David Streitfeld, "On the Web, Price Tags Blur," *Washington Post*, September 27, 2000, p. A01.

[80] This may depend on how price differences are described. For instance, although senior-citizen discounts are common and uncontroversial, a surcharge for children and working age adults, which would have the same effect, might be a controversial pricing policy.

[81] Svend Albaek, Peter Møllgaard, and Per. B. Overgaard, "Government Assisted Oligopoly Coordination? A Concrete Case," *Journal of Law and Economics*, vol. 45, December 1997, pp. 429-443.

[82] Morten Hviid and H. Peter Møllgaard, "Countervailing Power and Price Transparency," CIE discussion papers 2000-01, University of Copenhagen, Department of Economics, 2000.

differ in price sensitivity. Bargaining power and high price sensitivity are related because both depend on the availability of good alternatives.

More generally, some competition experts argue that some exchanges of information about production costs or prices among sellers often have anti-competitive effects. In particular, flows of information among firms can make coordination or collusion easier, as the cases of the Danish ready-mix concrete and the NASDAQ odd-eighths pricing convention suggest. On the other hand, flows of information to buyers make price comparisons among sellers easier and thus make consumers more sensitive to prices. Therefore, in general giving firms better price or cost information about other firms may harm competition, but giving consumers better price or cost information may enhance competition.[83]

The Hviid and Møllgaard model in some ways resembles the negotiations between hospitals and insurers. Hospitals engage in negotiations with private insurers, which make about one-third of hospital payments. Some insurers are in a stronger bargaining position than others due to better data analysis, larger size, or managerial talent. The Hviid and Møllgaard model and the Danish experience with price transparency in the concrete market suggest that it is not inevitable that greater price transparency in hospital markets would lead to lower average prices. Most of the evidence discussed below, however, suggests that for a variety of markets more information on prices leads to lower overall prices.

Restrictions on Advertising

In determining the effects of greater price transparency, restrictions on advertising which vary across jurisdictions or across time can provide evidence on the effects, as advertising can make price comparisons easier. Advertising has sometimes been banned for some goods and services. For example, many states prohibited lawyers and other professionals from advertising prices. In general, most studies that examined prices across jurisdictions that restricted or permitted advertising found lower prices in those jurisdictions that permitted advertising. Some studies also examined changes over time, involving a control group, which allows a simple method of controlling for other variables. The findings of this body of evidence may provide important insights about how improving price information for consumers in the health sector, where price-oriented advertising is uncommon and basic information about prices is often unavailable or difficult to obtain, might affect the level and dispersion of prices.

An important consideration is distinguishing between voluntary advertising and restrictions by a third party. Also, for some types of commodities, it is possible that low prices signal inferior quality. The clearest test of the effect of advertising occurs when a third party (usually the government) prevents advertising. Note that many of the studies discussed below are older because most advertising bans no longer exist, although their findings remain relevant.

Vision Exams and Eyeglasses

Several of the studies that compared effects across jurisdictions focused on optometry and the pricing of vision exams and eyeglasses, as past rules restricting advertising varied across states.

[83] Per Baltzer Overgaard, "*Market Transparency, Information Exchange and Competition*," presented at the workshop on Competition Strategies and Competition Law hosted by the Center for International Economic Law and Department of Economics, Swedish School of Economics and Business Administration, Helsinki, October 14, 2003, available at http://www.econ.au.dk/vip_htm/povergaard/pbohome/webpapers/transpcomphelsinki.pdf

Benham[84] examined the effects of advertising on eyeglasses by comparing prices paid in states with and without advertising restrictions in 1963. He first pointed out that the effect of advertising is theoretically ambiguous, as it may increase demand as well as competition. Subsequently, he separated the sample into states that permitted no advertising, that permitted advertising but not price advertising, or that permitted any type of advertising. He found the lowest prices in states with no restrictions, but also some benefit from advertising without price advertising. Overall, complete advertising restrictions caused prices to be higher by 25% or more. In two subsequent studies Feldman and Begun compared prices for vision examinations, controlling for quality (using length of exam and office equipment).[85] In the first study they found that state bans on price advertising by either opticians or optometrists had an insignificant effect on prices, but prices were higher by 16% when advertising was banned for *both*. In the second study they found that prices were higher by 11% when state governments and state optometry boards imposed bans. This study also indicated that the variance of prices increased with advertising restrictions. Maurizi and Moore found that eyeglasses and contact lenses are less expensive "if the optician or optometrist provides price information by telephone and advertises outside the telephone book."[86]

Bond, Kwoka, Phelan, and Whitten[87] report the results of an experiment where survey interviewers were sent to report on both the prices and characteristics of vision exams and eyeglasses and outcomes measured by an examination of the quality of the eyeglasses and evaluation of prescriptions. The study found that prices were lower in cities where advertising was restricted and chain firms did not operate; quality was about the same. Kwoka[88] studied exams by optometrists, dividing the observations into cities where advertising was not allowed, and cities where it was, which included non-advertisers who practice in professional-looking offices, those who do not advertise but have prominent signs in storefronts, small firms who are affiliated with firms that do advertise, and those who advertise heavily. This study found that advertisers offered lower prices than non-advertisers and also that non-advertisers in non-restricted markets offered lower prices than firms in restricted markets, but the differences were not nearly as large.

Time spent in the exam provides a proxy measure for quality. Optometrists that advertised spent less time in exams, but non-advertisers in markets in which advertising was allowed spent more time in exams than those in markets with advertising restrictions. These findings suggest that high quality service is not endangered by advertising. Overall, the analysis found quality was higher and price lower when advertising was permitted. Haas-Wilson[89] explored other restrictions on optometrists, but found media advertising reduced average prices and no effect on quality. Haas-

[84] Lee Benham, "The Effect of Advertising on the Price of Eyeglasses," *The Journal of Law and Economics*, vol. 25, October 1972, pp. 337-352.

[85] Roger D. Feldman and James W. Begun, "The Effects of Advertising Restrictions: Lessons from Optometry," *Journal of Human Resources*, vol. 13, 1978, pp. 247-262; "Does Advertising of Prices Reduce the Mean and Variance of Prices?" *Economic Inquiry*, vol. 18, July 1980, pp. 487-492.

[86] Alex R. Maurizi and Ruth L. Moore, "The Impact of Price Advertising: The California Eyewear Market After One Year," *Journal of Consumer Affairs*, vol. 15, no. 2, 1981, pp. 290-300.

[87] Ronald S. Bond, John E. Kwoka, Jr., John J. Phelan, and Ira Taylor Whitten, Effects of Restrictions on Advertising and Commercial Practice in the Professions: The Case of Optometry, Federal Trade Commission Staff Report, Washington, DC, U.S. Government Printing Office, September 1980.

[88] John E. Kwoka, "Advertising and the Price and Quality of Optometric Services," *American Economic Review*, vol. 74, March 1984, pp. 211-216.

[89] Deborah Haas-Wilson, "The Effect of Commercial Practice Restrictions: The Case of Optometry," *Journal of Law and Economics*, vol. 29, April 1986, pp. 165-186.

Wilson and Savoca,[90] who analyzed survey data collected by the Federal Trade Commission, found that advertising restrictions on optometrists had no effect on the quality of contact lens outcomes.

Prescription Drugs

Restrictions on advertising prescription drugs, according to some research, also lead to higher prices. In 1976, Cady[91] found that prescription drug prices were 4.3% higher on average in states restricting advertising of prices than in states allowing such advertising. The restrictions examined included limitations on outdoor signs with information identifying the products and prices offered by the pharmacy, prohibitions on implying the pharmacy has discount drugs, prohibitions on price advertising, and prohibitions of promotional schemes such as senior citizens' discount. He also found that the quantity of prescription drugs bought was unaffected. Cady found no evidence that advertising or lower prices would increase the consumption of drugs, as supporters of advertising restrictions had contended. (This result would not necessarily apply to drug manufacturers' current advertising to consumers that promotes potential benefits of drugs, but does not advertise prices.) Kopp analyzed how the initiation of direct-to-consumer advertising affected retail drug prices from 1986 through 1992. He found that average retail margins of 13 drugs that were advertised fell on average by 40% after the introduction of direct-to-consumer advertising, while the change in average price for 120 drugs that were not advertised did not fall.[92]

Gasoline

The final set of cross section studies related to restrictions on posting gasoline prices. In 1972, Maurizi[93] compared prices in cities with ordinances against posting large signs advertising price at gasoline stations and found that ordinances against the signs increased the variation in prices, but reduced the average price. He considered the price differences unimportant because he was unable to completely control for discounts in wholesale prices in areas subject to price wars, but did consider the variation evidence that restrictions on signs reduce competition. A subsequent critique by Marvel[94] argued that Maurizi's results were not valid because of a statistical issue, except for premium gasoline. A subsequent study by Maurizi and Kelly,[95] with access to a more extensive database, indicated that posting prices reduced prices.

[90] Deborah Haas-Wilson and Elizabeth Savoca, "Quality and Provider Choice: A Multinomial Logit-Least-Squares Model with Selectivity," *Health Services Research*, vol. 25, February 1990, pp. 791-809.

[91] John F. Cady, "An Estimate of the Price Effects of Restrictions on Drug Advertising," *Economic Inquiry*, vol. 44, December 1976, pp. 493-510.

[92] Steven W. Kopp, "Direct-To-Consumer Advertising and Consumer Prescription Prices," *Drug Information Journal*, vol. 30, 1996, pp. 59-65.

[93] Alex R. Maurizi, "The Effect of Laws Against Price Advertising: The Price of Retail Gasoline," *Western Economic Journal*, vol. 10, October 1972, pp. 321-329.

[94] Howard P. Marvel, "Gasoline Price Signs and Price Behavior: Comment," *Economic Inquiry*, vol. 7, January 1979, pp. 146-149.

[95] Alex R. Maurizi and Thom Kelley, *Prices and Consumer Information*, American Enterprise Institute, Washington, DC, 1978.

Alcoholic Beverages

Two studies analyzed changes in restrictions on advertising and alcoholic beverages. Luksetich and Lofgreen[96] examined the effect of an accidental repeal of liquor advertising restrictions in Minnesota, which led to an ability to post prices and distribute price lists. The result was a decline in price and slightly more variability in price. This latter effect was not predicted by the simple theory; however, the authors suspect it arose from abandoning wide usage of the manufacturer's suggested retail price. Milyo and Waldfogel[97] found that when restrictions on advertising in Rhode Island were eliminated, advertising stores cut prices on products they advertised and on products advertised by rivals. Non-advertising stores did not change prices, and advertising stores did not change prices of items not advertised. Also stores with the initial lower prices were more likely to advertise, and advertising stores drew more consumers.

Availability of Consumer Price Information

Some studies were also done on changes in information. Two studies related to food prices. Glazer[98] used the 1978 newspaper strike in New York City to examine the pattern of price movements compared to neighboring jurisdictions on several commodities whose prices could easily be altered, such as produce and meat. He found that prices went up in stores that normally advertised in the newspapers, relative to stores in other jurisdictions and to stores that did not advertise. He found the effects relatively small and that they declined over time, speculating that individuals may have found other sources of information on prices, such as radio. Grant and Devine[99] used an experiment in two Canadian cities where, in one city, price lists for a market basket of supermarket goods were provided via newspaper advertising and by direct mail to a sample of consumers, while this information was not provided in the other city. The study found that supermarket prices fell in the city with the advertising and mail data compared to the city without it. Food prices eventually declined by 7%, and the variation also declined. Prices began to rise when the public information program was ended.

Product Quality Information

Examining the effect of information on product quality is difficult. We summarize two related studies. Mathios[100] examined the effect of mandatory nutrition labeling on salad dressings. Low fat products advertised fat content on a voluntary basis, but high fat products (which varied in fat content) did not. Following the mandatory labeling, sales in the highest fat products declined significantly, suggesting that consumers used the information to make more desirable choices. Jin and Leslie[101] studied hygiene report cards for restaurants. In 1997, a Los Angeles television program showed unsanitary conditions in some restaurants. Los Angeles County officials

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[96] William Luksetich and Harold Lofgreen, "Price Advertising and Liquor Prices," *Industrial Organization Review*, vol. 4, 1976, pp. 13-25.

[97] Jeffrey Milyo and Joel Waldfogel, "The Effect of Price Advertising on Prices: Evidence in the Wake of 44 Liquormart," *American Economic Review*, vol. 89, December 1999, pp. 1081-1096.

[98] Amihai Glazer, "Advertising, Information and Prices—a Case Study," *Economic Inquiry*, vol. 19, October 1981, pp. 661-671.

[99] D. Grant Devine and Bruce W. Marion, "The Influence of Consumer Price Information on Retail Pricing and Consumer Behavior," *American Journal of Agricultural Economics*, vol. 62, May 1979, pp. 228-237.

[100] Alan D. Mathios, "The Impact of Mandatory Disclosure Laws on Product Choices: An Analysis of the Salad Dressing Market," *Journal of Law and Economics*, vol. 48, October 2000, pp. 651-676.

[101] Ginger Zhe Jin and Philip Leslie, "The Effect of Information on Product Quality: Evidence From Restaurant Hygiene Cards," *Quarterly Journal of Economics*, vol. 118, no. 2, 2003, pp. 409-451.

responded by requiring restaurants to post hygiene quality grade cards. Incorporated cities in the county, however, retained the power to pass their own regulations. In cities that delayed requiring restaurants to post report cards, restaurants could display voluntarily hygiene report cards once an inspection occurred. The authors, by analyzing variations in the timing of implementation of the report card requirement, found evidence that the displaying cards increased hygiene scores, but were concerned that this may have reflected "grade inflation." However, they also found an increase in revenues and a decrease in food-borne illnesses in the areas posting hygiene scores, compared to other areas.

Search Costs and the Internet

In some markets consumers obtain price information with difficulty or at high cost. For example, car buyers traditionally have had to negotiate with car dealers in person. Obtaining a price quote from a dealer can therefore require several hours of effort, from identifying local dealers, traveling to the dealer's lot, and negotiating with salesmen and finance specialists. When obtaining price information is costly, a consumer may settle for a given firm's price, even though further search might have identified a firm with lower prices. The economic theory of search describes a consumer's optimal strategy when obtaining price quotes is costly. A consumer gets a price quote, then either decides to search further or to settle for one of the price quotes he has in hand. An optimal search rule balances the cost of obtaining an additional price quote against the expected gains of further search.[102] If a consumer has previous experience in the market, and knows something about the distribution of prices, then computing an optimal stopping rule for a search is straightforward. If the distribution of prices is unknown, then no known optimal stopping rule exists.

In search theory models, firms cannot price discriminate, but consumers still pay different prices. On average, consumers who search more pay lower prices. Because consumers have different costs of search, different firms will offer different prices. Firms with higher prices earn higher markups on a smaller number of sales, while firms with lower prices have smaller markups but a higher number of sales. If search costs for consumers fall, then both average prices and price dispersion fall.

Prices and the Internet

Many economists expected that the Internet, which enabled the emergence of cheap and efficient price searching mechanisms, would lead to lower prices. Some studies, conducted when the Internet use had just started to spread to the general public, found higher prices online, although later studies tended to show some price reductions. Pricing and marketing techniques have changed as the Internet has evolved, often in different ways for different markets. In addition, studies of Internet pricing have become more sophisticated over time. In general, later studies, and studies of comparison sites, tend to find lower prices as a result of the Internet.

Cars

Lee[103] studied an electronic automobile auction network in Japan and found that prices can be higher than in more traditional markets, even after controlling for quality. This effect might be

[102] Search theory was initiated by George Stigler's article, "The Economics of Information," *Journal of Political Economy*, vol. 69, June 1961, pp. 213-25.

[103] H.G. Lee, "Do Electronic Marketplaces Lower the Price of Goods?" *Communications of the ACM*, vol. 41, January 1998, pp. 73-80. (Based on a review on the ACM website by S. Srinivasan at http://portal.acm.org/

attributable to the reduction in transaction costs and the better matching of desired car type. In two papers, Settlemeyer, Morton, and Silva-Risso[104] examined the effect of the Internet on car prices and found that prices were lower for direct Internet buying. Buyers referred to offline dealerships also paid lower prices, apparently because additional information increases bargaining power and because of the referral service.

Books and CDs

Bailey,[105] in one early Internet pricing study, found that prices for books, CDs, and software in 1996 and 1997 were higher online than in conventional outlets. Brynjolfsson and Smith,[106] however, studying a later period and using a more sophisticated methodology, found prices for books and CDs on the Internet were 9%—16% lower than prices in conventional outlets. Although posted Internet prices showed considerable dispersion, so that an unweighted measure of price variation for Internet sellers exceeded that for conventional sellers, prices weighted by market share varied less than conventional sellers' prices. This effect occurred because sales at a few Internet booksellers, whose prices were relatively close to one another, comprised a large proportion of book sales. Clay, Krishman, Wolff, and Fernandes,[107] in 2001, found that book prices were no lower on the Web than at physical booksellers. They also found evidence of product differentiation, given the higher prices charged by Amazon, compared to both Barnes & Noble online and Borders online. Goolsbee and Chevalier[108] found significant price variability for books on the Internet. Waldfogel and Chen[109] found that those who used price comparison sites reduce their shopping at branded retailers, such as Amazon, by a tenth if performing price comparison, and by a fifth if comparing both price and quality. Price comparison site users reduced purchases from Amazon and from offline chains.

Airline Travel

Verlinda and Lane[110] found an increase in unrestricted airline fares relative to restricted fares as Internet price searches increased, but this difference was statistically insignificant. Over the time period of this study the share of restricted tickets decreased substantially. This trend, on which the authors did not focus, could be interpreted as an increase in quality, as it allows more travelers flexibility in their travel plans. In addition, airline fares had long been subject to comparison

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citation.cfm?id=268122&coll=portal&dl=ACM.)

104 Florence Settlemeyer, Fiona Scott Morton, and Jorge Silva-Risso, "Cowboys or Cowards: Why are Internet Car Prices Lower?" mimeo, November 2005 (also appeared as National Bureau of Economic Research Working Paper 8667, December 2001); and "How the Internet Lowers Prices: Evidence from Matched Survey and Auto Transaction Data," National Bureau of Economic Research Working Paper 11515, August 2005.

105 Joseph Bailey, Electronic Commerce: Prices and Consumer Issues for Three Products: Books, Compact Discs, and Software (Paris: OECD, 1998).

106 Erik Brynjolfsson and Michael D. Smith, "Frictionless Commerce? A Comparison of Internet and Conventional Retailers," *Management Science*, vol. 46, April 2000, pp. 563-585.

107 Karen Clay, Ramayya Krishman, Eric Wolff, and Danny Fernandes, "Retail Strategies on the Web: Price and Non Price Competition in the Online Book Industry," *Journal of Industrial Economics*, vol. 49, December 2001, pp. 521-540.

108 Austan Goolsbee and Judith Chevalier, "Measuring Prices and Price Competition Online: Amazon and Barnes & Noble," National Bureau of Economic Research working paper 9085, July 2002.

109 Joel Waldfogel and Lu Chen, "Does Information Undermine Brand? Information Intermediary Use and Preference for Branded Web Retailers," National Bureau of Economic Research working paper 9942, September 2003.

110 Jeremy A. Verlinda and Leonard Lane, "The Effect of the Internet on Pricing in the Airline Industry," working paper, November 2004, available at http://www.ags.uci.edu/~verlinda/papers/verlinda-lane-final.pdf.

through travel agents, which means the increase in information may not have been as great for this product as for other products. Clemons, Hann, and Hitt found similar tickets on different sites in 1997 varied on average by 18%.[111] By 2002, Chen found these differences had narrowed to 0.3%-2.2% for fares available at multiple travel websites.[112] This convergence appears to stem from several major changes in the air travel market. First, the launch of several online ticket agencies and airlines' efforts to promote their own direct ticketing websites have substantially changed the online travel market. Between 1997 and 2002, use of online travel agencies increased elevenfold. Second, more consumers buy air tickets on the Internet. According to one recent estimate, 60% of travelers buy tickets on-line.[113]

Life Insurance

Brown and Goolsbee[114] found that the appearance of Internet sites which allowed for comparisons among term life insurance policies led to significant decreases in prices. This study found that an increase in the share of individuals using the Internet comparisons of 10% led to a 5% decrease in price.

Summary of Internet Studies

The evidence from Internet studies is mixed, and it is, of course, possible that Internet purchasers are willing to pay higher prices to purchase on the Internet because of the reduction in transactions cost or other advantages.

The characteristics of the Internet as it evolves have complex effects on marketing and pricing strategies. The Internet is well suited to increasingly sophisticated price comparison tools, which tend to reduce prices and price dispersion for those who use them. The evidence on the use of comparison sites (as opposed to direct sales on the Internet), which may be most relevant to the question at hand, seems to suggest that having access to direct price comparisons reduces prices when consumers use price comparison sites. Baye and Morgan contend that prices reached via price comparison sites are lower than prices obtained directly from a vendor's website.[115]

On the other hand, some Internet characteristics make entry of new firms difficult. Internet traffic patterns show strong winner-take-all features: a small number of websites account for a large proportion of total traffic. Designing, building, and maintaining a major retail website are expensive tasks. Some Internet sellers have been able to establish strong brand identification that permits higher prices. Because of these characteristics, in some product markets a few dominant firms may be able to maintain substantial market power in the Internet Age. Highly visible firms, however, can be vulnerable to public pressure, as the case of Amazon's dynamic pricing experiment illustrates.

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[111] E.K. Clemons, I. Hann, and L.M. Hitt, "Price Dispersion and Differentiation in Online Travel: An Empirical Investigation," *Management Science*, vol. 48, no. 4, 2001, pp. 521-39.

[112] Jihui Chen, "Difference in Average Prices on the Internet: Evidence from the Online Market for Air Travel," *Economic Inquiry*, vol. 44, no. 4, October 2006, pp. 656-670.

[113] Ibid., p.656.

[114] Jeffrey R. Brown and Austan Goolsbee, "Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry," *Journal of Political Economy*, vol. 110, June 2002, pp. 481-507.

[115] Michael R. Baye and John Morgan, "Information Gatekeepers and Price Discrimination on the Internet," *Economic Letters*, vol. 76, no. 1 (June), pp. 47-51.

Empirical Research on Price Transparency: Conclusions

Most research suggests that when better price information is available prices for goods sold to consumers fall. The largest and most straightforward body of evidence relates to the effect of advertising, where nearly all research indicates advertising prices is associated with lower prices. This reduction in prices suggests that advertising's increased information on prices and increases in competition outweigh any tendency to increase prices through increasing demand and brand identification. Evidence on price comparison sites on the Internet also seems to support this view. (Again, this conclusion may not apply to current manufacturers' drug advertising that does not include price information.)

Evidence for markets in intermediate goods is more complicated. When middlemen are involved the effects of price transparency depend on the particulars of market structure. Price transparency gives buyers and sellers important information about the true economic value of goods, services, or assets, but may also enable traders to observe deviations from collusive practices. Allowing weaker bargainers to see prices negotiated by stronger bargainers will change incentives facing buyers and sellers, and can lead to price increases. In financial markets dealers need to trade with other dealers on a frequent basis to rebalance portfolios and take actions to maintain liquidity, which leads to a complex relationship among price transparency, trading costs, and market efficiency. Studies in experimental financial economics suggest that price transparency can either increase or decrease prices.[116] In short, how price transparency affects intermediate goods markets is an active area of research, and settled conclusions have not yet been reached.

In traditional economic theory consumers react to price differences because lower prices mean that consumers can buy more goods and services. The unwillingness of consumers to pay higher prices imposes market discipline upon firms. Other mechanisms, however, may act to discipline firms as well. Firms that charge unusually high prices may face political or legal pressure. For example, sellers of gasoline may face complaints of price gouging with sharp price increases, as happened in some states following Katrina.[117] Also consumers are willing to punish firms by not doing business with them, even if this action reduces the welfare of consumers. For example, many consumers reported that they had resolved not to buy from Amazon.com after experiencing "dynamic pricing," even if this meant that they would pass up advantageous offers in the future.[118] NASDAQ spreads narrowed not because of consumer pressure, but because NASDAQ administrators feared adverse media coverage and lawsuits filed by investors and regulators. Thus, price transparency may impose discipline upon firms, even if this occurs through non-market mechanisms.

[116] For instance, Glosten notes that one experimental study found that "transparency involves lower spreads and more 'efficient' prices," while another study found that "transparency involves lower spreads and *less* 'efficient' prices (emphasis added)." See Lawrence R. Gloten, "Introductory Comments: Bloomfield and O'Hara, and Flood, Juisman, Koedijk, and Mahieu," *Review of Financial Studies*, vol. 12, no. 1, 1999, pp. 1-3.

[117] James McPherson, "Retail Gas Prices Jump, Deliveries Falter as Katrina's Energy Effects Spread," September 1, 2005, available at http://www.signonsandiego.com/news/nation/20050901-0605-katrina-gasprices html.

[118] David Streitfeld, "On the Web, Price Tags Blur," *Washington Post*, September 27, 2000, p. A1.

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United States Government Accountability Office

GAO

Report to Congressional Requesters

September 2011

HEALTH CARE PRICE TRANSPARENCY

Meaningful Price Information Is Difficult for Consumers to Obtain Prior to Receiving Care

U.S. Government Accountability Office

GAO 90 YEARS 1921-2011

ACCOUNTABILITY ★ INTEGRITY ★ RELIABILITY

September 2011

GAO Accountability * Integrity * Reliability

Highlights

Highlights of GAO-11-791, a report to congressional requesters

HEALTH CARE PRICE TRANSPARENCY

Meaningful Price Information Is Difficult for Consumers to Obtain Prior to Receiving Care

Why GAO Did This Study

In recent years, consumers have become responsible for a growing proportion of the costs of their health care. Health care price information that is transparent—available before consumers receive care—may help consumers anticipate these costs. Research identifies meaningful types of health care price information, such as estimates of what the complete cost will be to the consumer for a service. GAO defines an estimate of a consumer's complete health care cost as price information on a service that identifies a consumer's out-of-pocket cost, including any negotiated discounts, and all costs associated with a service or services. GAO examined (1) how various factors affect the availability of health care price information for consumers and (2) the information selected public and private health care price transparency initiatives make available to consumers. To do this work, GAO reviewed price transparency literature; interviewed experts; and examined a total of eight selected federal, state, and private insurance company health care price transparency initiatives. In addition, GAO anonymously contacted providers and requested the price of selected services to gain a consumer's perspective.

What GAO Recommends

GAO recommends that the Department of Health and Human Services (HHS) determine the feasibility of making estimates of complete costs of health care services available to consumers, and, as appropriate, identify next steps. HHS reviewed a draft of this report and provided technical comments, which GAO incorporated as appropriate.

View GAO-11-791. For more information, contact Linda T. Kohn at (202) 512-7114 or kohnl@gao.gov.

What GAO Found

Several health care and legal factors may make it difficult for consumers to obtain price information for the health care services they receive, particularly estimates of what their complete costs will be. The health care factors include the difficulty of predicting health care services in advance, billing from multiple providers, and the variety of insurance benefit structures. For example, when GAO contacted physicians' offices to obtain information on the price of a diabetes screening, several representatives said the patient needs to be seen by a physician before the physician could determine which screening tests the patient would need. According to provider association officials, consumers may have difficulty obtaining complete cost estimates from providers because providers have to know the status of insured consumers' cost sharing under health benefit plans, such as how much consumers have spent towards their deductible at any given time. In addition to the health care factors, researchers and officials identified several legal factors that may prevent the disclosure of negotiated rates between insurers and providers, which may be used to estimate consumers' complete costs. For example, several insurance company officials GAO interviewed said that contractual obligations with providers may prohibit the sharing of negotiated rates with the insurer's members on their price transparency initiatives' websites. Similarly, some officials and researchers told GAO that providers and insurers may be concerned with sharing negotiated rates due to the proprietary nature of the information and because of antitrust law concerns.

The eight public and private price transparency initiatives GAO examined, selected in part because they provide price information on a specific health care service by provider, vary in the price information they make available to consumers. These initiatives include one administered by HHS, which is also expected to expand its price transparency efforts in the future. The price information made available by the selected initiatives ranges from hospitals' billed charges, which are the amounts hospitals bill for services before any discounts are applied, to prices based on insurance companies' contractually negotiated rates with providers, to prices based on claims data that report payments made to a provider for that service. The price information varies, in large part, due to limits reported by the initiatives in their access or authority to collect certain price data. In addition to price information, most of the selected initiatives also provide a variety of nonprice information, such as quality data on providers, for consumers to consider along with price when making decisions about a provider. Lastly, GAO found that two of the selected initiatives—one publicly available with information only for a particular state and one available to members of a health insurance plan—are able to provide an estimate of a consumer's complete cost. The two initiatives are able to provide this information in part because of the type of data to which they have access—claims data and negotiated rates, respectively. For the remaining initiatives, they either do not use more meaningful price data or are constrained by other factors, including concerns about disclosing what providers may consider proprietary information. As HHS continues and expands its price transparency efforts, it has opportunities to promote more complete cost estimates for consumers.

Contents

Abbreviations

AHRQ	Agency for Healthcare Research and Quality
APCD	All Payer Claims Database
CMS	Centers for Medicare and Medicaid Services
CPT	Current Procedural Terminology
DOJ	Department of Justice
FEHB	Federal Employee Health Benefits
FTC	Federal Trade Commission
HHS	Department of Health and Human Services
OPM	Office of Personnel Management
PPACA	Patient Protection and Affordable Care Act
WHA	Wisconsin Hospital Association

GAO
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United States Government Accountability Office
Washington, DC 20548

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Congressional Requesters

Health care spending increased in recent years by an average of nearly 7 percent per year, from $1.4 trillion in 2000 to $2.5 trillion in 2009.[1] Consumers are becoming responsible for a growing proportion of this spending, such as in the case of those with insurance who face increased use of high-deductible health plans and other forms of cost sharing.[2] For example, from 2006 to 2010, the percentage of covered workers enrolled in high-deductible health plans increased from 4 percent to 13 percent, and the percentage of covered workers with a deductible of $1,000 or more for single coverage almost tripled, from 10 percent to 27 percent.[3] Depending upon the insurance plan, insured consumers are generally responsible for the cost of health care services until their deductible has been met. Even after reaching their deductibles, consumers may face significant out-of-pocket costs, such as fees associated with care received from a physician, laboratory, or hospital that are outside of an insurance network and may also bill for their services separately. Consumers without health insurance are also responsible for the cost of their care, and without a third party to negotiate on their behalf these consumers are generally responsible for paying what the provider charges, minus any agreed-to discounts, rather than discounted rates negotiated between the insurer and provider.

[1]Office of the Actuary, Centers for Medicare and Medicaid Services, *National Health Expenditures Tables*, table 1, accessed November 23, 2010, https://www.cms.gov/NationalHealthExpendData/downloads/tables.pdf.

[2]Many health plans require enrollees to pay a portion of their health care costs up to a certain threshold, known as the deductible. A high deductible health plan is defined by the Internal Revenue Service (IRS) as a health plan with a higher annual deductible than typical health plans and has a maximum limit on the annual deductible and out-of-pocket medical expenses (including copayments but not premiums) that a consumer would pay. For 2011, the IRS set the minimum annual deductible for single coverage in a high deductible health plan at $1,200 and the maximum annual deductible and other out-of-pocket expense at $5,950. IRS Pub. 969, (2011), p. 3.

[3]The Kaiser Family Foundation and Health Research & Educational Trust, *Employer Health Benefits 2010 Annual Survey* (2010).

Consumers generally learn of their health care costs after receiving care, such as when they receive a bill from their provider or an explanation of benefits from their insurer. In contrast, information on health care prices is considered transparent when this information is available to consumers before they receive health care services.[4] Transparent health care price information may help consumers anticipate their health care costs and reduce the possibility of unexpected expenses. When accompanied by information on the quality of care, transparent price information may also help consumers make more informed choices about their care. Specifically, research suggests that health care price transparency is most relevant for consumers who are having services that can be planned for in advance.[5] Researchers have identified characteristics of the most meaningful types of transparent price information, such as information that includes estimates of what the complete cost will be to a consumer for a service or services.[6] Based on this research, we define an estimate of a consumer's complete health care cost as price information on a health care service or services that (1) reflects any negotiated discounts; (2) is inclusive of all costs to the consumer associated with a service or services, including hospital, physician, and lab fees; and (3) identifies a consumer's out-of-pocket cost.

In recent years various federal, state, and private sector efforts have been initiated to make health care price information available to consumers. Federal efforts include various price transparency initiatives administered by the Department of Health and Human Services (HHS) and Centers for Medicare and Medicaid Services (CMS) that provide price information on health care services, prescription drugs, and health insurance plans. For

[4]In this report, we generally refer to "price" as information that is made available to the public by, for example, an insurer or state price transparency initiative. We generally refer to "cost" as a type of price information that is reflective of what a consumer may be expected to pay for a health care service.

[5]For example, to assist decision making, research suggests that health care price transparency is most relevant for consumers who are having services that are nonurgent, such as a knee replacement, or not complex, such as a colonoscopy. See, for example, Paul Ginsburg. "Shopping for Price in Medical Care," *Health Affairs*, vol. 26, no. 2 (2007).

[6]In addition to identifying consumers' out-of-pocket costs, research suggests that price information should also be actionable, easy to understand, easily available, timely, credible, and be paired with quality information. See, for example, Quality Alliance Steering Committee, *Recommendations for Reporting Cost and Price Information to Consumers*, accessed August 18, 2010, www.healthqualityalliance.org/.../Cost-Price%20Recommendations_Final.pdf.

example, HHS provides price information on insurance plans, such as the amount of cost-sharing and premium rates for specific plans, through its healthcare.gov website. In addition, CMS's Medicare Plan Finder provides information on prescription drug prices, and CMS's Health Care Consumer Initiatives provide information on the price Medicare pays for common health care services by various geographic areas.[7] At the state level, the National Conference of State Legislatures reports that at least 30 states have proposed or enacted some form of price transparency legislation,[8] and a report by America's Health Insurance Plans, an industry group, states that at least 25 states have price transparency initiatives that provide publicly accessible websites with health care price information.[9] Additionally, with the enactment of the Patient Protection and Affordable Care Act (PPACA) in 2010, hospitals operating in the United States are required annually to make public and update a list of their hospital's standard charges for items and services provided by the hospital.[10]

In addition to existing price transparency initiatives, more efforts are planned that may increase the amount of health care price information available to consumers. For example, under PPACA, Health Insurance Exchanges for each state must be developed by January 1, 2014, to facilitate the purchase of qualified health plans and assist small

[7]Specifically, CMS's online Medicare Plan Finder tool enables consumers to compare both the prices of prescription drugs and Medicare Part D prescription drug coverage plans. Another CMS initiative, entitled Health Care Consumer Initiatives, provides price information based on what Medicare pays for common health care services at the county or other geographic areas, state, and national levels. Additionally, in June 2011, CMS proposed rules to allow organizations that meet certain qualifications to access Medicare claims data in an effort to help consumers and employers select high-quality, low-price health care providers. 76 Fed. Reg. 33567 (June 8, 2011).

[8]National Conference of State Legislatures, *State Legislation Relating to Transparency and Disclosure of Health and Hospital Charges* (Updated December 2010), accessed June 9, 2011, http://www.ncsl.org/default.aspx?tabid=14512. GAO did not independently verify the laws reviewed in this study. State price transparency legislation makes price information available to consumers through various forms, such as requiring hospitals to make information available upon request or requiring hospitals to submit price information to a state agency that makes the information publicly available.

[9]America's Health Insurance Plans, *Health Care Provider Financial Information: State Reporting Requirements* (January 2011).

[10]PPACA, § 1001, 124 Stat. 119, 130-8, amended by § 10101(f), 124 Stat. 119, 885-7 (codified at 42 U.S.C. § 300gg-18).

employers in facilitating enrollment of their employees in these health plans.[11] The Exchanges must require participating health plans to permit individuals to learn through a website or other means the amount of cost sharing, such as deductibles and copayments, for which they would be responsible when receiving specific health care services if covered under each company's insurance plan.[12]

In light of consumers' increased responsibility for paying the costs of their health care and efforts aimed at making price information transparent, you asked us to study the extent to which health care price information actually is available to consumers and other interested parties. This report describes (1) how various factors affect the availability of health care price information for consumers and (2) the information selected public and private health care price transparency initiatives make available to consumers and other interested parties.

To describe how various factors affect the availability of health care price information for consumers, we reviewed relevant literature, such as reports from the Congressional Budget Office and the Center for Studying Health System Change.[13] In addition to reviewing relevant literature, we interviewed researchers who have expertise in health care price

[11]PPACA, § 1311, 124 Stat. 119, 173-181, amended by § 10104(f), 124 Stat. 119, 900-01 (codified at 42 U.S.C. § 18031(e)(3)(C)). States have flexibility in designing their Exchanges to meet local needs, as long as the health insurance plans offered meet minimum certification standards established by the federal government. The federal government is exploring ways to partner on an Exchange with states that will not be certified by January 1, 2014.

[12]PPACA, § 10104(f), 124 Stat. 119, 900-01 (codified at 42 U.S.C. § 18031(e)(3)(C)). To implement these Exchanges, HHS has issued guidance and has begun the rulemaking process. For example, in July 2011, CMS issued proposed rules that include requirements that states must meet if they elect to establish and operate an Exchange and requirements that health insurance plans must meet to participate in the Exchanges, among other things. For more information, see 76 Fed. Reg. 41,866 (July 15, 2011) and 76 Fed. Reg. 41930 (July 15, 2011). Additionally, according to CMS officials, healthcare.gov also provides cost sharing information such as deductible and out-of-pocket costs for consumers.

[13]We identified relevant literature by searching on an Internet search engine using the term "health care price transparency" in conjunction with the following terms: "legal barriers," "regulatory barriers," "factors," "antitrust laws," "violation of privacy," "proprietary," and "barriers to." Additionally, we searched the Congressional Budget Office's and Congressional Research Service's websites, as well as previous work conducted by GAO.

transparency;[14] a selection of hospital, physician, and insurer associations; officials from two of the largest insurance companies by enrollment; and officials from the selected public and private price transparency initiatives in our review (see below for information on how we selected these initiatives). In our review of relevant literature and interviews with officials, we focused on identifying factors that affect the availability of health care price information, including estimates of complete costs to consumers. To provide illustrative examples of how the factors we identified may affect the availability of health care price information, including estimates of consumers' complete costs, and to gain the perspective of consumers on this issue, we anonymously contacted representatives from 39 providers—19 hospitals and 20 primary care physician offices. From these providers we requested price information on two selected health care services: full knee replacement surgery and diabetes screening. We randomly selected these hospitals and physicians from a health care market in Colorado, which requires certain providers to make price information on selected services available to consumers upon request.[15] We did not assess the accuracy of the price information provided by these selected providers, nor did we evaluate the effectiveness of Colorado's law. (See app. I for more information about our methodology for selecting and contacting hospitals and physicians and the information we obtained.)

To describe the information selected public and private price transparency initiatives make available to consumers and other interested parties, we judgmentally selected a total of eight price transparency initiatives that met our definition of a price transparency initiative—initiatives that make provider-specific price information on a specific health care service available to consumers and other interested parties.[16]

[14]To identify researchers with subject-matter expertise we reviewed relevant literature and selected researchers who testified before Congress in matters related to price transparency or who authored relevant literature.

[15]Specifically, Colorado requires each licensed hospital to disclose, upon request, the average facility charge to a person seeking care or treatment for a frequently performed inpatient procedure prior to admission for such a procedure. Colo. Rev. Stat. § 6-20-101 (2011). We selected Colorado in part because its law does not specify the manner in which consumers may request price information from hospitals, thus making the state more suitable for requests by telephone.

[16]For the purposes of this study, we are excluding initiatives that are focused solely on providing the prices of prescription drugs or insurance plans.

Specifically, our eight selected initiatives include: one federal price transparency initiative, which was the only federal price transparency initiative we identified that met our definition;[17] five state initiatives,[18] which we selected based on input from researchers with subject-matter expertise and on the initiatives' geographic variation; and two private initiatives, which we selected from among those provided by the top 10 insurance companies by enrollment in 2009 and based upon input from researchers with subject-matter expertise.[19] See table 1 for a summary of the eight public and private initiatives that we selected.

[17]We also reviewed the Office of Personnel Management's (OPM) Federal Employee Health Benefits (FEHB) program. OPM administers this program by setting price transparency expectations, such as a minimum number of health care services to include, for insurance companies that participate in FEHB. Due to the third party relationship of OPM in providing price information to consumers, we do not discuss OPM's price transparency initiative along with the other selected price transparency initiatives. In addition, the federal government has other price transparency initiatives that do not meet our definition of a price transparency initiative, such as HHS's Medicare Plan Finder and healthcare.gov.

[18]In some cases, a statewide initiative is administered by a private third party entity, such as a state hospital association, but the state has a role in its initiation, regulation, or ongoing development of the price transparency initiative. In these cases, we have classified these as "public (state) initiatives" for the purpose of our review.

[19]In our review we identified several types of private sector price transparency initiatives, such as websites that aggregate price information from public sources and companies that contract with employers to provide health care price information for the company's employees.

Table 1: Selected Public and Private Sector Price Transparency Initiatives

Type of initiative	Administrating entity and name of price transparency initiative
Public (federal)	Centers for Medicare and Medicaid Services Hospital Compare
Public (state)	California Common Surgeries and Charges Comparison
	Florida Health Finder
	Massachusetts MyHealthCareOptions
	New Hampshire HealthCost
	Wisconsin Hospital Association PricePoint[a]
Private	Aetna Member Payment Estimator
	Anthem Care Comparison

Source: GAO.

[a]In some cases, a statewide initiative is administered by a private third party entity, such as a state hospital association, but the state has a role in its initiation, regulation, or ongoing development of the price transparency initiative. In these cases, we have classified these as "public (state) initiatives" for the purpose of our review.

For each of the eight initiatives we selected, we interviewed officials and reviewed documentation to identify the types of health care price and other information these initiatives make available—including the extent to which the initiatives make available price information that includes estimates of consumers' complete costs for health care services. As part of this documentation review, we also reviewed the information available to consumers on the selected initiatives' websites.

We conducted this performance audit from November 2010 to September 2011, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Research indicates that making price and other contextual information available is important for consumers to be able to anticipate the costs of their care and also to make informed health care decisions. In recent years, many public and private price transparency initiatives have been initiated to provide consumers with information about the price of their health care services.

Health Care Pricing

Determining the price of a health care service often involves coordination between providers, insurers, and consumers. Providers, such as hospitals or physicians, charge consumers fees for the services they receive, which are known as billed charges. Payers, such as insurance companies, often have contractual agreements with providers under which the payers negotiate lower payment rates for a service on behalf of their members or beneficiaries. These rates are known as negotiated rates. In the case of Medicare specifically, CMS sets the program's payment rates for providers based on a formula that includes several factors, such as geographic location.

For consumers with health insurance, their out-of-pocket costs for a health care service is determined by the amount of cost sharing specified in the benefits of their health insurance plan for services covered by the insurer. For consumers who lack health insurance, they are often billed for the full amount charged by the provider, such as a billed charge from a hospital. The estimated out-of-pocket cost for an uninsured consumer will typically be the billed charge for a health care service minus any charity care or discounts that may be applied by the provider.[20]

Health Care Services and Episodes of Care

Providers and payers often price health care services using the various codes used by health care professionals. For example, physicians may bill for their services based on Current Procedural Terminology (CPT) codes developed by the American Medical Association. Individual health care services, such as those referred to by individual CPT codes, can be grouped or bundled together into an episode of care, which refers to a group of health care services associated with a patient's condition over a defined period of time. An episode of care for a knee replacement, for example, includes multiple services such as those provided during the actual surgery, as well as preoperation and postoperation consultations.

[20]Some research indicates that uninsured patients rarely pay the full billed charge, and amounts charged may be heavily discounted based on charity care or other reduced payment programs. For example, one source estimates that most hospitals in the United States collect only 5 percent or less of billed charges from uninsured patients. See, for example, William O. Cleverly, Paula H. Song, and James O. Cleverly, *Essentials of Health Care Finance*, 7th ed. (Sudbury, MA: Jones & Bartlett Learning, 2011). For more information also see, Uwe E. Reinhardt, "The Pricing of U.S. Hospital Services: Chaos Behind a Veil of Secrecy," *Health Affairs*, 25, no. 1 (2006); and Mark Merlis, "Health Care Price Transparency and Price Competition," National Health Policy Forum (Mar. 28, 2007).

The episode of care would also include services provided by various providers who typically bill separately, such as a hospital, surgeon, and anesthesiologist. PPACA requires HHS to develop a national pilot program, which may include bundled payments for episodes of care surrounding certain hospitalizations, in order to improve the coordination, quality, and efficiency of health care services.[21]

Importance of Quality and Other Contextual Information

According to researchers, it is important for consumers to have access to quality of care and other information to provide context to the price information and help consumers in their decision making. For example, according to the Agency for Healthcare Research and Quality (AHRQ),[22] appropriate quality of care information for consumers may include the mortality rates for a specific procedure, the percentage of patients with surgical complications or postoperative infections, or the average length of stay, among other measures.[23] By combining quality and price information, some researchers argue that consumers can then use this information to choose providers with the highest quality and the lowest price—thereby obtaining the greatest value when purchasing care.[24] Furthermore, some research suggests that information on volume (the number of services performed) may be used as an indication of quality for

[21]PPACA, § 3023, 124 Stat. 119, 399 (codified at 42 U.S.C. § 1395cc-4).

[22]AHRQ is an agency within HHS, whose mission is to improve the quality, safety, efficiency, and effectiveness of health care by using evidence to improve health care, improving health care outcomes through research, and transforming research into practice. AHRQ also sponsors the Healthcare Cost and Utilization Project which is a family of health care databases and related software tools developed through a federal-state-industry partnership to build a multistate health data system for health care research and decision making. These databases include clinical and nonclinical information, such as charges for all patients regardless of payer by various regions and areas in the United States. We did not include this project in our study because it did not meet our definition of a price transparency initiative.

[23]Specifically, these measures are part of AHRQ's Talking Quality program which provides guidance for sponsors of consumer reports on health care quality. The specific measures cited above relate to the Institute of Medicine's six domains of health care quality, which includes patient safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity measures.

[24]For more information on our work on value in health care, see GAO, *Value in Health Care: Key Information for Policymakers to Assess Efforts to Improve Quality While Reducing Costs*, GAO-11-445 (Washington, D.C.: July 26, 2011).

certain procedures.[25] This assumes a positive association between the number of times a provider administers a service and the quality of the service provided. Information about previous patients' satisfaction with a provider's service can also help consumers make decisions about their health care.

Development and Use of Public and Private Price Transparency Initiatives

Public price transparency initiatives often began in response to laws or orders requiring an agency or organization to make price information available to consumers, while private sector initiatives started primarily through voluntary efforts. For example, in response to a 2006 federal executive order to promote quality and efficiency in federal health care programs, federal agencies that administer or sponsor a health care program were directed, among other things, to make available to enrollees the prices paid for health care services.[26] In response, agencies including HHS (including its component agencies such as CMS and AHRQ) and OPM began to make health care price information available. Similarly, over 30 states have proposed or enacted some type of price transparency legislation, though what is actually required varies greatly across the states.[27] For example, some states, such as Colorado and South Dakota, require hospitals to disclose, upon request, the expected or average price for the treatment requested.[28] In contrast, some states, such as Maine and Minnesota, require that certain health care price information be made publicly available through an Internet website.[29] While many public price transparency initiatives began as a result of legislation, private sector price transparency initiatives, such as insurance company initiatives, were established voluntarily for various reasons. For

[25]See, for example, E.A. Halm, C. Lee, and M.R. Chassin, "Is Volume Related to Outcome in Health Care? A Systematic Review and Methodologic Critique of the Literature" *Annals of Internal Medicine*, vol. 137, no. 6 (2002).

[26]Exec. Order No. 13,410, 71 Fed. Reg. 51,089 (Aug. 28, 2006). The executive order also directed agencies to improve usage of health information technology, implement programs to measure quality of services, and identify and develop approaches that facilitate high-quality and efficient health care.

[27]National Conference of State Legislatures, *State Legislation Relating to Transparency and Disclosure of Health and Hospital Charges* (Updated December 2010), accessed June 9, 2011, http://www.ncsl.org/default.aspx?tabid=14512.

[28]Colo. Rev. Stat. § 6-20-101 (2011), S.D. Codified Laws § 34-12E-8 (Michie 2010).

[29]Me. Rev. Stat. Ann. title 22 § 8712(2) (West 2011), Minn. Stat. § 62J.82 (2011).

example, insurance officials that we spoke with said their price transparency initiatives started for reasons such as increased interest from employers to curb costs, to gain a competitive edge over other insurance companies without price transparency initiatives, and to help their members become better health care consumers. Other private price transparency initiatives, such as Health Care Blue Book and PriceDoc, were started to help consumers find and negotiate fair prices for health care services.[30]

Though both public and private price transparency initiatives have become more widespread in the last 5 years, some research suggests that even if consumers have access to price information, such as price information made available by these initiatives, they may not use such information in their decision making.[31] For example, insured consumers may be less sensitive to prices, since the financial costs of selecting one provider over another may be borne by the insurer, not the consumer. Despite these concerns, some research indicates that consumers want access to price information before they receive health care services and have tried to use price information to some degree to inform their decision making.[32] Furthermore, research states that incentives may be helpful to further consumers' use of transparent price information. Specifically, financial incentives may include insurers providing lower out-of-pocket costs for their members if they select low-price, high-quality providers.[33]

[30]See http://healthcarebluebook.com/ and http://www.pricedoc.com/ for more information.

[31]See, for example, Congressional Research Service, *Does Price Transparency Improve Market Efficiency? Implications of Empirical Evidence in Other Markets for the Health Sector*, RL34101 (Apr. 29, 2008); and Paul Ginsburg, "Shopping for Price in Medical Care," *Health Affairs*, vol. 26, no. 2 (2007).

[32]See, for example, The Commonwealth Fund Commission on a High Performance Health System, *Data Brief – Health Care Opinion Leaders' Views on the Transparency of Health Care Quality and Price Information in the United States* (New York: The Commonwealth Fund, November 2007).

[33]See for example, Paul Ginsburg, "Shopping for Price in Medical Care," *Health Affairs*, vol. 26, no. 2 (2007).

Various Health Care and Legal Factors Make Estimates of Consumers' Complete Costs Difficult to Obtain

Several health care and legal factors can make it difficult for consumers to obtain price information—in particular, estimates of their complete costs—for health care services before the services are provided. The health care factors include the difficulty of predicting in advance all the services that will be provided for an episode of care and billing services from multiple providers separately. In addition, according to researchers and officials we interviewed, legal factors, such as contractual obligations, may prevent insurers and providers from making available their negotiated rates, which can be used to estimate consumers' complete costs.

Various Factors, Such as the Difficulty of Predicting Health Care Services in Advance, Billing from Multiple Providers, and the Variety of Insurance Benefit Structures, Can Make Estimates of Consumers' Complete Costs Difficult to Obtain

One factor that may make it difficult for consumers to obtain estimates of their complete costs for a health care service is that it may be difficult for providers to predict which services a patient will need in advance. Specifically, physicians often do not decide what services their patients will need until after examining them. Researchers and officials we spoke with commented that health care services are not standardized across all patients because of each patient's unique circumstances, which influence the specific services a physician would recommend. For example, when we anonymously contacted 20 physicians' offices to obtain information on the price of a diabetes screening, several representatives said the patient needs to be seen by a physician before the physician would know what tests the patient would need.[34]

In addition, even after identifying what health care service or services a patient may need, additional aspects associated with the delivery of a service may be difficult to predict in advance, such as the length of time a patient stays in a hospital. This factor can make it challenging for providers to estimate consumers' complete costs in advance. For example, when we anonymously contacted 19 hospitals to obtain information on the price of a full knee replacement surgery, several hospital representatives quoted a range of prices, from about $33,000 to about $101,000. The representatives explained that the price for the procedure could vary based on a variety of factors, such as the time the patient will be in the operating room and the type of anesthetic the patient

[34]See appendix I for the information we obtained when contacting selected providers about the price of selected health care services.

may receive, and some noted that they would need to know this information if they were to provide a more specific price estimate.

Several hospital and physician office representatives we spoke with recommended that insured consumers contact their insurer for complete cost information; however, the inability to predict which health care services will be needed in advance also makes it challenging for insurers to provide complete cost estimates. Officials from an insurer association commented that, if asked by their members for cost estimates, insurance company representatives may require more information—such as the CPT codes for the services a patient will receive—before the insurers can provide a cost estimate. However, in the instances when providers cannot predict in advance the codes for which they will bill, consumers will be unable to provide the respective codes to insurers and obtain complete cost estimates from them.

Another factor is that many services included in one episode of care may be provided by multiple providers, such as a hospital and surgeon, who bill for their services separately. This makes obtaining complete cost information challenging because, in these cases, consumers may have to contact multiple providers to obtain estimates of their complete costs. Many providers can only give price estimates in advance for the services that they provide, and are often unaware of the prices for services performed by other providers. For example, when we contacted hospitals anonymously for the price of a full knee replacement, none were able to provide information on the complete cost to consumers for this service. The hospital representatives we contacted who could provide price information were only able to provide us with the hospital's estimated charges or a Medicare deductible amount for the service and could not provide us with the charges associated with the other providers involved in the service, such as a surgeon or anesthesiologist. Charges from these providers are typically billed separately from the hospital's charges, even though some of these services are provided in the hospital. Similarly, when we called physicians' offices to obtain information on the price of a diabetes screening, most representatives could not tell us how much the associated lab fees would cost and some noted that this was because the lab fees are billed separately. Several hospital and physician office representatives we spoke with suggested we contact the other providers, such as a surgeon or lab, separately in order to obtain information on the price of these services. However, officials from a provider association questioned how consumers would even know which providers to contact to get price information if the consumers do not know all of the different providers who are involved in an episode of care in advance.

Lastly, consumers may have difficulty obtaining complete cost estimates from providers because providers are often unaware of these costs due to the variety of insured consumers' health benefit structures. For example, according to officials from a provider association, physicians may have difficulty accessing insured consumers' health benefit plan information, and thus may not be able to provide estimates of consumers' out-of-pocket costs under their specific benefit plans. For example, officials stated that for physicians to inform a patient about the price of a health care service in advance they have to know the status of consumers' cost sharing under their specific health benefit plan, such as how much consumers have spent in out-of-pocket costs or towards their deductible at any given time. Without this information, physicians may have difficulty providing accurate out-of-pocket estimates for insured consumers. In addition, different consumers may have out-of-pocket costs that vary within the same benefit plan, which adds to the variety of potential costs a patient could have, and creates complexity for providers in providing complete cost estimates to consumers.

Officials from provider associations commented that insurers should be responsible for providing complete cost information to their insured customers because insurers can provide price information specific to insured consumers' situations. However, insurers may also have difficulty estimating consumers' complete costs. Specifically, according to a 2007 report by the Healthcare Financial Management Association, many insurers do not have data systems that are capable of calculating real-time estimates of complete costs for their members prior to receiving a service.[35] As a result, insurers may have difficulty maintaining real-time data on how much their members have paid towards their deductibles, which could affect an estimate of the complete cost.

Additionally, according to officials from an insurance company, it is difficult for insurers to estimate complete costs when insured customers receive services from providers that are outside of the insurer's network. These estimates may be difficult to provide because insurers have not negotiated a rate with providers out of the insurer's network, and thus may be unaware of these providers' billed charges before a service is

[35]For more information, see "The Opportunity of Price Transparency," *Healthcare Financial Management Association* (2007): 4. The Healthcare Financial Management Association is an organization that seeks to provide education, analysis, and guidance, among other things, to health care finance professionals.

given. Officials from an insurance company explained that this concern is especially a problem for their members who go to an in-network hospital and are seen by a nonparticipating physician within that hospital during their visit. The officials explained that this can occur without the patient's knowledge because patients often do not choose certain providers, such as radiologists or anesthesiologists, and consumers may be faced with significant out-of-pocket costs.

Researchers and Officials Identify Legal Factors That May Prevent the Disclosure of Negotiated Rates, Which Can Be Used to Estimate Consumers' Complete Costs

Researchers and officials we interviewed identified several legal factors that may prevent providers and insurers from sharing negotiated rates, which can be used to estimate consumers' complete costs. First, some officials stated that some contractual obligations between insurers and providers prohibit the disclosure of negotiated rates with anyone outside of the contracting entities, such as an insurer's members.[36] Specifically, most officials representing insurance companies have reported that some hospitals have included contractual obligations in their agreements with insurers that restrict insurers from disclosing negotiated rates to their members. For example, some insurance company officials we interviewed told us that these contractual obligations prohibited the sharing of specific information on negotiated rates between providers and insurers on their price transparency initiatives' websites. Officials from one insurance company said that they generally accept these contractual obligations, particularly in the case of hospitals that have significant market leverage, because they do not want to exclude these hospitals from their networks.[37]

Second, some of the officials and researchers we spoke with reported that providers and insurers may be concerned with sharing their negotiated rates, considered proprietary information, which may be protected by law from unauthorized disclosure. Some officials and

[36]For example, officials from one insurance company said one of the contractual obligations with a provider states that the insurer is prohibited from disclosing specific negotiated contract rates to its members, unless such information is provided in an explanation of benefits or through calls placed individually to the insurer's member services department.

[37]Although the insurance officials said that some providers impose contractual obligations that restrict the disclosure of negotiated rates, officials from one insurance company told us that they were able to negotiate their contracts with providers without such contractual obligations by explaining the methodology used to develop and present price information to consumers.

researchers we spoke with suggest that without these rates, it could be more difficult for consumers to obtain complete cost estimates. According to officials from an insurer association, proprietary information such as negotiated rates may be prohibited from being shared under the Uniform Trade Secrets Act, which many states have adopted to protect the competitive advantage of the entities involved.[38] These laws are designed to protect against the wrongful disclosure or wrongful appropriation of trade secrets, which may include negotiated rates. For example, if a hospital was aware that another hospital negotiated a higher rate with the same insurance company, then the lower-priced hospital could seek out higher negotiated rates which may eliminate the first hospital's competitive advantage. Conversely, if officials from an insurance company were aware that another insurer paid the same hospital a lower rate for a given service, the higher-paying insurer may try to negotiate lower payment rates with that hospital.

Lastly, some researchers and officials noted that antitrust law concerns may discourage providers and insurers from making negotiated rates public.[39] For example, some insurance company officials we spoke with expressed concerns that sharing negotiated rates publicly would give multiple competing providers access to each other's rates, and therefore could lead to collusion in price negotiations between providers and insurers.[40] According to the Federal Trade Commission (FTC) and the Department of Justice (DOJ)—the principal federal agencies enforcing the antitrust laws—antitrust laws aim to protect and promote competition by preventing businesses from acting together in ways that can limit competition. Joint guidance from FTC and DOJ indicates that without appropriate safeguards, exchanges of price information—which insurance

[38]Many states have adopted the Uniform Trade Secrets Act, proposed by the Uniform Law Commissioners, which protects proprietary information. Uniform Law Commission, Trade Secrets Act, accessed July 14, 2011, http://www.nccusl.org/Act.aspx?title=Trade%20Secrets%20Act. States that have not adopted the Uniform Trade Secrets Act may have similar laws that protect proprietary information from being misappropriated.

[39]According to the Department of Justice, the three major federal antitrust laws are the Sherman Antitrust Act, the Clayton Act, and the Federal Trade Commission Act. In addition, many states also have antitrust laws.

[40]However, these insurance officials agreed that antitrust restrictions do not prevent the sharing of negotiated rates and other components of complete cost estimates with their members.

company officials told us could include negotiated rates—among competing providers may present the risk that competing providers communicate with each other regarding a mutually acceptable level of prices for health care services or compensation for employees.[41]

Although some officials and researchers noted that antitrust laws may discourage making negotiated rates public, the FTC and DOJ guidance also identifies circumstances in which exchanges of health care price information—that could include negotiated rates—are unlikely to raise significant antitrust concerns. These circumstances require the collecting of price information by a third-party entity and ensuring that any information disseminated is aggregated such that it would not allow recipients to identify the prices charged by an individual provider.[42] Under these circumstances, consumers may not be hindered in their ability to have information that will allow them to make informed decisions about their health care.

Selected Initiatives Vary in the Information They Make Available, and Few Initiatives Provide Estimates of Consumers' Complete Costs

The price information made available to consumers by the eight selected price transparency initiatives varies, in large part due to differences in the price data available to each initiative. Additionally, we found that few of the selected initiatives are able to provide estimates of consumers' complete costs, primarily due to limitations of the price data that they use and other obstacles.

[41]See U.S. Department of Justice and the Federal Trade Commission, *Statements of Antitrust Enforcement Policy in Health Care* (1996). According to FTC and DOJ guidance, providers may act individually to provide price information to a purchaser without concern; however under certain circumstances, if they act collectively it may raise antitrust concerns because it may lead to collusion.

[42]While careful adherence to the guidelines will usually not generate FTC or DOJ enforcement action, both agencies have made clear that each case or business practice requires an analysis of the particular facts and circumstances involved. To the extent that any uncertainty exists, a provider or other entity may take advantage of DOJ's expedited business review procedure or FTC's advisory opinion procedure for guidance in order to alleviate antitrust concerns.

Selected Initiatives Vary In the Information They Make Available to Consumers and Other Interested Parties

The eight public and private price transparency initiatives that we examined vary in the price information they make available to consumers. (See table 2.) Three public initiatives in California, Florida, and Wisconsin make information available on hospitals' billed charges, which are typically the amounts hospitals bill payers and patients for services before any negotiated or reduced payment discounts are applied. In general, hospitals' billed charges do not reflect the amount most payers and patients ultimately pay for the service. Two private initiatives administered by Aetna and Anthem provide their members with price information based on their contracts with providers, and this information reflects the insurer's negotiated discounts. Similarly, the federal initiative provides price information based on Medicare payment rates. Initiatives in Massachusetts and New Hampshire provide price information, based on payments made to providers, using claims data, and these prices reflect any negotiated discounts or other reductions off the billed charges.[43] Despite differences in the types of price information they provide, the selected initiatives are generally similar in the types of services for which they provided price information,[44] with most providing price information only for a limited set of hospital or surgical services that are common, comparable, or planned in advance, such as a knee replacement or a diagnostic test.[45]

[43]New Hampshire's and Massachusetts' claims data include all payments for that service contributed by private health insurance plans and their members, as well as payments from self-insured plans for state government employees and their members.

[44]The selected price transparency initiatives use different terms to refer to what we describe as the health care "services" for which consumers can look up price information.

[45]In some cases, the state law specified the number or types of services made available by the price transparency initiative. See, e.g., Cal. Health & Safety Code § 1339.56(a) (2008), Fla. Stat. Ann. § 408.05(3)(k)(4) (West 2011).

Table 2: Types of Health Care Services and Price Information Made Available by Selected Price Transparency Initiatives, 2011

Selected price transparency initiatives	Health care services for which price information is made available[a]	Type of price information made available
Centers for Medicare and Medicaid Services (CMS) Hospital Compare	43 common inpatient hospital services	Median Medicare payment rates[b]
California Common Surgeries and Charges Comparison	37 inpatient surgical services	Median billed charges from hospitals[c]
Florida Health Finder	Over 150 inpatient, outpatient, and ambulatory surgery center services	Range (25^{th} to 75^{th} percentile) of billed charges from hospitals[c]
Massachusetts MyHealthCareOptions	37 inpatient and outpatient hospital services	Median and range (15^{th} to 85^{th} percentile) of insurers' aggregated payments made to that provider based on claims data[d]
New Hampshire HealthCost	42 preventative health, emergency visits, radiology, surgical procedures, and maternity services	Median payment made by that specific insurance plan to that specific provider based on claims data[d]
Wisconsin Hospital Association PricePoint	316 inpatient hospital services, 75 outpatient surgical services, and 27 emergency department and urgent care services	Average and median billed charges from hospitals and median and range (20^{th} to 80^{th} percentile) of billed charges from ambulatory care centers[c]
Aetna Member Payment Estimator	40 hospital service bundles and 460 physician service bundles (comprised of 3 categories of physician office visits, surgical procedures, and diagnostic tests and procedures)	Aetna's negotiated rates[e]
Anthem Care Comparison	59 service bundles including hospital inpatient and outpatient services, physician office visits, and diagnostic and imaging services	Range of Anthem's negotiated rates[e]

Source: GAO analysis of selected price transparency initiatives and interviews with administering officials.

[a]The selected price transparency initiatives use different terms to refer to what we describe as the health care "services" for which consumers can look up price information.

[b]Medicare payment rates are the prices CMS recently paid providers for services provided to Medicare beneficiaries. These payment rates are set by CMS and based on various factors such as geographic location.

[c]Billed charges are the amount hospitals and other providers bill payers and patients for a service, before any negotiated or reduced payment discounts are applied, and thus generally do not reflect the amount most payers and patients ultimately pay for the service.

[d]Claims data reflect the amount, based on the record of payments made by consumers and payers, a provider was previously reimbursed for the service and incorporates any insurer's negotiated discounts or any reduced discounts given. Initiatives used claims data to identify and report price information in different ways. New Hampshire's price transparency website uses its claims data to report a single point estimate of the estimated cost of the service, based on the median of all payments paid by that specific insurance plan to that provider for that service. Massachusetts's price transparency website combines the claims of all the applicable insurers and reports a price reflecting the aggregated price per provider for that service, as paid by these insurers.

[e]Negotiated rates are the prices an insurance company has negotiated with a provider to provide a health care service. These prices reflect prices under contract and any discounts that have been agreed to.

Various factors help explain the differences in the types of price information made available by the selected initiatives. In some cases, the initiatives provide certain types of price information because of the price data available to them, generally through state law. For example, the Wisconsin initiative provides price information based on hospitals' billed charges because the state contracted with the Wisconsin Hospital Association (WHA) to collect and disseminate hospital information, including hospitals' billed charges, when the state privatized hospital data collection. WHA saw this as an opportunity to develop a price transparency initiative that reported billed charges for consumers.[46] In both California and Florida, initiative officials said that state laws enabled the state to collect and make hospitals' billed charges public and this gave the states the authority to make this information available to consumers.[47] In Massachusetts, officials said that 2006 state health reform legislation provided the state with the necessary authority to collect claims data for the price transparency initiative.[48]

In other cases, the price information the initiatives provide reflects choices made by initiative officials regarding the types of information that they considered would be most helpful to consumers. For example, in developing Hospital Compare, CMS officials chose to provide price information based on Medicare payment rates to hospitals because, according to officials, this information would be more helpful than hospitals' retrospective billed charges for Medicare patients. The officials explained that hospitals' billed charges are too divergent from what Medicare and insurance companies actually pay for the same service, and CMS officials reasoned that Medicare rates could give consumers, particularly those without insurance, a point of comparison from which

[46]Wisconsin's price transparency website, called PricePoint, has served as a model for other states. Since its launch, WHA has been hired by at least 16 states to develop PricePoint websites for their initiatives.

[47]See Cal. Health & Safety Code §§ 1339.56(c) (2008), Fla. Stat. Ann § 408.05 (3)(k)(4) (West 2011). Florida's initiative provides a disclaimer that patients rarely are required to pay billed charges without any discounts and this type of price information may not be the most meaningful indicator of what the consumer can be expected to pay. Similarly, California's initiative acknowledges that the charges do not reflect how much the hospital is typically paid for a service because the discounts have not been applied.

[48]Health care claims data must be submitted to a state agency and such information was then added to the state's price transparency initiative. See Mass Regs. Code tit. 129 § 2.05(3) (2009).

they may be able to negotiate lower prices with providers.[49] In New Hampshire, officials said they successfully sought legislation to get access to claims data from all payers in the state to establish an All Payer Claims Database (APCD) for their initiative.[50] Based on an earlier experience with posting billed charges and feedback from consumers, New Hampshire officials were convinced that billed charges were not useful for insured consumers.

Additionally, some factors that may limit access to certain price data also limit how the price information is presented to consumers. For example, some of the selected initiatives, such as Florida and Anthem, present price information as a range, which avoids providing a specific price that providers may consider proprietary.[51] Anthem officials further noted that the primary reason the initiative provides price information as a range is so that the price information can better reflect for consumers the billing variation and differences in treatment decisions that occur when health care services are delivered to different patients. In Massachusetts, the initiative combines the claims, or prices paid, by commercial insurers for that specific hospital service and reports a provider's median price as well as a range of prices paid for that service. Officials explained that they present aggregated price information across all health plans to avoid disclosing prices that may raise proprietary concerns among providers and insurers. In another approach, the two initiatives by New Hampshire and Aetna bundle multiple services typically performed at the same time into the price presented, such as bundling all associated costs for a hip replacement surgery. By doing so, New Hampshire officials said that they are able to mask the specific rates paid for individual items, and avoid proprietary concerns, while providing an easily understandable estimate for the total health care service. Lastly, officials from the Aetna and

[49]At the same time, CMS officials described reliance on Medicare payment data as a weakness of their initiative because consumers do not know how to understand and use that price data.

[50]See N.H. Rev. Stat. Ann. §§ 420-G:11, 420-G:11-a (2011). APCD is a database of payment reimbursement records to providers that may include claims from private insurance company payers and their members and public payers (Medicare and Medicaid). According to the APCD Council, as of November 2010, 13 states, including Massachusetts, are using or in the process of developing APCDs.

[51]Although presenting prices as ranges, rather than single point estimates, may be useful for avoiding proprietary concerns, ranges may also be so broad that they lose the utility for meeting consumers' needs to compare prices and anticipate health care costs.

Anthem initiatives cited provider resistance as limiting the extent to which they can make price information available to their members for all providers in the insurers' networks—with provider-imposed contractual obligations requiring the Aetna and Anthem initiatives to omit price information for certain providers in the initiatives' websites' search results.

In addition to providing the price of a service, most selected initiatives also provide a wide range of nonprice information, such as information on quality of care measures or patient volume. Five of the eight selected initiatives provide quality information for consumers to consider along with price when making decisions about a provider. (See table 3.) In addition to providing quality and volume measures, initiatives also shared information, such as resources for understanding and using price information, including explanations of the source and limitations of the price data, glossaries, and medical encyclopedias. Initiatives also provided a range of supplementary financial information to give context to the price information provided. For example, Massachusetts' initiative presents symbols ($, $$, $$$) to indicate how the provider's price compares to the state median for that service in an effort to provide what officials described as more easily understood price information for consumers who are familiar with graphical ratings systems. Additionally, Wisconsin's initiative provides pie charts representing the percentage different payer types—such as private insurers, Medicare, and Medicaid—paid to a specific hospital in relation to the total billed charges, which indicates at an aggregate level the extent of discounts given by payer category.

Table 3: Quality and Volume Information Provided by Selected Price Transparency Initiatives

Selected price transparency initiative	Quality data	Volume data	Examples of quality and volume data[a]
Centers for Medicare and Medicaid Services (CMS) Hospital Compare	✓	✓	Process of care measures, how many Medicare patients were treated for a service at a given facility
California Common Surgeries and Charges Comparison		✓	The number of discharges for a service in a given year
Florida Health Finder	✓	✓	Patient safety indicators, total number of hospitalizations by service at a facility
Massachusetts MyHealthCareOptions	✓	✓	Information on patient safety practices, number of patients treated
New Hampshire HealthCost			None
Wisconsin Hospital Association PricePoint		✓	The number of discharges for a service in a given year
Aetna Member Payment Estimator	✓		Designation of quality and efficiency for hospitals and selected specialists
Anthem Care Comparison	✓	✓	Mortality rates, number of patients who received that treatment

Source: GAO analysis of selected price transparency initiatives and interviews with administering officials.

[a]Quality data and other nonprice information provided by the initiatives' websites came from a variety of national sources, including WebMD, CMS, Leapfrog Group, and AHRQ. Many state initiatives also relied on information reported to state agencies, such as the California Office of Statewide Health Planning and Development, the Florida Center for Health Information and Policy Analysis, and the Massachusetts Division of Health Care Finance and Policy.

Some officials expressed reservations about how consumers may use price and quality information together.[52] Insurance company officials we spoke with see linking price to quality information as a means for consumers to identify high-value providers and for the company to create more cost-efficient provider networks. In Hospital Compare, however, quality data and price data are not linked. CMS officials said that while quality data are featured prominently on Hospital Compare, price information is featured less prominently. CMS officials explained that promoting price information to consumers, in the absence of greater consumer education about how to understand price information in relation to quality, could lead consumers to select high-priced providers due to an assumption that price is indicative of quality. Due to similar concerns that consumers may assume that a higher price is a sign of higher quality,

[52]These nonprice data, such as the frequency or quality of a provider in performing a procedure, is often gathered from national sources, such as WebMD, CMS, and AHRQ, or directly from providers' data submissions, such as data submitted to state agencies, which may vary based on the states' reporting requirements.

Aetna's initiative provides information to educate consumers that high quality and low price are not mutually exclusive.

Lastly, in addition to the variety of price and other information made available by the selected initiatives, the initiatives also vary in terms of who has access to the initiatives' websites and in terms of their expected audiences. For example, the price information provided by the federal initiative we selected is available to all consumers through a publicly available website. CMS officials said the expected audience of this initiative includes insured and uninsured consumers, researchers, Medicare beneficiaries, and providers. Like the federal initiative, all of the selected state initiatives' websites are publicly available, although they include price information only for their particular state. In contrast, the price information provided by the two selected insurance company initiatives' websites are accessible to their members, but not to the general public.

Few Selected Initiatives Provide Estimates of Complete Costs to Consumers

Few of the selected initiatives provide estimates of consumers' complete costs, which is price information that incorporates any negotiated discounts; is inclusive of all costs associated with a particular health care service, such as hospital, physician, and lab fees; and identifies consumers' out-of-pocket costs. (See table 4.) Specifically, of our eight selected initiatives, only the Aetna and New Hampshire initiatives provide estimates of a consumer's complete cost. The two initiatives are able to provide this information in part because they have access to and use price data—negotiated rates and claims data, respectively—that allow them to provide consumers with a price for the service by each provider that is inclusive of any negotiated discounts or reduced payments made to the billed charge. Specifically, Aetna bases its price data on its contractual rates with providers, which include negotiated discounts. New Hampshire provides price information based on its records of closed claims of particular providers for particular services under a consumer's specific health insurance plan.[53] Both initiatives use claims data to identify all of the hospital, physician, and lab fees associated with the services for which they provide price information. For calculating estimated out-of-pocket costs, Aetna links member data to its price transparency website,

[53]Since New Hampshire uses claims data over a year old, officials adjust the claims' prices across the board with a 5 percent increase for every year to account for an estimated annual rate of inflation in medical costs.

which automatically updates and calculates the member's estimated out-of-pocket costs in real-time based on the provider and service reported, and the member's partially exhausted deductibles. In contrast, to calculate out-of-pocket costs, insured users of New Hampshire's initiative's website enter their insurance plan, their deductible amount, and their percentage rate of co-insurance. New Hampshire's Health Cost website then uses that information to calculate an out-of-pocket cost, along with a total cost for the service by provider. Both initiatives demonstrate that while providing complete cost information presents challenges, it can be done—either as undertaken by Aetna for its members or as carried out by New Hampshire, which makes complete cost information available through publicly accessible means.

Table 4: Extent to Which Selected Price Transparency Initiatives Provide Price Information That Reflects Estimates of Consumers' Complete Costs

	Components of complete cost estimates provided by initiative			
Selected price transparency initiative	**Price reflects negotiated discounts**	**Price inclusive of all associated costs, including hospital, physician, and lab fees**	**Identifies out-of-pocket costs**	**Complete cost estimate provided by initiative**
Centers for Medicare and Medicaid Services Hospital Compare	✓			
California Common Surgeries and Charges Comparison			[a]	
Florida Health Finder			[a]	
Massachusetts MyHealthCareOptions	✓[b]			
New Hampshire HealthCost	✓	✓	✓[c]	✓
Wisconsin Hospital Association PricePoint			[a]	
Aetna Member Payment Estimator	✓	✓	✓[d]	✓
Anthem Care Comparison	✓	✓		

Source: GAO analysis of selected price transparency initiatives' documentation and interviews with administering officials.

[a]Selected initiatives in Florida, Wisconsin, and California report price information as billed charges, that is, the price billed to consumers with no negotiated discounts from insurers or providers included. An uninsured patient may expect to be billed the full amount charged by the provider; however, some research indicates that uninsured patients rarely pay the full billed charge. In practice, what an uninsured consumer may be expected to pay out-of-pocket is often arranged on a case-by-case basis with the provider, and may depend on various factors, such as the consumer's ability to pay, the availability of charity care or sliding scale deductions, and state restrictions on what hospitals can collect from uninsured patients.

[b]Massachusetts's initiative uses the claims data of applicable insurers that reflect payments made after negotiated discounts have been applied. The price presented is an aggregate of all the prices paid by these insurers to that provider for that service.

[c]For insured consumers, New Hampshire's initiative identifies an estimated out-of-pocket cost, by health plan, for that provider and that service. For uninsured consumers, the New Hampshire initiative reports price information based on billed charges minus a 15 percent discount for uninsured consumers, which it states is a typical uninsured discount.

[d]Aetna's initiative provides out-of-pocket costs only to its intended audience, Aetna members.

As table 4 shows, six of the eight initiatives that we reviewed do not provide estimates of consumers' complete costs. The reasons for this vary by initiative, but are primarily due to the limitations of the price data that each initiative uses. For example, initiatives in California, Florida, and Wisconsin provide price information based on billed charges from hospitals, which do not reflect discounts negotiated by payers and providers, all associated costs (such as physician fees), and out-of-pocket costs. An official representing Wisconsin's initiative said that WHA commonly receives requests from consumers to include physician fees in the price estimate, but the initiative does not have access to these price data, as they are part of a separate billing process and the hospitals do not have these data to submit. California officials said that collecting claims data from insurers would require additional legal authority, raise proprietary concerns, and pose resource challenges. Florida officials acknowledged that providing a billed charge is not as meaningful for consumers as other types of price data, such as claims data. However, while Florida officials have the authority to collect claims data,[54] they said that at this time they are limited from pursuing such information due to the expected financial costs of collecting and storing the data and the challenges of overcoming the proprietary concerns of providers and insurers. Florida officials characterized their initiative's inability to report out-of-pocket costs as a major limitation. The federal initiative provides price information that reflects what Medicare pays to hospitals for a given service but does not reflect what consumers, including Medicare beneficiaries, would pay out-of-pocket. CMS officials said that providing out-of-pocket costs was too complicated to calculate in advance due to consumers' medical variation and technological limitations.

In contrast, other initiatives have access to data that may enable the initiatives to provide more complete cost estimates to consumers, but certain factors limit the extent to which this type of information is made available. For example, the Massachusetts initiative has access to claims data that could be used to provide more complete cost estimates to consumers, such as negotiated discounts for commercial insurers.[55] However, it presents price information that aggregates the prices paid by commercial insurers for particular services, in part due to insurers' and providers' concerns about the initiative disclosing price information by insurer. As a result, consumers are unable to see an estimate for a particular provider that is specific to their insurance company or to calculate their out-of pocket costs based on their specific plan. The officials noted that providers' and insurers' resistance to publicly reporting payments made by insurers may also be a challenge for states seeking access to more meaningful price information for their initiatives, such as claims data. Lastly, Anthem's initiative does provide a price inclusive of all

[54]Fla. Stat. Ann § 408.061(c) (West 2011).

[55]Furthermore, although Massachusetts has access to claims data that in some cases provide all associated costs, such as physician fees, for a specific health care service, officials there said that they currently lack the technical capability to identify from the claims data which hospital and physician fees should be linked. They noted that insurance plans are not consistent in how they report physician fees in the claims data.

associated fees and negotiated discounts, but currently does not use the specific details of consumers' insurance plan benefits, such as their deductible, copayment, or coinsurance, to estimate consumers' out-of-pocket costs.[56]

Conclusions

Transparent health care price information—especially estimates of consumers' complete costs—can be difficult for consumers to obtain prior to receiving care. For example, when we contacted hospitals and physicians to obtain price information for two common services, we generally received only incomplete estimates, which are insufficient for helping consumers to anticipate all of the costs associated with these services or to make more informed decisions about their health care. Our review identified various health care and legal factors that can make it difficult for consumers to obtain meaningful health care price information, such as estimates of consumers' complete costs, in advance of receiving services. This lack of health care price transparency presents a serious challenge for consumers who are increasingly being asked to pay a greater share of their health care costs.

Despite the complexities of doing so, two of the eight price transparency initiatives we examined were able to make complete cost estimates available to consumers. Making meaningful health care price information available to consumers is important, and the fact that two initiatives have been able to do it suggests that this is an attainable goal. To promote health care price transparency, HHS is currently supporting various efforts to make price information available to consumers—including the CMS initiative in our review—and the agency is expected to do more in this area in the future. We note in our review, for example, that HHS provides price information on insurance plans through its healthcare.gov website. Similarly, CMS's web-based Medicare Part D Plan Finder also provides information on prescription drug prices and CMS's Health Care Consumer Initiatives provide information on the price Medicare pays for common health care services at the county and state levels. In the near future, HHS's price transparency efforts are expected to expand. For example, PPACA requires HHS to provide oversight and guidance for the Exchanges that are expected to provide certain price information for

[56]Anthem officials said that they are exploring the possibility of developing an out-of-pocket cost calculator for their consumer initiative.

consumers through participating insurers. PPACA also directs HHS to develop a pilot program which may include bundled payments, providing another possible opportunity for price transparency. In total, HHS has several opportunities to promote greater health care price transparency for consumers.

Recommendations for Executive Action

As HHS implements its current and forthcoming efforts to make transparent price information available to consumers, we recommend that HHS take the following two actions:

- Determine the feasibility of making estimates of complete costs of health care services available to consumers through any of these efforts.
- Determine, as appropriate, the next steps for making estimates of complete costs of health care services available to consumers.

Agency Comments

HHS reviewed a draft of this report and provided technical comments, which we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the Secretary of Health and Human Services and other interested parties. In addition, the report will be available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-7114 or kohnl@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.

Linda T. Kohn
Director, Health Care

List of Congressional Requesters

The Honorable Fred Upton
Chairman
Committee on Energy and Commerce
House of Representatives

The Honorable Cliff Stearns
Chairman
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
House of Representatives

The Honorable Joe Barton
House of Representatives

The Honorable Michael Burgess
House of Representatives

The Honorable Gene Green
House of Representatives

Appendix I: Methodology and Results of Contacting Selected Providers for Price Information

To obtain illustrative examples of factors that influence the availability of health care price information for consumers, we anonymously contacted hospitals and primary care physicians with zip codes located in the Denver, Colorado, health care market.[1] We requested the price of a full knee replacement from hospitals and the price of a diabetes screening from primary care physicians. We requested these prices for patients without insurance and for patients with Medicare (without supplemental health insurance). Specifically, we called 19 hospitals and 20 primary care physicians between February 28 and March 10, 2011, and contacted each provider up to three times in an attempt to get a response.[2] We determined that we obtained a response from representatives if they answered the phone or they transferred us to a price quote voice mail message that requested specific information from us about the requested service so representatives could call back with cost estimates. In cases where we were asked to provide more information, such as in the case of receiving a price quote voice mail, we did not provide such information in order to help maintain our anonymity. We considered hospitals and physicians nonresponsive if no one answered the phone, or if we received a voice mail message that did not indicate what we needed to provide in order to receive price information, in all three attempts.

[1]We selected a health care market in Colorado because this state requires certain providers to respond to consumers' requests for price information, but does not restrict how consumers may request such information. For more information, see Colo. Rev. Stat. § 6-20-101 (2011). We did not evaluate the effectiveness of the law. We specifically selected the Denver health care market, as defined by a hospital referral region, because it was the health care market in Colorado with the most hospitals with zip codes in Colorado. A hospital referral region, as defined by the Dartmouth Atlas of Health Care, represents a regional health care market. Furthermore, we determined that the Denver health care market did not have any characteristics that would make it particularly unique compared to other health care markets in the United States.

[2]For purposes of this study, we contacted selected providers using contact information from the Centers for Medicare and Medicaid Services' (CMS) Hospital Compare database (for hospitals) and the National Provider Identifier Registry (for primary care physicians). We excluded hospitals and physicians with addresses located outside of Denver, Colorado, for the purposes of this study. We contacted 19 hospitals because there were only 19 hospitals in the Denver, Colorado, hospital referral region that provided knee replacement surgery, according to CMS's Hospital Compare database. For primary care physicians, we randomly selected a nonrepresentative group of 20 physicians with a specialty such as internal medicine, family medicine, and general practice to be a comparable sample size to that of the hospitals.

Results from Contacting Hospital Representatives

We received a response from representatives at 17 of the 19 hospitals we contacted. Of the 17 hospital representatives that responded, 10 did not provide any type of price information. None of the hospital representatives could provide a complete cost estimate for a full knee replacement, meaning the price given was not reflective of any negotiated discounts, was not inclusive of all associated costs, and did not identify consumers' out-of-pocket costs. Almost all of the hospital representatives that responded (14 of 17) required more information from us to provide a complete cost estimate, such as current procedural terminology (CPT)[3] codes, the length of time in the operating room, the model of knee used, or what kind of anesthetic would be provided, which we did not provide. Of the 7 hospital representatives that were able to provide some price information, 5 provided billed charges in either a range, such as between $32,974.73 and $100,676.50 or an average charge, such as $82,390, which is typically reflective of what an uninsured consumer would pay.[4] (See table 5 for more information.)

[3]According to the American Medical Association, CPT is a medical nomenclature used to report medical procedures and services under public and private insurance programs.

[4]According to Hospital Compare, CMS's quality and price transparency initiative, the median Medicare payment to hospitals within 25 miles of Denver, Colorado, for a major joint replacement or reattachment of a lower extremity without major complications or comorbidities ranges from $446 to $18,668. According to CMS officials, there may be a wide range of median Medicare payments to hospitals for this health care service because the data provided in Hospital Compare include cases in which Medicare was only responsible for a portion of the payment. Because these cases do not reflect the full amount paid for a service, CMS officials stated that they plan to remove these cases from the data in October 2011.

Table 5: Results of Contacting Hospitals for the Price of a Full Knee Replacement on Behalf of a Patient with Medicare and without Health Insurance from Those Who Responded

Hospital number and insurance status	Type of price provided	Actual price provided	Price reflective of consumers' complete cost estimates (Y/N)?	Examples of responses from representatives[a]
1. Medicare	Deductible	$1,132 (inpatient services) and $162 (outpatient services) and 20% of Medicare approved amount	N – Does not include associated fees	Representative did not know what the surgeon would charge.
2. Medicare	Average and range of billed charges, Medicare-allowable amount	$82,390 or $65,000 - $95,000; with Medicare: $13,360 to 16,650.	N – Does not include associated fees or identify out-of-pocket costs	The charges vary depending upon length of stay (2-4 days), length of time in operating room, and model of knee used.
3. Medicare	None	N/A	N/A	It would take a week to get an estimate after speaking with a nurse.
4. Medicare	None	N/A	N/A	Asked to leave message with name, date of procedure, physician's name, procedure, and phone number and they will call back with an estimate.
5. Medicare	None	N/A	N/A	Asked to leave message with name, phone number, CPT codes, physician's name, insurance company name, subscriber's identification number, and date of birth.
6. Medicare	None	N/A	N/A	Requested us to ask the physician for CPT codes, and provide physician's name. The estimate would only include the hospital facility fees, and unsure what the other charges would be.
7. Medicare	Deductible	$1,132	N – Does not reflect negotiated rates or include associated fees	Could not provide a charge for the procedure. The deductible does not include physician, rehabilitation, or anesthesiology fees.
8. Medicare	None	N/A	N/A	Requested CPT codes, how long the length of stay would be in the hospital, how long the patient would be in the operating room, and under what kind of anesthetic (local or general).
9. Medicare	Range of billed charges, co-payment, and deductible	$32,974.73 to $100,676.50; with Medicare: $2,662 to $2,566 and $1,100 deductible	N – Does not include associated fees	Hospital charges vary based on how many days patient is in the hospital and variation in cases. Representative provided a disclaimer that the price is just an estimate and the hospital is not liable for any differences.

Hospital number and insurance status	Type of price provided	Actual price provided	Price reflective of consumers' complete cost estimates (Y/N)?	Examples of responses from representatives[a]
10. Medicare	Average billed charge and deductible	$50,000 and $1,132	N – Does not reflect negotiated rates and does not include associated fees	Did not provide.
11. Uninsured	None	N/A	N/A	Asked to leave message with name, phone number, procedure, CPT and International Statistical Classification of Diseases (ICD)-9 codes, and date of service. The representative said no one else could provide this information because it is complicated and they would need to check information with the patient's insurer.
12. Uninsured	None	N/A	N/A	Needed the procedure and diagnostic codes, the name of the hospital, name, phone number, and insurance information.
13. Uninsured	None	N/A	N/A	Asked to leave message with first and last name, phone number, CPT code (can get from physician), physician's name, insurance company name, subscriber's identification number, and date of birth.
14. Uninsured	Range of billed charges	$65,000 to $95,000	N – Does not include associated fees[b]	Range of billed charges is dependent on the model of implant used, number of days in hospital, and how long the operating room time is.
15. Uninsured	Average billed charge	$58,581.59 (including a discount for self-payers) or $50,023.42 if paid within 4 days of receiving the bill	N – Does not include associated fees	Did not provide.
16. Uninsured	None	N/A	N/A	Asked to leave message with phone number, patient name, procedure, CPT code, ICD-9 code, and date of service (if scheduled).
17. Uninsured	None	N/A	N/A	Recommended we contact an orthopedic surgeon or physician for price information.

Source: GAO analysis of anonymous phone calls to hospitals.

[a]When we called several hospitals we received a price quote voice mail message which asked us to list information, such as diagnosis codes for the service we inquired about and personal information, and a representative would call back with a cost estimate. We considered this receiving a response since this method was the way these hospitals responded to such requests. In cases where we were asked to provide additional information by a voice mail or representative, we did not provide such information in order to help maintain our anonymity.

[b]According to the hospital representative we spoke with, the range of billed charges provided were considered an out-of-pocket cost for an uninsured consumer.

Results from Contacting Physician Office Representatives

We received a response from 18 of the 20 representatives we contacted. Of the physician representatives that responded, most could provide some type of price information (14 of 18), but only 4 out of 18 representatives who responded could provide a complete cost estimate for a diabetes screening. Most representatives who responded (13 of 18) required more information from us to provide a complete cost estimate, such as a diagnosis from a physician and the amount the laboratory would charge, which we did not provide. Additionally, almost half (8 of 18) of representatives who responded said the patient needs to be seen by a physician before determining a complete cost estimate. All 14 physician representatives who were able to provide some type of price information provided price information based on billed charges.[5] (See table 6 for more information.)

[5]According to Medicare.gov, Medicare patients may receive two free diabetes screening tests per year and they generally have to pay 20 percent of the Medicare-approved amount for the doctor's visit.

Table 6: Results of Contacting Physicians for the Price of a Diabetes Screening on Behalf of a Patient with Medicare and without Health Insurance from Those Who Responded

Primary care physician number and insurance status	Type of price provided	Actual price provided	Price reflective of consumers' complete cost estimates (Y/N)?[a]	Examples of responses from representatives[b]
1. Medicare	Billed charge	$75 for an office visit for a person without insurance	N – Does not reflect negotiated rates, include associated fees, or identify out-of-pocket costs	Price is different for everyone. Patient would need to come in for office visit and then the physician would decide on a test.
2. Medicare	Billed charge, Medicare deductible and co-payment	$125 for an office visit, $250 to $500 quarterly, and 20% of the office visit (about $25)	N – Does not include associated fees	Not sure what the lab would charge.
3. Medicare	Range of billed charges	$100 to $200 for office visit for a person without insurance	N – Does not reflect negotiated rates, include associated fees, or identify out-of-pocket costs	There would be other tests that would need to happen depending upon a visit with the physician.
4. Medicare	Billed charges	Physician fee is $85, blood draw is $25	N – Does not reflect negotiated rates or identify out-of-pocket costs	Unsure of what Medicare would cover.
5. Medicare	None	N/A	N/A	Did not know what Medicare covers or the charge amount. The lab services are also an additional charge and are billed separately.
6. Medicare	None	N/A	N/A	The price varies based on the office visit and the diagnosis and whatever Medicare would pay. Lab work would also cost extra.
7. Medicare	Billed charge	$90 to see a physician	N – Does not reflect negotiated rates, include associated fees, or identify out-of-pocket costs	Requested the name of the specific test as it would be ordered from the physician. They needed to know what services the physician would order to determine the price.
8. Medicare	Billed charge	$33 for nurse's visit, $8 for glucose test	N – Does not reflect negotiated rates or identify out-of-pocket costs	Unsure of the price Medicare would charge.
9. Medicare	None	N/A	N/A	Respondent had no idea how much it would cost and said they are not taking new Medicare patients anyway.
10. Uninsured	Billed charges	$159 to see a physician	N – Does not include associated fees[c]	Have to be seen by a physician before determining costs. For lab tests, the price depends because some tests are done by the lab and some are given in the office.

Primary care physician number and insurance status	Type of price provided	Actual price provided	Price reflective of consumers' complete cost estimates (Y/N)?[a]	Examples of responses from representatives[b]
11. Uninsured	Billed charges	$120 to see a physician, $37.40 for a comprehensive metabolic panel, $66 for a 1 hour screen	Y[c]	Have to be seen by a doctor first to determine what services are needed.
12. Uninsured	Billed charges	$241 to see physician, $14 for the glucose test, and $32 for a blood draw	N – Does not include associated fees[c]	Unsure of the lab cost because it is a separate charge. It can range based on what services the patient receives.
13. Uninsured	Range of billed charges	$89 - $150 to see a physician, 30% discount for self-paying patients	N – Does not include associated fees[c]	Need to be seen by a physician here to determine what lab work would need to be done. A range is provided because it depends on the complexity of the visit.
14. Uninsured	Billed charges	$250 for a new patient exam and the test is $125 including blood work	Y[c]	Did not provide.
15. Uninsured	Billed charges	$57 for the test and about $120 for office visit. There is a 30% discount for the office visit for paying day of.	Y	The price depends on the length of the visit.
16. Uninsured	Range of co-payment if qualifies for Colorado Indigent Care Program (CICP)[d]	$5 - 35	Y	Without being in the CICP program, they could not provide price information.
17. Uninsured	None	N/A	N/A	Person needs to be an established patient and have a physical every year. Also the physician does not take uninsured patients.
18. Uninsured	Range of billed charges and billed charge	$120 for physician's visit and test could range from $100 to $500	N – Does not include associated fees[c]	Blood tests are billed separately. The tests done will depend upon what services the physician orders.

Source: GAO analysis of anonymous phone calls to primary care physicians' offices.

[a]In cases where a representative did not mention a negotiated discount for an uninsured patient, we assumed that a negotiated discount was not applicable.

[b]When asked for additional information by a physician representative, we did not provide it in order to help maintain our anonymity.

[c]According to the physician representative we spoke with, the billed charges provided were considered an out-of-pocket cost for an uninsured consumer.

[d]CICP provides funding to clinics and hospitals for Colorado residents or migrant farm workers who are United States citizens or legal immigrants, who have income and resources combined at or below 250 percent of the Federal Poverty Level, and are not eligible for the Medicaid Program or Child Health Plan *Plus*.

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

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Many patients are surprised to learn what their health care procedures cost. 9dream studio/shutterstock.com

What would happen if hospitals openly shared their prices?

January 30, 2019 6.50am EST

Imagine there was a store where there were no prices on items, and you never knew what you'd pay until you'd picked out your purchases and were leaving the shop. You might be skeptical that the store would have any incentive to offer reasonable prices.

This exact situation has become the norm in U.S. health care, at least for those people who lack publicly provided health insurance. Meanwhile, American health care prices are, by many measures, the highest in the world.

Hospitals have resisted disclosing prices, leading policymakers to consider laws requiring price transparency. This issue has taken on increasing urgency, as patients face increasing out-of-pocket costs. In addition, prices vary widely across hospitals. The same lower limb MRI can cost US$700 at one hospital and $2,100 at another. This means that there are large potential savings if patients switched to less expensive options.

There was a tiny step in this direction on Jan. 1, when all hospitals in the U.S. were required to post their charge prices. However, the list of over 15,000 procedures is notoriously incomprehensible, even for medical professionals. What exactly is a "HC PTC CLOS PAT DUCT ART," a procedure listed by one Tennessee hospital? Perhaps more importantly, patients' out-of-pocket costs often depend on the specifics of their insurance plan and the prices that are negotiated by their insurer, meaning the listed prices do not reflect what they actually pay.

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For these reasons, many researchers and commentators, including myself, believe that this approach is unlikely to have a meaningful effect on health care costs.

Tools that patients can use

That does not mean that price transparency is hopeless. Recent research shows that price transparency tools that actually have useful, easy-to-use information can benefit patients and reduce health care costs.

Individual employers worried about increasing health care costs have started offering tools with personalized information, helping employees compare out-of-pocket prices. A study by Ethan Lieber at University of Notre Dame found that patients who use Compass, one of these price transparency tools, save 10 to 17 percent on medical care. A separate study of a similar tool, Castlight, also found evidence that using the tool led to sizable savings.

Given the limited availability of these tools, a few states have tried to forge ahead on price transparency available to all. New Hampshire provides a particularly well-designed website that gives all insured patients in the state personalized information about prices, letting them easily determine which are the low-cost options.

In an upcoming study, I analyzed the effect of this website using detailed claims data from the state. I found that the website not only helped some patients choose lower-cost options, but it led to lower prices that benefited all patients, including those who did not use the website.

Even though individual patients can save hundreds of dollars by comparing prices, these tools are not yet widely used. In addition, prices are often only available for a small number of procedures. Therefore, overall cost savings are currently quite modest. When I looked at medical imaging procedures in New Hampshire, I found overall savings for patients and insurers of about 3 percent. However, the savings appear to be growing as more people use the website over time and hospitals lower their prices in response.

Transparent prices

A study looked at how medical spending changed before and after New Hampshire introduced a website that gives all insured patients in the state personalized information about prices. Four years later, spending had dropped by 4.3 percent for medical imaging procedures on the website relative to similar medical imaging procedures not on the website.

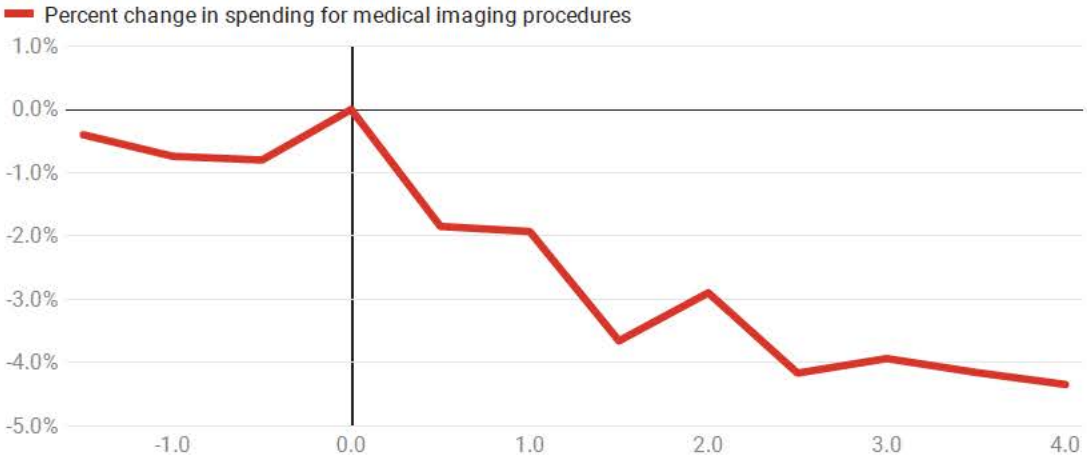

Chart: The Conversation, CC-BY-ND • Source: Review of Economics and Statistics (2019) • Get the data

Imagining a transparent system

Employer tools and state price transparency websites are a first step, but one could imagine going much further. Hospitals and insurers could be required to publicly disclose the rates negotiated with insurers, making it easy for governments or individuals to design innovative websites and apps using accurate data on prices and insurance policies. Currently, states such as New Hampshire use prices of medical claims in previous years to predict current prices.

Hospitals could also be required to provide a detailed price quote – with a single number summarizing what patient will actually pay – before scheduling any appointment. With the exception of a few medical procedures, such as emergency services, I see no practical reason why billing cannot be determined before a procedure rather than after.

Even though individual patients can save hundreds of dollars by comparing prices, these tools are not yet widely used by patients. toodtuphoto/shutterstock.com

Finally, it is important to note that even the best-designed price transparency initiatives are unlikely to reduce health care costs if there is not sufficient competition among hospitals. What good is knowing the price if a patient has no other options? Hospital mergers have been continuing at a rapid pace, and there is growing consensus among researchers that these mergers often increase prices by reducing competition.

If health care is to be left to market forces, then I believe that those markets should be transparent and competitive. Reining in health care costs will require bold solutions that lift the veil on prices.

An Empirical Model of Price Transparency and Markups in Health Care*

Zach Y. Brown†

August 2019

Abstract

It is usually difficult for patients to compare out-of-pocket prices for medical services. What are the implications for prices and welfare? In order to understand the effects of price transparency, this paper develops an empirical model of demand and supply for medical imaging services that incorporates patients' limited information about prices. Estimation exploits the introduction of a price transparency website that informed a subset of patients. Counterfactual simulations imply a 22 percent reduction in prices if all patients had full information. However, the results also shed light on the barriers to widespread adoption of price transparency tools.

Keywords: health care, price uncertainty, price transparency, information frictions
JEL Classification: I13, L11, L86

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1 Introduction

In many markets, consumers do not know exact prices until they have committed to a purchase. For instance, this is the case for automotive repair, building construction, and financial services, as well as other products with complicated bundling, discounts, or add-ons.[1] Ex-ante uncertainty about prices is particularly common in the U.S. private health care market. Health care prices are determined in private negotiations between insurers and medical providers, and these firms are often contractually forbidden from disclosing negotiated rates. As a result, the vast majority of consumers say they do not compare prices before receiving medical care.[2] Due to the fact that prices are opaque, hospitals and other providers potentially face more inelastic demand, leading to higher prices. Although there have been some efforts to make price information more available to patients, these efforts have been quite limited in their reach. In response, some policy makers have called for more "price transparency" in health care.[3]

Despite the fact that the lack of price transparency is a key feature of U.S. healthcare markets, models have generally not accounted for this issue. The issue is particularly important given that privately-provided health care in the U.S. comprises about 6 percent of GDP and the relatively high level of spending is often attributed to high prices.[4] In addition, a recent literature has documented the large degree of price dispersion in health care, even for relatively standardized procedures (Cooper et al. 2018). Like search costs, the lack of price transparency may increase prices and lead to price dispersion.

This paper empirically evaluates how price transparency affects markups and welfare in the U.S. health care market. I estimate a demand model that explicitly accounts for consumer uncertainty about prices. During the sample period, an innovative price transparency website became available, providing information about out-of-pocket costs. Given that only some patients sought out the tool and used it, the model allows for usage of the tool to be endogenous. I then combine the demand system with a model of bargaining between providers and insurers in order to examine how consumer price transparency affects negotiated prices.

The model allows me to answer three questions. First, I evaluate the welfare effects of the price transparency website. The model also allows me to examine the mechanisms and distributional consequences of the tool. Second, I use the model to provide insight into the potential equilibrium effects if more individuals were to use price transparency tools. Doing so allows me to quantify the welfare effects of increased price transparency. Finally, I examine how cost sharing interacts with price transparency. This provides insight into why more individuals are not using price transparency tools despite the large dispersion in negotiated prices.

In order to examine these issues, this paper develops a discrete-choice model in which consumers choose where to receive medical care in the presence of information frictions. The model

[1] See, for example, Ellison (2005).

[2] See, for instance, "How Much Will it Cost? How Americans Use Prices in Health Care," Public Agenda, March 2015.

[3] More than half of U.S. states have proposed health care price transparency laws in recent years. Various price transparency initiatives have also been proposed at the federal level.

[4] See Martin et al. (2016) for information on private health care spending. For a discussion of high prices in the market for health care services, see, for example, Anderson et al. (2003), Koechlin et al. (2010), and Cooper et al. (2018).

allows patients to potentially have some limited information about prices even when prices are not posted publicly, an important feature of health care markets. In the model, consumers with rational expectations receive noisy signals about prices, form beliefs about prices based on the signals, then make decisions according to their beliefs. Consumers may choose options they believe to be the best value but are often surprised by the bill. Accounting for the difference between expected prices and actual prices is important for recovering underlying consumer preferences, including price sensitivity, and evaluating the welfare effects of price information.

The key estimation challenge stems from the fact that it is difficult to determine whether individuals do not care about prices, i.e. have low price sensitivity, or do not know prices. The estimation strategy makes use of plausibly exogenous variation in consumers' information set stemming from a price transparency website introduced by the New Hampshire state government. In contrast to other price transparency efforts, the website allowed privately-insured consumers in the state to enter insurance information and easily compare accurate out-of-pocket prices across all providers in the state. I exploit the fact that the website was introduced in March 2007 and could only be used to obtain price information for a subset of medical imaging procedures. Individuals with the most to gain may be more likely to seek out the tool and use it. By leveraging website traffic information, I also estimate a model of website usage. If consumers use the price transparency website when it is available, I assume that they have perfect information about out-of-pocket prices. Otherwise, I allow for a discrepancy between expected prices and actual prices. Estimation of the model makes use of MCMC methods in order to recover individuals' beliefs about the prices of all options, a high dimensional latent variable.

Next, I turn to the supply side and present a bargaining model to recover information about marginal cost and examine how price transparency affects negotiated prices in equilibrium. Empirical work has used models of bilateral bargaining between insurers and medical providers to gain insight into the effects of hospital and insurer competition (Gowrisankaran et al. 2015; Ho and Lee 2017). While others have suggested that price transparency can affect health care prices, I develop the first model of equilibrium behavior that incorporates consumer price uncertainty.[5] I then derive an expression for equilibrium prices and highlight two countervailing effects of price transparency on prices. Price transparency can make residual demand more elastic, decreasing the incentive for providers to negotiate high prices. This would decrease negotiated rates. On the other hand, price transparency ensures that consumers do not choose high cost providers, implying that insurers may be more willing to have high cost providers in their network. This could potentially reduce the incentive of insurers to negotiate low prices. Therefore, the effect of price transparency on negotiated prices is theoretically ambiguous and it is necessary to examine these issues empirically.

The model is estimated using detailed administrative data on private health care claims and price transparency website usage in New Hampshire. The claims data contain information on negotiated prices and cost sharing for all privately-insured individuals in the state. These are the same data used to construct plan-specific out-of-pocket prices for the website. I focus on relatively simple outpatient medical imaging procedures—X-rays, CT scans, and MR scans. Despite the fact that these procedures are relatively standardized, I find that the price of each procedure varies

[5]For a discussion about how price transparency could affect markups see "Health Care Price Transparency: Can It Promote High-Value Care?", Commonwealth Fund, April/May 2012. Also see Section 2.

widely across providers in the state.[6] In addition to individual-level information on the choice of medical provider, I also utilize disaggregated information on usage of the price transparency tool obtained from website traffic logs.

In the first empirical exercise, the estimates are used to evaluate the effect of New Hampshire's price transparency website. Estimates imply that the website resulted in overall savings of 4 percent for medical imaging procedures.[7] These results are largely consistent with reduced-form results, helping to validate the model. In contrast to the reduced-form approach, the structural model allows me to disentangle the mechanisms and shed light on the welfare effects and distributional consequences. I find that welfare effects are primary due to increased price-shopping on the part of consumers, however part of the welfare gains are also due to a modest reduction in the equilibrium prices. I also use the model to examine the effect for individuals who actually used the website. Perhaps unsurprisingly, estimates show the website primarily benefited individuals subject to a deductible. These individuals saw substantial savings, about $200 per visit. However, price information may cause individuals to switch, for example, from nearby hospitals perceived as high quality to distant imaging centers with lower perceived quality. Taking the change in non-price attributes into account, the estimates reveal that welfare gains are substantially smaller than savings.

Next, I use the model to examine what would happen if more individuals used the website. Website traffic data imply that consumers used the website for only about 8 percent of medical imaging visits when the website was available. Given modest take-up, policy makers are interested in the potential effects if more individuals used these tools. In order to answer this question, it is important to take into account two issues that make it difficult to simply extrapolate from reduced-form estimates. First, if the individuals who find out about the website and choose to use it are those that receive a larger benefit, there may be decreasing returns in terms of savings as more individuals become informed about prices. Second, equilibrium prices are a function of the number of consumers that have price information. By affecting negotiated prices, price transparency generates spillover effects that benefit all consumers, including those that do not have price information. This implies that there may be increasing returns as more individuals are informed.

Counterfactual simulations imply that, while both mechanisms are present, the effect on equilibrium prices dominates. If all consumers were informed, the model implies that equilibrium prices would be 22 percent lower. Prices decline because demand effectively becomes more elastic, allowing insurers to negotiate lower prices with most providers in their network. In addition, consumers would choose lower cost providers in their choice set, resulting in per visit savings of $39 for consumers and $281 for insurers relative to no price transparency. Savings would come largely at the expense of provider profits, although some of the savings would also be due to individuals switching to providers with lower marginal cost (e.g. imaging centers and clinics rather than hospitals). The results imply that even a quarter of individuals being informed is enough to generate a considerable reduction in equilibrium prices, generating a large externality

[6]This is consistent with previous research documenting the large degree of price dispersion for these procedures nationally (Cooper et al. 2018). Also note that medical imaging procedures in the U.S. are roughly double the price of the same procedures in other OECD countries with available data. See "The US Health System in Perspective: A Comparison of Twelve Industrialized Nations," Commonwealth Fund Issue Brief, 2011.

[7]Overall savings refers to change in spending for both insurers and consumers.

for uninformed patients.

The results highlight that there would be large spending reductions if more individuals used price transparency tools. So why is take-up so low? One explanation is that low cost sharing reduces consumers' private benefit of using these tools. To examine this, I analyze how price transparency interacts with cost sharing in counterfactual simulations. Results indicate that if cost sharing is high enough, enough consumers are incentivized to use the price transparency tool to substantially reduce health care prices. In particular, a 50% coinsurance rate applied to medical imaging procedures results in prices that are 15% lower. This suggests that for the price transparency tool to generate large savings for patients and insurers, cost sharing would have to be quite high.

1.1 Related Literature

This paper is related to the large literature on search costs and competition, starting with Stigler (1961) and Diamond (1971). Search costs have been shown to be empirically important in a large variety of markets.[8] A common assumption in this literature is that individuals make a purchase decision after learning the price of at least some of the options, i.e. the consideration set. In contrast, this paper studies a context in which individuals make decisions with uncertainty about prices, and true prices are only revealed afterwards. I argue that this has important welfare implications. The model presented in this paper also has implications for other situations in which it is not possible to observe actual prices when making a purchase decision, such as markets where consumers receive price quotes.

This paper is also contributes to the literature examining markets with shrouded add-on pricing. The price of add-ons may be shrouded in equilibrium due to consumer lack of self-control (DellaVigna and Malmendier 2004), selection issues (Ellison 2005), bounded rationality (Spiegler 2006), or myopia (Gabaix and Laibson 2006).[9] Related work on bill-shock has examined situations in which consumers are inattentive about the price of the next unit of consumption, such as for cellular phone contracts (Grubb 2014; Grubb and Osborne 2015). Pricing in the market for medical services can be seen as the limit-case of add-on pricing—in the absence of price transparency tools the full price is partially shrouded. Therefore, the model developed in this paper can be seen as a new approach to add-on pricing in which consumers have imprecise beliefs about shrouded attributes and maximize expected utility.

While this paper argues that information frictions are important for understanding consumers' choice of medical providers, a broader literature has emphasized frictions in other parts of the health care system. A number of studies have examined information frictions related to insurance choice (e.g. Ericson 2014; Decarolis 2015; Handel and Kolstad 2015; Ho et al. 2016). In addition, there is evidence that uncertainty about the effectiveness of different drugs is relevant for pharmaceutical demand (Crawford and Shum 2005; Ching 2010; Dickstein 2014). In a similar vein, a literature has examined uncertainty about quality of medical services and medical devices (e.g. Kolstad 2013; Grennan and Town 2015). Finally, Grennan and Swanson (2016) find that informa-

[8] Empirical work has studied search frictions in markets for mutual funds, textbooks, online bookstores, grocery stores, auto insurance, electricity, online hotel booking, and trade-waste (Hortaçsu and Syverson 2004; Hong and Shum 2006; De Los Santos et al. 2012; Seiler 2013; Honka 2014; Giulietti et al. 2014; Koulayev 2014; Salz 2015).

[9] Also see Grubb (2015) for related review.

tion affects hospital-supplier bargaining. Despite this growing literature, to my knowledge, there is no evidence on the welfare effects of frictions that affect consumers' choice of hospital, which I argue is particularly important for understanding high health care spending.

After estimating a demand model that incorporates price uncertainty, I use the demand parameters to estimate a model of bilateral bargaining between insurers and providers. Empirical models of bilateral bargaining have been applied to a number of vertical markets (e.g. Crawford and Yurukoglu 2012; Grennan 2013; Allen et al. 2019). A recent literature has also used this approach to examine bargaining between providers and hospitals in order to examine hospital mergers (Gowrisankaran et al. 2015), hospital system bargaining power (Lewis and Pflum 2015), tiered hospital networks (Prager 2016), and insurer competition (Ho and Lee 2017). With the exception of Allen et al. (2019) work examining consumer lending, empirical models of bargaining in oligopolistic markets have assumed perfect information.[10] To examine the effect on prices, I use an approach closely related to Gowrisankaran et al. (2015), however I incorporate consumer uncertainty about prices and examine the various channels through which price transparency affects equilibrium prices. Overall, the effect of price transparency is ambiguous in a bargaining context, which has implications for other vertical markets where consumers have uncertainty about product characteristics.

Prior reduced-form work has examined the effect of health care price transparency efforts by individual employers or insurers. In particular, Lieber (2017) and Whaley (2015a,b) find evidence that this information allowed some individuals to shop around for lower cost options, while Desai et al. (2016) finds little effect. In contrast, the state-run price transparency website in New Hampshire was available to all individuals in the state. In Brown (2019), I use reduced-form methods to examine the effect of the price transparency website on spending. The reduced-form approach provides evidence on the intent-to-treat effect of the price transparency website but remains silent on a number of important issues. First, it provides little insight into the mechanisms and the effect on welfare. Given that price transparency has implications for distance traveled and the quality of medical providers chosen, the effect on welfare may be quite different than the effect on spending. Perhaps most importantly, health care price transparency tools are not yet widely used, and therefore it is difficult to draw general conclusions about the role of information frictions using a reduced-form approach. By developing a model based on theory, counterfactual analysis can be used to examine what would happen if more individuals were informed about health care prices as well as how price transparency interacts with other potential policies such as cost sharing.

1.2 Roadmap

The remainder of the paper is organized as follows. Section 2 describes the data and provides background on the price transparency website. Section 3 presents the model of website usage and choice of medical provider. Section 4 presents the bargaining model, focusing on the role of consumer information. Section 5 presents the results. Section 6 uses the estimates to examine the effect of the website while Section 7 presents out-of-sample counterfactual simulations. Section 8

[10] Allen et al. (2019) incorporate search frictions into a model of the mortgage market. Note that while this paper models business-to-business bargaining, Allen et al. (2019) examines negotiations between consumers and lenders.

provides a discussion and Section 9 concludes.

2 Data and Background

2.1 New Hampshire Medical Claims

The main dataset contains enrollment and claims for the universe of individuals with private health insurance in New Hampshire for the period January 2005 to November 2010.[11] These data were collected as part of the New Hampshire Comprehensive Health Care Information System (NHCHIS), which assembled data from all commercial insurers in the state. The data were collected by the state in order to analyze health spending and construct prices for the price transparency website.

This paper analyzes the market for outpatient medical imaging services. This includes X-rays, computerized tomography (CT) scans, and magnetic resonance imaging (MRI) scans, all of which are diagnostic procedures that provide internal images of the body. I restrict the sample to the three major insurers in the state and eliminate uncommon procedures. I describe the sample restrictions in more detail in Appendix A. The full list of medical imaging procedures is given in Table A-1.[12]

I focus on this set of procedures for a few reasons. I argue these procedures are particularly important given that medical technology, especially related to medical imaging, is often cited as a key driver of health care cost growth.[13] Second, these procedures are relatively standardized, mitigating concerns about unobserved quality. Finally, patients have significant discretion over where to receive outpatient medical imaging procedures.[14]

The data contain information on out-of-pocket prices and insurer reimbursement amounts, allowing me to construct each patient's cost sharing. Importantly, prices are aggregated to the visit level, which may include multiple procedures. I use a similar methodology to aggregate prices as the price transparency website, which displays the aggregated visit prices. The construction of visit prices is described in more detail in Appendix A.

For each visit, an identifier allows me to link information about the medical provider that performed the procedure, which includes both hospital and non-hospital facilities. While hospitals offer outpatient medical imaging services, freestanding outpatient facilities (e.g. imaging centers) are significantly less expensive. In New Hampshire, the average total cost of an imaging visit is $1,004 at hospitals but only $797 at non-hospital providers. The location of these providers, derived from their zip code, is shown in Figure A-1.

For each individuals, I observe age, gender, zip code, insurance enrollment, and whether they are subject to a deductible. I define 5 different age groups (0-18, 19-35, 36-50, 51-64) and omit individuals over age 65 since they are likely eligible for Medicare. Average income and education using the 2007-2010 American Community Survey is linked to each individual using the zip code.

[11] Although the data include information about claims in later years, I focus on the period prior to December 2010 since this is when detailed website traffic data is available.

[12] In addition, 2011 is excluded since website traffic data is not available.

[13] See Newhouse (1992) and Cutler (1995).

[14] Other procedures featured on the website, such as kidney stone removal, physician office visits, and newborn delivery, tend to be less standardized and involve a different set of providers.

Table 1
Summary of Privately Insured Individuals with Medical Imaging Claims

	Mean	SD	Min	Max
Male	0.47	0.50	0	1
Age 0-18	0.20	0.40	0	1
Age 19-35	0.18	0.39	0	1
Age 36-50	0.31	0.46	0	1
Age 51-64	0.31	0.46	0	1
Charlson Comorbidity Index	0.6	0.8	0.0	2.0
Zip income ($1,000s)	82.8	24.2	22.0	309.3
Zip BA Degree (%)	33.8	14.0	0.0	100.0
Unique Individuals		174,672		

Notes: Sample includes all privately insured individuals in the state of New Hampshire over the period 2005 to 2010 with at least one outpatient medical imaging visit. The unit of observation is a unique individual.

In addition, patient zip code is used to calculate the distance to each provider. I also construct each patient's Charlson Comorbidity Index, a measure of chronic diseases or conditions. Given the potential importance of primary care recommendations, I also construct an indicator for likely referrals.[15] Finally, I construct an indicator for whether each individual has the medical imaging procedure in the week following an emergency.[16]

Table 1 provides a summary of the 174,672 individuals with outpatient imaging visits over the period. Table A-2 provides additional summary statistics. Half of the individuals are in HMO plans and most of the remainder are in PPO or POS plans. About 43 percent of individuals have a plan with a deductible.

When an individual needs a specific procedure, the choice set is defined as the providers that are available through the individual's insurance plan that can perform the procedure in the given year. Although I do not observe each insurer's network directly, I construct each insurer network by examining the providers chosen by individuals in each insurance company-product pair (e.g. Anthem HMO).[17] For each option in the choice set, I construct procedure prices that vary by insurance company-product pair and year. In addition, out-of-pocket prices vary across individuals with the same insurance product since some individuals are under the deductible and some are not. Within each individual's choice set, I remove providers that cannot perform the procedure as well as those that are more than 75 miles from the individual.

The full dataset is summarized for each of the three insurers in Table 2. Anthem is by far

[15]The referral indicator is described in more detail in Appendix A.

[16]Although these are relatively minor emergency visits since I exclude inpatient admissions, this may affect demand since it may be more time sensitive (e.g. demand for medical imaging procedures after a bone fracture may be different than for routine preventative care).

[17]In some cases, individuals may have plans, such as PPO plans, that allow them to choose providers out-of-network. To the extent that individuals actually choose these providers, they are included in the choice set but have higher prices. For the purposes of the model, I refer to the set of providers that individuals can access given their insurance as the "network" even though this could potentially include providers that are technically out-of-network.

Table 2
Summary of Medical Imaging Visits by Insurer

	Anthem		Cigna		Harvard Pilgrim	
	Mean	SD	Mean	SD	Mean	SD
Observations	946,057		216,176		266,747	
Number of choice situations	104,358		26,864		33,275	
Number of unique patients	67,749		19,912		21,114	
Number of unique non-hospital providers	148		82		62	
Number of unique hospital providers	29		13		0	
Providers in choice set	11.7	5.2	11.9	5.9	10.3	4.3
Total negotiated price	777.2	945.9	613.3	764.7	706.3	758.7
Insurance price	697.1	907.5	577.4	739.9	627.6	711.9
Out-of-pocket price	80.1	178.7	35.8	77.9	78.8	193.2
Distance to provider	34.1	17.7	28.9	16.2	28.9	15.1
Choose hospital	0.38	0.49	0.23	0.42	0.00	0.00
Choose referral	0.33	0.47	0.41	0.49	0.33	0.47

Notes: Includes all outpatient medical imaging visits for privately insured individuals in the state of New Hampshire over the period 2005 to 2011. All prices in 2010 inflation-adjusted dollars.

the largest insurer, with over 100,000 medical imaging visits over the period. On average, the out-of-pocket price is 13 percent of the total negotiated price. However, there is large variation—individuals under the deductible pay the full price. In general, there is greater cost sharing in the beginning of the year, when individuals have not hit their deductible, than at the end of the year.[18] Individuals choose between 13 different providers on average, although, again, there is significant variation. This is partially due to the fact that there are more providers that are capable of performing X-rays than MR scans. Given large number of observations, I use a 10 percent sample of visits for the main analysis.

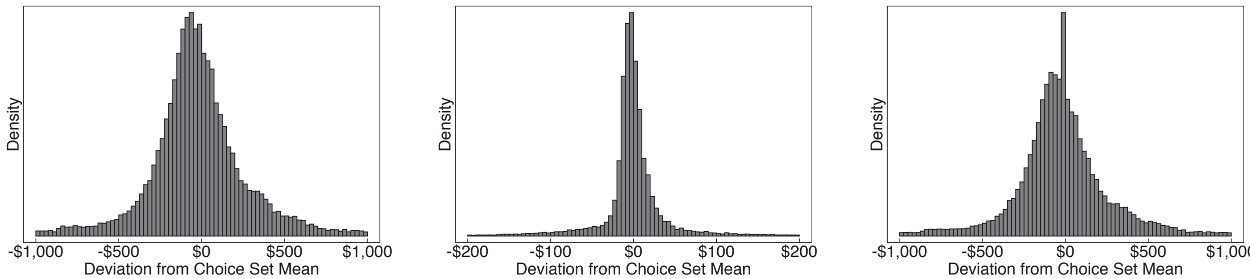
Within individual's choice sets, there is a large degree of price dispersion, and consequently, significant potential savings if individuals switch to low cost options. Figure 1a shows the distribution of demeaned negotiated prices within individuals' choice sets. The distribution is approximately normal, with standard deviation of $747 (and coefficient of variation of 46 percent). If a consumer is under the deductible for the year, the individual is fully exposed to the variation in prices. However, since most patients share cost with an insurer, out-of-pocket price dispersion is smaller, with a standard deviation of $69 (see Figure 1b). Finally, Figure 1c shows the distribution of prices paid by the insurer.

Given the variation in prices, there are large potential savings if consumers switched to cheaper providers in their network. The potential savings for consumers and insurers are summarized in Table A-3. Overall, I find that there would be savings of over 30 percent if consumers switched to providers in the first quartile of the price distribution.[19] This is true for across all three procedures types. Consumers subject to a deductible have large gains from switching, but much

[18]In January, out-of-pocket prices are about 20 percent of the total negotiated price on average.

[19]These are the potential consumers and insurer savings if all consumers choosing a provider ranked above the first quartile in their choice set were to switch to the provider in the first quartile of their choice set.

Figure 1
Price Variation within Individuals' Choice Sets



(a) Total Negotiated Price (b) Patient Out-of-Pocket Price (c) Insurer Price

Notes: Histograms show distribution of prices across individuals' choice sets. Prices are demeaned since individuals face different choice sets and prices depending on their insurance plan, procedure, year, geographic location, and if they have surpassed their deductible.

of the potential savings for consumers without a deductible go to insurers. This suggests that, although there are large potential savings for the health care system, consumers with low cost sharing may have little incentive to switch to less expensive providers even if they have price information.

2.2 HealthCost Website

In an effort to increase health care price transparency, the New Hampshire Insurance Department launched the HealthCost website in March 2007.[20] Other price transparency initiatives only provide information on the hospital list price of each procedure (i.e. charge amount), which has little bearing on the out-of-pocket prices that insured individuals actually pay. New Hampshire's HealthCost website was unique because it provided information about insurer-specific out-of-pocket prices for the entire visit. Although other states, such as Maine and Colorado, have since created tools with similar information, New Hampshire's price transparency efforts remain the most comprehensive.[21] Individuals with private insurance in the state can select one of about 35, mostly outpatient, procedures (see Figure A-2a). In addition to providing information for insured individuals, the website also has a separate tool for uninsured individuals in the state. Since the claims data cover the population of insured individuals, I focus only on the former. After my period of analysis, the website added information about provider quality and a guide to health insurance.[22]

To use the website, consumers enter their insurance information, deductible, zip code, and search radius and the website returns a list of median bundled out-of-pocket prices at each provider calculated using the NHCHIS dataset. Figure A-2b illustrates an example of prices returned by

[20] The website can be found at nhhealthcost.nh.gov. Originally the website was nhhealthcost.org.

[21] New Hampshire was the only state to receive an "A" grade from Catalyst for Payment Reform's 2015 Report Card on State Price Transparency Laws.

[22] It is also important to note that there have been other price transparency efforts by individual insurers, notably Aetna which started its Member Payment Estimator tool in 2010. However, Aetna had a very small presence in New Hampshire and is excluded from the analysis.

the website. The table of prices is automatically sorted by out-of-pocket price, making it easy for consumers to schedule an appointment with the lowest cost provider. In addition to the out-of-pocket price, the website also returns the amount paid by insurers and the total negotiated price. For the purposes of analysis, I assume that individuals who use the website are fully informed about prices. I discuss this assumption in greater detail in Section 3.2.[23]

The website was widely promoted and there were 41,506 searches for price information per year on average according to website traffic logs, about a third of which were for medical imaging procedures.[24] Surveys of people in New Hampshire found that 60 percent who used the website reported saving money.[25] Furthermore, anecdotal evidence suggests that the website not only let consumers shop around, but may have allowed insurers to negotiate lower rates. One report noted that after the introduction of the website "the balance of plan-provider negotiating power began shifting significantly in New Hampshire."[26] In particular, Anthem, the largest insurer in New Hampshire, had a public battle with an expensive hospital in the state and local news sources suggest that the price transparency website facilitated lower prices.[27]

In order to examine the effect of price transparency, this paper exploits two sources of variation generated by the HealthCost website. First, there is variation due to the timing of the website introduction. In this way, I can examine procedures on the website and compare observed choices from January 2005 to February 2007, prior to the introduction of the website, to observed choices in the period starting March 2007. Second, there is variation due to the fact that only a subset of medical imaging procedures were available on the website.[28] The X-ray, CT scan, and MR scan procedures with and without information available on the website are listed in Table A-1. I argue that imaging procedures on the website tend to be quite similar to procedures not on the website. For example, the price of a knee X-ray is available on the website while the price of a knee/leg CT scan is not, even though the website includes other CT scans. One concern is that the website indirectly affected prices for procedures not on the website due to cross-subsidization, a concern I address in Brown (2019) by showing that results are robust to exploiting cross-state variation. Using both time variation and cross-sectional variation is important given that there are potential unobserved shocks that affect all imaging procedures.[29]

I use website traffic logs obtained from the New Hampshire Insurance Department to calculate

[23]The website also provides information on precision of the cost estimate and typical patient complexity. I argue these are less relevant for medical imaging procedures since the procedures are relatively common (i.e. estimates are fairly precise) and relatively standardized (i.e. price depends little on patient complexity).

[24]According to discussions with state employees, the website was promoted by encouraging insurers and primary care doctors to inform patients about the website. In addition, there were at least 40 news articles mentioning the website over the period.

[25]See "How New Hampshire Residents Use Health Care Price Information," April 2017. Public Agenda Research Brief.

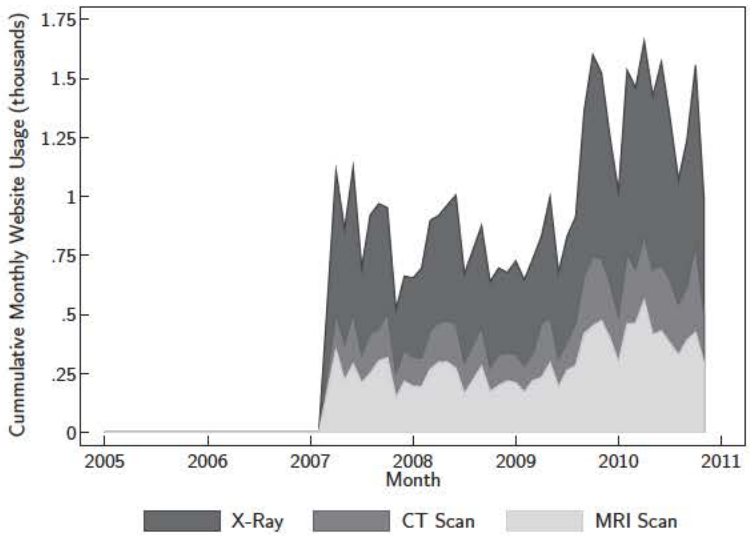
[26]See "Moving Markets: Lessons from New Hampshire's Health Care Price Transparency Experiment," April 2014. California HealthCare Foundation.

[27]See "Higher costs of services snags Exeter Hospital's new deal with Anthem," *Portsmouth Herald*, November 7, 2010 and "Exeter Hospital says costs being used as negotiating tactic," *Portsmouth Herald*, November 14, 2010.

[28]According to discussions with state employees, only a subset of procedures were chosen because cleaning the data and constructing prices was time consuming and the department had limited resources. Note that after the period of analysis, the website added additional information.

[29]For instance, Medicare reduced payments to imaging procedures starting in 2007. To the extent that this affected private-payer prices, this is unlikely to differentially impact prices for procedures on the website.

Figure 2
Price Transparency Website Usage for Medical Imaging Procedures
By Month



Notes: Chart shows cumulative searches by procedure group. Includes all searches using "Health Costs for Insured Patients" wizard on either nhhealthcost.nh.gov or nhhealthcost.org. Note the website began in March 2007.

the number of website price searches in each month for each procedure listed on the website. Website traffic data, obtained from server logs, is available from March 2007 through November 2010, at which point the website switched hosting companies. Figure 2 shows monthly price searches for X-rays, CT scans, and MR scans. When the website was first introduced in 2007, there were about 750 to 1,000 searches per month for the price of medical imaging procedures, however this grew to over 1,500 searches per month by late 2009, likely due to more individuals learning about the website.

In order to estimate the fraction of informed consumers, I divide the number of price searches per procedure by the total number of visits in New Hampshire from the claims data.[30] In other words, I assume that each use of the website is a unique individual.[31] Overall, this implies about 8 percent of individuals receiving a procedure on the website were informed. This is higher than usage of other price transparency tools, potentially due to the fact that New Hampshire's price transparency tool is easily accessible and utilizes high quality data on actual negotiated prices, which has not been the case for other price transparency efforts.[32]

[30] Note that the website procedures (e.g. knee X-ray) are more broad than the procedures as defined by CPT codes (e.g. knee X-ray with 1 or 2 views). Therefore, I aggregate across all CPT procedure codes related to the website procedure to obtain the total number of visits related to the website procedure in each month.

[31] If the same individual uses the website multiple times prior to a medical visit, the fraction of informed consumers would be lower. This would imply that the estimated savings conditional on using the website are actually larger. For this reason, the assumption that the number of website hits is equivalent to the number of informed consumers results in a conservative estimate of website savings.

[32] New Hampshire's tool has consistently received higher marks than other tools. See Catalyst for Payment Reform's 2015 Report Card on State Price Transparency Laws.

Table A-4 has the estimated percent of consumers with price information for each medical imaging procedure listed on the website. The percent of informed consumers tends to be higher for CT scans and MR scans compare to X-rays. CT scans and MR scans also tend to be more expensive, making the website potentially more valuable. There is also variation across time due in part to the fact that there is random variation in the type of individuals that need a procedure in a given month. This variation is used to help estimate the demand model and recover information about the choice to use the website if it is available.

3 Demand for Providers and Website Usage

This section presents a model of demand in which individuals have uncertainty about prices unless they use the price transparency website. The model has two parts. First, I model the selection of individuals that use the price transparency website if it is available. Second, based on their information set, consumers choose a medical provider.

I start backwards and begin by discussing the choice of provider with and without price information in Section 3.2. In Section 3.3 I discuss the model of website usage using results derived from Section 3.2. Finally, I discuss estimation and identification.

3.1 Model Setup and Timing

There are a set of providers that perform medical imaging services $\mathcal{J}$ indexed by j. The set of providers includes hospitals as well as non-hospital providers (i.e. freestanding outpatient facilities such as imaging centers and clinics). Each year, insurer $k \in \mathcal{K}$ contracts with a subset of providers, $\mathcal{N}_{kmt} \subseteq \mathcal{J}$, that can perform procedure $m \in \mathcal{M}$, where $\mathcal{M}$ is the set of medical imaging procedures.[33] Finally, let $i \in \mathcal{I}$ denote an individual enrolled in an insurance plan who needs a medical imaging procedure.

Each provider has a schedule of negotiated prices that is insurer-specific. In particular, the total price of procedure m at provider j for enrollees in insurer k at time t is given by $p_{jkmt} \in \mathbf{p}_{kmt}$, where $\mathbf{p}_{kmt}$ denotes the vector of prices across all providers. In Section 4, I model the bargaining process that determines these prices in each year. In contrast to the previous literature, it is important to note that I define prices at the visit level, i.e. prices include the cost of supplemental procedures as on the price transparency website.[34]

Individual i pays fraction c_{ikmt} of the negotiated price. The cost sharing fraction is observed in the claims data by calculating out-of-pocket costs as a fraction of total cost for each plan. The degree of cost sharing is determined by both the coinsurance rate applied to procedure m when enrolled in insurance plan k as well whether the individual is past the deductible for the year. In particular, if the individual is subject to a deductible then $c_{ikmt} = 1$. Therefore, for a given

[33] Given that insurers contract with a network of providers, their role extends beyond providing insurance. For this reason, they are often referred to as managed care organizations.

[34] Focusing only on the main procedure would likely understate price differences across providers since consumers are in fact purchasing a bundle of procedures. Note that much of the literature focuses on inpatient hospital spending where prices are often defined by diagnosis.

individual, cost sharing can vary over time t. The out-of-pocket price paid by the individual is

$$p^{OP}_{ijkmt} = c_{ikmt} p_{jkmt}$$

I assume that individuals do not anticipate whether they will surpass their annual deductible and respond only to this spot price. This is consistent with the fact that, in the reduced-form analysis, much of the price transparency effect is from individuals subject to a deductible, including those that later surpass their deductible. It is also consistent with the previous findings of myopic behavior in health care (Brot-Goldberg et al. 2017).[35]

The remainder of the cost is paid by the insurer

$$p^{Insur}_{ijkmt} = (1 - c_{ikmt}) p_{jkmt}$$

After prices are determined via bargaining in each year, individuals that need a medical imaging procedure must choose a provider. I assume that each time an individual needs a medical imaging procedure there is the following timing:

1. The individual forms a prior about prices (i.e. they know the distribution from which prices are drawn)
2. The individual receives a vector of price signals and updates beliefs in a Bayesian fashion
3. The individual evaluates the expected gain from price information and chooses whether to use the website if it is available
4. The individual learns taste shocks and chooses the provider that maximizes expected utility[36]

After choosing a provider and receiving the procedure, the individual receives a bill and learns the true price.

3.2 Choice of Provider

Provider Choice When Prices are Known

I start by defining utility for the standard case in which prices are known. This expression is also the ex-post realized utility for the case in which individuals have ex-ante uncertainty. For individual i with insurance k receiving procedure m from medical provider j, indirect utility is assumed to take the additively separable form

$$u_{ijkmt} = -\gamma_i p^{OP}_{ijkmt} + \underbrace{\alpha_1 d_{ij} + \alpha_2 d^2_{ij} + \alpha_3 r_{ijt} + \xi_{jM} + \beta \mathbf{x}_{ikmt} h_j}_{\delta_{ijkmt}} + \varepsilon_{ijkmt} \tag{1}$$

[35] In contrast to the evidence from health care, the evidence from prescription drug insurance is mixed. See Aron-Dine et al. (2015), Abaluck et al. (2015), and Sacks et al. (2016).

[36] This assumption is required to calculate the expected gain in consumer surplus from price information and tractably model the decision to use the website in the subsequent section. Learning the taste shock after choosing to use the website is consistent with the idea that consumers may evaluate providers based on observable characteristics, choose to use the website if it is available, and only then learn about their idiosyncratic shock, such as whether providers have an appointment time that fits their schedule.

I allow for individual-specific heterogeneity in out-of-pocket price sensitivity, γ_i, which is distributed with density $f(\gamma_i)$. This approach has the benefit of not exhibiting the independence from irrelevant alternatives property. It is also important since individuals that are more price sensitive may be more likely to use the price transparency website, which I explicitly account for in Section 3.3. I estimate the mean and variance of the distribution and allow the price coefficient to be correlated with the individual's average cost sharing, c_{ik}, since individuals with greater price sensitivity may differentially select into more generous plans.[37] Accounting for the adverse selection into insurance is important for understanding which individuals benefit from the price transparency website. In particular, I assume that the random coefficient is distributed normally and may be correlated with cost sharing, i.e. $\gamma_i \sim N(\bar{\gamma} + \rho c_{ik}, (\sigma^\gamma)^2)$. In order to account for correlation in unobserved utility when individuals have multiple medical imaging visits over the period, the random-coefficient on price is assumed to be individual-specific (Revelt and Train 1998).

In addition to price, utility depends on observable non-price attributes, δ_{ijkmt}. This term includes distance from each individual to each provider, d_{ij}, distance-squared, d_{ij}^2, as well as an indicator for whether individual i was referred to provider j, r_{ijt}. Controlling for referrals is important as physicians may influence where patients choose to go and there may be benefits to receiving a medical imaging procedures from a provider closely connected to a patient's specialist.

Demand for hospitals may also differ depending on individual characteristics. Utility includes $\mathbf{x}_{ikmt}h_j$, the interaction between observable individual characteristics and an indicator for whether the provider is a hospital. The vector of individual characteristics, $\mathbf{x}$, includes age categories, gender, income, education, outpatient emergency indicator, and the Charlson Comorbidity Index. The last two are important for accounting for the fact that sicker patients or those in more urgent need of care may have distinct preferences. Utility is also a function of unobserved perceived quality or amenities at each provider, ξ_{jM}. This is allowed to vary according to the three procedure groups, X-rays, CT scans, or MR scans, which are indexed by M. This accounts for the fact that providers may specialize in certain types of procedures.

Finally, ε_{ijkmt} is an idiosyncratic error distributed i.i.d. type 1 extreme value that is known by the individuals at the time the choice of provider is made. Individuals may only visit a provider in their network, $j \in \mathcal{N}_{kmt}$. There is no outside option since individuals are assumed to receive a medical imaging procedure if their doctor recommends it.[38]

The observed choice probability of individual i enrolled in insurer k receiving procedure m at

[37] This approach is related to Limbrock (2011), who models selection into HMO plans and pharmaceutical demand. Note that c_{ik} is defined as the individual's average cost sharing for medical imaging procedures over the period of analysis.

[38] One concern is that price transparency affects the choice to have a procedure at all. In Brown (2019), I examine the effect of the price transparency website on the probability of having medical imaging procedures for all privately-insured individuals in the state and do not find a statistically significant effect. This is consistent with the fact that X-rays, CT scans, and MR scans tend to be less discretionary than other medical services. This implies that conditioning on individuals that had a medical imaging procedure and assuming they all choose an inside option is unlikely to bias counterfactual estimates. However, price transparency tools may affect quantity for other types of procedures such as preventative care.

time t conditional on price information is then

$$s_{ijkmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt} = 1) = \int_{\gamma_i} \frac{\exp(-\gamma_i p^{OP}_{ijkmt} + \delta_{ijkmt})}{\sum_{j' \in \mathcal{N}_{kmt}} \exp(-\gamma_i p^{OP}_{ij'kmt} + \delta_{ij'kmt})} f(\gamma_i) d\gamma_i \tag{2}$$

where ϑ_{ikmt} is an indicator for whether the individual used the website and was informed about prices.

The expected consumer surplus, conditional on having price information, for a patient needing a medical imaging procedure is then:[39]

$$CS_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt} = 1) = \frac{1}{\gamma_i} \log \left(\sum_{j \in \mathcal{N}_{kmt}} \exp(-\gamma_i p^{OP}_{ijkmt} + \delta_{ijkmt}) \right) \tag{3}$$

Provider Choice with Price Uncertainty

A defining feature of the health care market is that precise price information is, in general, not available to patients. Previous models of hospital demand either assume that individuals do not account for hospital prices at all or have perfect information about prices.[40] Consistent with the fact that demand for medical services is not perfectly inelastic even when price transparency tools are not available, the model allows individuals to have limited information about prices.[41] Individuals form beliefs using Bayes' rule and then make a decision based on those beliefs. This information structure is related to the empirical literature on consumer learning and investment decisions with imperfect information (e.g. Erdem and Keane 1996; Ackerberg 2003; Erdem et al. 2008; Crawford and Shum 2005; Ching 2010; Dickstein 2014; Grennan and Town 2015; Dickstein and Morales 2016).

I assume that individuals know the distribution from which prices are drawn, which is assumed to be normal. In particular, their prior is determined by the true mean and variance of prices in their choice set, $\bar{p}^{OP}_{kmt}$ and $\bar{s}^2_{kmt}$ respectively:

$$p^{OP}_{ijkmt} \overset{iid}{\sim} N(\bar{p}^{OP}_{kmt}, \bar{s}^2_{kmt}) \tag{4}$$

The demeaned distribution of prices across options in individuals' choice sets can be seen in Figure 1b, which is approximately normal. For individuals subject to a deductible, $\bar{s}^2_{kmt}$ can be quite large (see Figure 1a).

The prior provides no information about relative prices in the choice set, and therefore is not useful for choosing a provider on its own. However, individuals may be able to obtain additional information about individual prices. For instance, they may be able to look up list prices or

[39] This is the consumer surplus before the idiosyncratic error is known. All expressions for expected consumer surplus are up to a constant. See Small and Rosen (1981).

[40] For example, Kessler and McClellan (2000), Tay (2003), Ho (2006), and Ho and Lee (2017) assume that price does not influence patient choice while Capps et al. (2003), Gaynor and Vogt (2003), Ho and Pakes (2014) and Gowrisankaran et al. (2015) include price in utility and assume perfect information.

[41] When price transparency tools are not available, demand is still observed to be somewhat elastic, implying individuals have at least some information about prices. This can be seen in Table A-5, as well as other studies examining demand for hospitals (e.g. Gowrisankaran et al. 2015).

receive potentially noisy price information from other individuals that had similar procedures. When asked, providers and insurers sometimes provide a price range if they provide any price information at all.[42] I model this by assuming that individuals receive a vector of unbiased signals, where each signal is given by

$$p^{OP}_{ijkmt} + e_{ijkmt} \tag{5}$$

where p^{OP}_{ijkmt} is the true price and e_{ijkmt} is signal noise with density $f(e_{ijkmt})$. I assume the distribution of signal noise is normal:

$$e_{ijkmt} \overset{iid}{\sim} N(0, \sigma^2) \tag{6}$$

The key parameter is σ^2, which can be thought of as a measure of price transparency (or opacity).

Using Bayes' rule, individuals' posterior beliefs about price, $\widetilde{p^{OP}_{ijkmt}}$, are also normally distributed. The mean of the posterior (i.e. expected price) given the individual's signal is given by

$$\mathbb{E}\left[\widetilde{p^{OP}_{ijkmt}}\right] = w_{ikmt}(p^{OP}_{ijkmt} + e_{ijkmt}) + (1 - w_{ikmt})\bar{p}^{OP}_{kmt} \tag{7}$$

where the weight given to the signal is defined as $w_{ikmt} = \bar{s}^2_{kmt}/(\bar{s}^2_{kmt} + \sigma^2)$. Using the assumption that the prior and signal are normally distributed, the variance of posterior beliefs is $Var[\widetilde{p^{OP}_{ijkmt}}] = w_{ikmt}\sigma^2$.

If $\sigma^2 = 0$, then $w_{ikmt} = 1$ and individuals know true prices. Conversely, if $\sigma^2 \to \infty$ then $w_{ikmt} \to 0$, implying that individuals place no weight on the price signals. In this way, the prior is important because it disciplines individual's beliefs about price—if individuals receive very noisy signals than they effectively ignore prices.[43] In Section D, I present an alternative model in which individuals have an uninformative prior and take price signals as given.

When individuals do not use the price transparency website, I assume they form beliefs about utility, $\widetilde{u_{ijkmt}}$, and choose the provider that maximizes expected utility. In particular, the expected utility of risk neutral individuals is

$$\begin{aligned}\mathbb{E}\left[\widetilde{u_{ijkmt}}\right] &= -\gamma_i \mathbb{E}\left[\widetilde{p^{OP}_{ijkmt}}\right] + \underbrace{\alpha_1 d_{ij} + \alpha_2 d^2_{ij} + \alpha_3 r_{ijt} + \xi_{jM} + \beta \mathbf{x}_{ikmt} h_j}_{\delta_{ijkmt}} + \varepsilon_{ijkmt} \\ &= -\gamma_i w_{ikmt}(p^{OP}_{ijkmt} + e_{ijkmt}) + \delta_{ijkmt} + \varepsilon_{ijkmt}\end{aligned} \tag{8}$$

The second line follows from the fact that $(1 - w_{ikmt})\bar{p}^{OP}_{kmt}$ is a constant that is the same across choices, and thus can be differenced out.

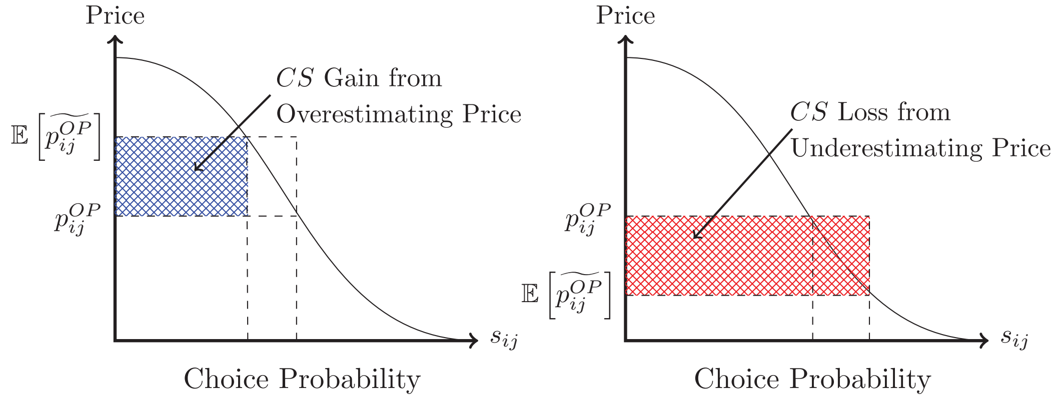
In this model, all individuals receive signals with the same variance, parameterized by σ. This is motivated by the fact that individuals have access to similar public information, and therefore

[42] See, for instance, "How to Research Health Care Prices," *Wall Street Journal*, December 4, 2009.

[43] This can be seen formally by noting that the choice probability depends only on non-price attributes in the limit, i.e.

$$\lim_{\sigma^2 \to \infty} \mathbb{E}_e \left[\frac{\exp(-\gamma_i w_{ikmt}(p^{OP}_{ijkmt} + e_{ijkmt}) + \delta_{ijkmt})}{\sum_{j' \in \mathcal{N}_{kmt}} \exp(-\gamma_i w_{ikmt}(p^{OP}_{ij'kmt} + e_{ij'kmt}) + \delta_{ij'kmt})}\right] = \frac{\exp(\delta_{ijkmt})}{\sum_{j' \in \mathcal{N}_{kmt}} \exp(\delta_{ij'kmt})}$$

Figure 3
Consumer Surplus when Expected Price Differs from Actual Price



Notes: Blue shaded region shows the gain in consumer surplus relative to expected consumer surplus due to price being less than expected. Red region shows the loss in consumer surplus from price being more than expected. Note that there is a "winner's curse" and the expected loss is larger.

have a similar degree of uncertainty about prices. It is important to note that the model rules out learning over time. Only 7 percent of patients get repeat outpatient procedures in a year, and even then may still have uncertainty due to changes in deductible status.[44]

Focusing on the component of utility that is due to price, it is useful to clarify what is known by the individual and what is known by the researcher. The individual knows her price sensitivity, γ_i, and signal, $p_{ijkmt}^{OP} + e_{ijkmt}$, but not the true price. However, the researcher observes the true price, p_{ijkmt}^{OP}, but not the signal noise, e_{ijkmt}, or the individual's price sensitivity. The prior distribution is known by both the researcher and the individual.

Therefore, the observed choice probabilities from the researcher's perspective is given by

$$s_{ijkmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt} | \vartheta_{ikmt} = 0) = \int_{\gamma_i} \int_{\mathbf{e}_{ikmt}} \frac{\exp(-\gamma_i w_{ikmt}(p_{ijkmt}^{OP} + e_{ijkmt}) + \delta_{ijkmt})}{\sum_{j' \in \mathcal{N}_{kmt}} \exp(-\gamma_i w_{ikmt}(p_{ij'kmt}^{OP} + e_{ij'kmt}) + \delta_{ij'kmt})} f(\mathbf{e}_{ikmt}) f(\gamma_i) d^J \mathbf{e}_{ikmt} d\gamma_i \quad (9)$$

where $\vartheta_{ikmt} = 0$ indicates that the individual did not use the website and is uninformed about prices. Since the vector of signal noise, $\mathbf{e}_{ikmt}$, has the same number of elements as $\mathcal{N}_{kmt}$, computing the expectation over individual beliefs requires evaluating a potentially high dimensional integral. This is the key estimation challenge, an issue that is discussed in greater detail in Section 3.4.

The calculation of expected consumer surplus must take into account that, from the perspective of the individual, the expected price, $\mathbb{E}[\widetilde{p_{ijkmt}^{OP}}]$, may differ from true price, p_{ijkmt}^{OP}. Train (2015) formalizes the calculation of consumer surplus when individuals misperceive product attributes. In particular, individual's expected ex-post consumer surplus includes a standard term

[44]I find that the effect of the website is similar for patients with and without a history receiving medical imaging procedures, indicating that learning about prices over time is not a first order concern for these procedures. See Brown (2019) Appendix.

(Small and Rosen 1981) as well as a term that captures the loss from incorrect beliefs:

$$CS_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt} = 0) = \underbrace{\frac{1}{\gamma_i} \log \left(\sum_{j \in \mathcal{N}_{kmt}} \exp(-\gamma_i w_{ikmt}(p^{OP}_{ijkmt} + e_{ijkmt}) + \delta_{ijkmt}) \right)}_{\text{CS evaluated at beliefs of prices}} + \underbrace{\sum_{j \in \mathcal{N}_{kmt}} \left[\mathbb{E}\left[\widetilde{p^{OP}_{ijkmt}}\right] - p^{OP}_{ijkmt} \right] s_{ijkmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt} = 0)}_{\text{CS gain/loss from incorrect beliefs}} \tag{10}$$

The second term is the average difference between expected price and true price, weighted by choice probabilities. The "bill shock" for each option is given by

$$\mathbb{E}\left[\widetilde{p^{OP}_{ijkmt}}\right] - p^{OP}_{ijkmt} = w_{ikmt} e_{ijkmt} + (1 - w_{ikmt})(\bar{p}^{OP}_{kmt} - p^{OP}_{ijkmt}) \tag{11}$$

In general, individuals are more likely to choose a provider they falsely believe to be inexpensive, creating a situation similar to a "winner's curse". This can be seen in Figure 3 which presents two situations, one in which expected price is greater than actual price and one in which expected price is less than actual price. Believing an option to be inexpensive (i.e. receiving a low e_{ijkmt}) results in a higher choice probability, increasing the expected loss from incorrect beliefs.

3.3 Website Usage

In this section I develop a model in which individuals choose to seek out the price transparency website and use it if it is available. The model allows for selection by assuming that individuals with the most to gain may be more likely to use the website. Specifically, individuals evaluate the expected gain in consumer surplus from using the website and compare this to the cost. They then use the website if the net benefit is positive. In Section 7, the estimates from this selection model are used to simulate website usage under counterfactual scenarios.

The expected consumer surplus gain of using the website is the difference between expected consumer surplus when consumers know they will receive price information, but have not yet received it, and expected consumer surplus without price information. The expected benefit of using the website, b_{ikmt}, is given by

$$b_{ikmt} = \frac{\gamma_i w_{ikmt} \sum_{j \in \mathcal{N}_{kmt}} \sigma^2_h \left[\exp(-\gamma_i \mathbb{E}\left[\widetilde{p^{OP}_{ijkmt}}\right] + \delta_{ijkmt}) \Phi_{ijkmt} \right]}{2 \left[\sum_{j \in \mathcal{N}_{kmt}} \exp(-\gamma_i \mathbb{E}\left[\widetilde{p^{OP}_{ijkmt}}\right] + \delta_{ijkmt}) \right]^2} \tag{12}$$

where $\Phi_{ijkmt} \equiv \sum_{j' \in \mathcal{N}_{kmt} \setminus j} \exp(-\gamma_i \mathbb{E}[\widetilde{p^{OP}_{ij'kmt}}] + \delta_{ij'kmt})$. Given the lack of a closed-form expression, which is needed for computational tractability, the expression above is an approximiation using a second-order Taylor series expansion. In Appendix B, I derive this expression and argue that the approximation is quite accurate.

Holding beliefs about prices fixed, an increase in price uncertainty, as measured by σ^2, increases the value of using the website. Similarly, an increase in price dispersion affects w_{ikmt}, also increasing the value of using the website. Note that the benefit of using the website is increasing in the magnitude of the individual-specific price sensitivity parameter, γ_i.

Now I turn to the cost of using the website. In practice, the website is free to use and only takes a few minutes. However, there may be large non-pecuniary costs. In 2007, when the website started, only 58 percent of New Hampshire households had high speed internet.[45] In addition, many individuals were likely unaware of the website and had to be motivated enough to discover the website on their own.

I assume cost has both an observable component, which is a function of individual characteristics $\mathbf{x}_{ikmt}$, as well as an unobservable component, ν_{ikmt}. Observable characteristics include age categories, gender, income, eduction, Charlson Comorbidity Index, emergency indicator, and year fixed effects in order to account for the fact that more individuals may hear about the website over time, reducing the implicit cost.[46] I also include a constant.

Individuals use the website if the net benefit is positive

$$\underbrace{\theta b_{ikmt}}_{\text{Website Benefit}} - \underbrace{\phi \mathbf{x}_{ikmt} + \nu_{ikmt}}_{\text{Website Cost}} > 0 \tag{13}$$

I assume that the distribution of ν_{ikmt} is distributed i.i.d. type 1 extreme value (with normalized variance). Therefore, the observed probability that individual i uses the website for the price of procedure m at time t takes the logistic form:

$$\vartheta_{ikmt} = \frac{\exp(\theta b_{ikmt} - \phi \mathbf{x}_{ikmt})}{1 + \exp(\theta b_{ikmt} - \phi \mathbf{x}_{ikmt})} \tag{14}$$

where θ and ϕ are parameters to be estimated.

Website traffic logs provide an estimate of the number of individuals that use the website for each procedure in each month. Since it is not possible to link website usage to individual claims, it is necessary to connect the model's predicted individual website usage to overall website usage in each month for each procedure. Conditional on the parameters, the average predicted website usage for a procedure-month is given by $\vartheta_{mt} = \frac{1}{n_{mt}} \sum_{i \in \mathcal{I}_{mt}} \vartheta_{ikmt}$ where n_{mt} is the number of individuals receiving procedure m in month t.

3.4 Joint Estimation of Demand

Likelihood Function and Estimation

The likelihood function is directly based on the structural equations describing individual provider choices and website usage. The first component of the likelihood function is the probability of choosing the provider that was actually chosen. If the website is not available, individuals have uncertainty about prices and choice probabilities are given by Equation 9. If the website is available, the choice probabilities are given by Equation 2 if the website is actually used, where the probability of using the website is given by Equation 14. The second component of the

[45] See "State of New Hampshire Broadband Action Plan," New Hampshire Department of Resources and Economic Development and Telecommunications Advisory Board, June 30, 2008.

[46] This also accounts for the fact that more consumers have broadband internet over time.

likelihood function is the probability of actual website traffic given predicted website usage. The likelihood function is described in greater detail in Appendix C.

To estimate the model, I use a Markov chain Monte Carlo (MCMC) estimator to simulate the posterior distribution of $\Theta = (\sigma^{\gamma}, \rho, \alpha, \xi, \beta, \sigma, \theta, \phi)$. The key estimation challenge is computing high dimensional integrals in order to find the expectation over $\mathbf{e}_{ikmt}$, individuals' unobserved beliefs. The standard maximum likelihood estimation strategy is to use simulation methods and draw from $f(\mathbf{e}_{ikmt})$, calculate the log-likelihood for each draw, and average over the results to obtain the simulated log-likelihood for a given value of the parameters. Given the high dimensionality of $\mathbf{e}_{ikmt}$, this approach is not computationally feasible. The MCMC estimator overcomes the curse of dimensionality by sampling the parameter space conditional on the data.

I employ Hamiltonian Monte Carlo (HMC), a variant of MCMC.[47] Relative to standard MCMC algorithms such as Metropolis-Hastings and Gibbs sampling, this approach is known to converge significantly faster for high-dimensional problems, making it well suited for a situation with alternative-specific unobservables. In addition, it does not necessitate the use of conjugate priors, allowing for more flexible modeling assumptions. For posterior estimation, I use 4 chains, each with 2,000 warmup draws, which are discarded, and 2,000 sample draws. See Appendix C for additional estimation details.

It is important to note that using Bayesian methods for estimation does not impose additional assumptions since I use uninformative priors for all of the structural parameters.[48] The use of MCMC is primarily motivated by the fact that it is computationally attractive.

Identification Intuition

Without variation in consumers' information set, it is difficult or impossible to separately identify price sensitivity and the degree of price uncertainty, i.e. the observed choices from a population with low price sensitivity are potentially observationally equivalent to the observed choices from a population with high price sensitivity but limited information about prices. I overcome this issue by exploiting quasi-random variation due to the introduction of the price transparency website.

To describe the source of identification, I begin by focusing on individuals with price information. Assuming the researcher can identify a subset of consumers that have price information, identification of demand parameters $(\sigma^{\gamma}, \bar{\gamma}, \rho, \alpha, \xi, \beta)$ follows the same argument as for the standard mixed logit model. Identification relies on variation in observed provider choices when the characteristics of the providers or the choice set differ. In particular, price sensitivity is identified by the fact that the price of a given provider varies depending on an individual's insurer, if the individual is under the deductible, and year. In addition, the choice set of consumers varies over insurers, locations, and years. Substitution patterns help identify the variance of the random coefficient on price.

[47]This approach, developed by Hoffman and Gelman (2014), uses the gradient of the log posterior density to more efficiently sample the posterior distribution and ensure that sampling does not double back on the parameter space. This algorithm is implemented in the Stan programming language, which I use to automatically compute gradients and estimate the model.

[48]In supplemental material, I examine a simplified version of the model with a small choice set and show that point estimates and standard errors obtained via simulated maximum likelihood are very similar to those obtained via MCMC estimation.

In order to illustrate how underlying tastes and the degree of price uncertainty are separately identified, it is useful to start by describing the ideal experiment. Consider a population that is randomly divided into a treatment group and control group. Although both groups have the same distribution of preferences, the treatment group is given information about prices. If the treatment group appears more price sensitive than the control group, it must be due to the fact that the control group had noisy beliefs about prices. The extent to which individuals in the control group are less price sensitive provides information about the signal variance.[49]

In this paper, I take advantage of a natural experiment in which a price transparency website was available for a subset of consumers. In contrast to the ideal experiment described above, individuals often did not use the website even when it was available. However, conditional on θ and ϕ, the parameters that predict website usage, the observed choices of individuals who used the website when it is available can be compared to the observed choices of similar individuals who would have used the website if it were available. For this population, the identification argument is the same as in the ideal experiment.

Finally, I turn to identification of the website usage parameters (i.e. θ and ϕ). In principle, these parameters can be identified by observing which individuals appear to be more price sensitive when the website is available relative to when the website is not available. In practice, identification is facilitated by using the website traffic data and exploiting variation in website traffic across months and across procedures. In particular, correlation between consumers' benefit of using the website and observed website traffic helps identify θ, while correlation between observed characteristics of consumers and observed website traffic helps identify ϕ, the cost.

4 Bargaining between Providers and Insurers

In a variety of markets, prices are determined through bilateral bargaining. For instance, wholesalers negotiate prices with retailers and unions negotiate wages with employers. Although there is a growing empirical literature that seeks to shed light on how outcomes are determined in these markets, there is little evidence about how information frictions, in particular price transparency, affects equilibrium outcomes when prices are negotiated.

In this section, I extend the bargaining model from Gowrisankaran et al. (2015) by incorporating information frictions. Using the estimates from the demand model given in the previous section, I use the model to estimate the marginal cost of each procedure at each provider. These estimates are then used in Section 6 and Section 7 to simulate negotiated prices under various counterfactual scenarios.

[49] The mean bias of beliefs is not identified in the case in which all individuals choose an inside option. This is because if individuals underestimate or overestimate the price of *all* options in the choice set, observed choices do not change.

4.1 Bargaining Model

In each year, insurer k negotiates the price of procedure m with each provider in the insurer's network, $j \in \mathcal{N}_{kmt}$.[50] For the analysis, I assume that each provider negotiates independently.[51] I also take the set of providers $\mathcal{J}$ and networks $\mathcal{N}_{kmt}$ as given.[52]

I start by describing the gains from trade for provider j when contracting with insurer k. The provider's profit from individual i enrolled in insurer k receiving procedure m at time t is given by

$$\Pi^J_{ijkmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt}) = s_{ijkmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt})[p_{jkmt} - mc_{jkmt}] \tag{15}$$

where mc_{jkmt} is the marginal cost of the procedure and $s_{ijkmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt})$ is the choice probability which depends on whether the individual is informed about prices, ϑ_{ikmt}. Without a contract with the insurer, the provider's profit from a given individual is zero. Therefore, the gains from trade are simply the provider profit summed over individuals and procedures.

Next, I turn to the insurer's gains from trade. For a given individual, the reimbursement amount paid by the insurer across all providers is

$$TC_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt}) = \sum_{j \in \mathcal{N}_{kmt}} p_{jkmt}(1 - c_{ikmt})s_{ijkmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{ikmt}) \tag{16}$$

Following Gowrisankaran et al. (2015), I also assume that insurers internalize the consumer surplus of their enrollees. When consumers are informed about prices, consumer surplus takes the standard form (see Equation 3). However, insurers are aware when consumers have uncertainty about prices, and consumer surplus includes a term that accounts for incorrect beliefs. In particular, consumer surplus is given by Equation 10.

The insurer's surplus generated by an individual visit is then the weighted sum of consumer surplus and total cost

$$\Pi^K_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt}) = \zeta CS_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt}) - TC_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt})) \tag{17}$$

where ζ is a parameter reflecting the relative weight on consumer surplus. The insurer gains from trade for an enrollee visit are the difference between the surplus generated with and without provider j in the network

$$\Delta_j \Pi^K_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt}) = \Pi^K_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt}) - \Pi^K_{ikmt}(\mathcal{N}_{kmt} \backslash j, \mathbf{p}_{kmt}|\vartheta_{kmt}) \tag{18}$$

Equation 17 and Equation 18 can be thought of as a stylized approach to modeling the in-

[50] While the previous literature has assumed that insurers negotiate over a price index, I allow insurers to negotiate over the visit price of each procedure $m \in \mathcal{M}$. For outpatient procedures, I believe this to be a more realistic assumption. Note that negotiated prices for a visit may change due to lower individual procedure prices or different supplemental procedures. I do not distinguish between these mechanism.

[51] In contrast, Gowrisankaran et al. (2015) and Ho and Lee (2017) allow hospitals that are part of a system to jointly negotiate with insurers. I am unable to link anonymous provider identifiers to ownership data, and therefore cannot examine hospital systems. To my knowledge, the medical imaging providers in the sample tend to be independently owned.

[52] It is possible that a large increase in price transparency increases entry of low cost outpatient facilities, leading to larger cost savings for consumers. I assume entry and exit are exogenously determined.

surer's profit function. The consumer surplus of the insurer's enrollees enters the insurer's surplus function since a larger consumer surplus implies that the insurer can charge higher premiums to consumers, generating profit for the insurer. Unlike Ho and Lee (2017), I do not explicitly model insurer competition. Given that I find no reduced-form effect of price transparency on insurance choice, I argue that holding insurer competition fixed is relatively innocuous in this context.[53]

I now define the Nash bargaining problem that determines equilibrium prices. Importantly, the equilibrium price at a given provider, p_{jkmt}, also depends on the price of the procedure at other providers. Following Horn and Wolinsky (1988) and the previous empirical bargaining literature, I assume that equilibrium prices are those that solve the Nash bargaining solution given the equilibrium prices at other providers, $\mathbf{p}^*_{kmt} \backslash p_{jkmt}$. In other words, a hypothetical disagreement is assumed to not affect other prices. Collard-Wexler et al. (2014) rationalize this model by showing conditions under which the Nash-in-Nash solution is equivalent to a non-cooperative extensive form game with alternating offers.

Therefore, the Nash bargaining solution is the negotiated prices for each provider-insurer-procedure triple in a given year, p^*_{jkmt}, that satisfy

$$\arg\max_{p_{jkmt}} \left(\underbrace{\sum_{i \in I_{kmt}} \mathbb{E}_e \left[\Pi^J_{ijkmt}(\mathcal{N}_{kmt}, p_{jkmt}, \mathbf{p}^*_{kmt} \backslash p_{jkmt} | \vartheta_{ikmt}) \right]}_{\text{Provider gains from trade}} \right)^{\tau_h} \left(\underbrace{\sum_{i \in I_{kmt}} \mathbb{E}_e \left[\Delta_j \Pi^K_{ikmt}(\mathcal{N}_{kmt}, p_{jkmt}, \mathbf{p}^*_{kmt} \backslash p_{jkmt} | \vartheta_{kmt}) \right]}_{\text{Insurer gains from trade}} \right)^{1-\tau_h} \quad (19)$$

where the gains from trade are summed over all individuals enrolled in insurer k receiving procedure m in year t, I_{kmt}. The Nash bargaining weight is $\tau_h \in [0, 1]$, which is allowed to vary based on whether the provider is a hospital. Since insurers and providers do not know the price signals that consumers will receive, both take the expectation over consumer beliefs.[54]

Unlike the previous literature, I model bargaining for each procedure separately rather than for a price index. This is important for capturing the fact that there is not a simple scaling of procedure prices for each insurer.[55] In addition, separate bargaining is needed to explain observed changes in negotiated prices for procedures on the website relative to procedures not on the website. One concern is that bargaining over a given procedure is not independent of other procedures. For instance, hospitals may be able to leverage the fact that they provide services other than medical imagining when negotiating with insurers. One reason for allowing the bargaining parameter, τ_h, to vary by whether the provider is a hospital is that it helps account for this issue without explicitly modeling all inpatient and outpatient procedures.

Empirical models of bilateral bargaining in vertical markets generally assume that the negotiating parties do not have asymmetrical information about the relevant gains from trade. As in the previous literature, I assume that insurers and providers have full information. Price transparency indirectly affects equilibrium prices since changes in consumer behavior affect the gains from trade. In the context of hospital-supplier bargaining, Grennan and Swanson (2016) find

[53] In Brown (2019), I examine whether insurance enrollment changed after the introduction of the price transparency website and do not find a statistically significant effect.

[54] The providers and insurers know the variance of the price signals, σ^2. In practice, beliefs are simulated by drawing from the distribution of $\mathbf{e}_{ikmt}$, computing each term, and then averaging over the draws.

[55] For example, negotiated prices for X-rays are higher for Anthem than for Harvard Pilgrim. However, the opposite is true for MR scans.

evidence that price transparency affects negotiated prices in a way that is consistent with a theoretical model of bargaining under asymmetric information. While hospital-insurer bargaining may also involve asymmetric information, I argue that this concern is mitigated in the context of New Hampshire since the price transparency initiatives allowed insurers and providers access to information about prices for all procedures, not just those on the website.[56] By exploiting variation in the procedures listed on the website, which was targeted at consumers, I argue that the model isolates the effect of consumer information rather than firm information. Further research is needed to understand whether price transparency affects provider-insurer bargaining directly.

4.2 First Order Condition of the Bargaining Problem

I now turn to the equilibrium of the bargaining model. The first order condition of the bargaining problem given by Equation 19 implies that equilibrium prices are determined by marginal cost plus a margin[57]

$$\begin{aligned} p_{jkmt} &= mc_{jkmt} \\ &+\left(-\frac{1-\tau_h}{\tau_h}\frac{\frac{\partial}{\partial p_{jkmt}}[\sum_{i\in I_{km}}\mathbb{E}_e\Pi^K_{ikmt}(\mathcal{N}_{kmt},\mathbf{p}_{kmt}|\vartheta_{kmt})]}{\sum_{i\in I_{km}}\mathbb{E}_e\Delta_j\Pi^K_{ikmt}(\mathcal{N}_{kmt},\mathbf{p}_{kmt}|\vartheta_{kmt})} - \frac{\frac{\partial}{\partial p_{jkmt}}[\sum_{i\in I_{km}}\mathbb{E}_e s_{ijkmt}(\mathcal{N}_{kmt},\mathbf{p}_{kmt}|\vartheta_{ikmt})]}{\sum_{i\in I_{km}}\mathbb{E}_e s_{ijkmt}(\mathcal{N}_{kmt},\mathbf{p}_{kmt}|\vartheta_{ikmt})}\right)^{-1} \end{aligned} \tag{20}$$

I present further detail, including the derivation of $\frac{\partial}{\partial p_{jkmt}}[\sum_{i\in I_{km}}\mathbb{E}_e\Pi^K_{ikmt}(\mathcal{N}_{kmt},\mathbf{p}_{kmt}|\vartheta_{kmt})]$, in Appendix E. Given that there are many providers in each network, a single price change has a minimal effect on individuals' prior about the distribution of prices. For tractability, I assume that providers and insurers do not take into account changes in individuals' priors, and therefore hold the prior fixed when solving the first order condition.

The Nash-in-Nash bargaining model nests the standard Bertrand-Nash pricing assumption when $\tau_h = 1$. In this case, providers unilaterally set prices and an increase in price transparency that makes demand more elastic leads to lower prices in equilibrium.

In the market for privately-provided health care, insurers negotiate their own rates with each provider that are thought to be lower than what a Bertrand-Nash pricing assumption would imply.[58] This corresponds to the case in which $\tau_h < 1$. Therefore, it is important to also understand how price transparency affects insurers' incentive to negotiate lower prices.

There are multiple channels through which consumer price transparency can affect equilibrium outcomes in the bargaining model. First, price transparency affects the incentives of the provider. This can be seen by noting that the provider gains-from-trade are a function of the choice probabilities, $s_{ijkmt}(\mathcal{N}_{kmt},\mathbf{p}_{kmt}|\vartheta_{ikmt})$, which depend on website usage, ϑ_{ikmt}. In general, demand is more elastic when more consumers are informed about prices. Under a Bertrand-Nash pricing assumption, this implies that providers will choose lower prices when more consumers are

[56]Firms had access to public-use versions of the NHCHIS dataset. Conversations with market participants indicate they were likely informed about prices independently of the website.

[57]For simplicity, I omit the $*$ used to indicate equilibrium outcomes.

[58]Under Bertrand-Nash pricing, providers would be able to set prices unilaterally. In the absence of price information, demand is extremely inelastic, implying extremely large markups. In many cases, Bertrand-Nash pricing would imply negative marginal cost.

informed. Similarly, in the bargaining framework, providers have less incentive to negotiate high prices.

The effect of price transparency on insurers' incentives are more complicated. Insurers always wish to negotiate the lowest prices possible. Holding provider incentives fixed, insurers have the greatest ability to demand lower prices when they can credibly threaten to drop a provider from their network, i.e. when the insurer's gains-from-trade are low. Price transparency has an ambiguous effect on insurer's gains from trade, and therefore has an ambiguous effect on equilibrium prices. This can be seen by noting that insurer gains from trade are, in part, a function of the change in cost, $\Delta_j TC_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt})$.[59] Price transparency allows insurers to steer patients to low-price providers, lowering the cost of having expensive providers in the network. This in turn reduces the incentives of insurers to negotiate lower prices with these providers by changing $\Delta_j \Pi^K_{ikmt}$ and Π^K_{ikmt} in Equation 20. Therefore, when demand becomes more elastic due to increased price transparency, it is not always the case that all prices decline.

4.3 Estimation and Identification of Bargaining Model

In this section, I describe the estimation strategy for the bargaining model. Following the previous empirical bargaining literature, I parameterize marginal cost and use the bargaining first-order condition to derive a moment condition which is then estimated using GMM.

The marginal cost of a visit is assumed to vary by procedure, provider, and year and is additively separable taking the form

$$mc_{jkmt} = \eta_j + \eta_m + \eta_t + \varepsilon^{MC}_{jkmt} \tag{21}$$

where η_j are provider fixed effects and η_m are procedure fixed effects. Health care prices increased significantly over the six year period, therefore it is important to include year fixed effects, η_t. The unobservable component of marginal cost is ε^{MC}_{jkmt}. I assume providers have constant returns to scale.

Using the parameterized marginal cost above along with the first-order condition given by Equation 20, the marginal cost error is given by

$$\varepsilon^{MC}_{jkmt} = \eta_j + \eta_m + \eta_t - p_{jkmt} + \left(-\frac{1-\tau_h}{\tau_h} \frac{\frac{\partial}{\partial p_{jkmt}} \sum_{i \in I_{km}} [\zeta CS_{ikmt} - TC_{ikmt}]}{\sum_{i \in I_{km}} [\zeta \Delta_j CS_{ikmt} - \Delta_j TC_{ikmt}]} - \frac{\frac{\partial}{\partial p_{jkmt}} [\sum_{i \in I_{km}} s_{ijkmt}]}{\sum_{i \in I_{km}} s_{ijkmt}} \right)^{-1} \tag{22}$$

This is used to form a moment condition, $\mathbb{E}[\varepsilon^{MC}_{jkmt}|Z_{jkmt}] = 0$, where Z_{jkmt} is a vector of variables assumed to be exogenous. The model assumes that the bargaining participants know mc_{jkmt}, including ε^{MC}_{jkmt}, implying that prices are potentially endogenous. Following the previous literature, I address this issue by including two instruments: predicted willingness-to-pay for each provider at mean price and predicted total provider quantity at mean price.[60] Although these instruments are correlated with price, it is assumed that they are uncorrelated with ε^{MC}_{jkmt}. The

[59] Note that price transparency also affects the consumer surplus of the insurer's enrollees, $CS_{ikmt}(\mathcal{N}_{kmt}, \mathbf{p}_{kmt}|\vartheta_{kmt})$, since individuals can switch to lower cost providers and are not surprised by the bill (see Equation 3 and Equation 10).

[60] These are a similar set of instruments as those used by Gowrisankaran et al. (2015). They also include willingness-to-pay for the hospital system and willingness-to-pay per enrollee for each insurer.

instrument set, Z_{jkmt}, also includes all marginal cost fixed effects.

Identification of parameters η, τ_h, and ζ follows from a similar argument as that presented in Gowrisankaran et al. (2015). The provider choice and website usage parameters from the demand model allow me to construct CS_{ikmt}, TC_{ikmt}, and s_{ijkmt}, as well as their derivatives with respect to price (these are given in Appendix E). In the bargaining model, these are treated like data. Variation in provider incentives (determined by s_{ijkmt} and $\partial s_{ijkmt}/\partial p_{jkmt}$) and insurer incentives (determined by CS_{ikmt}, TC_{ikmt}, $\partial CS_{ikmt}/\partial p_{jkmt}$, and $\partial TC_{ikmt}/\partial p_{jkmt}$) that can explain variation in prices identifies ζ and τ_h. This variation comes in part from the introduction of the price transparency website. The remaining price variation identifies the marginal cost fixed effects, η. Unlike Gowrisankaran et al. (2015), I take advantage of price variation across individual procedures. This provides an additional source of variation to identify ζ and τ_h.

5 Results

5.1 Estimates from Demand Model

Estimates from Multinomial Logit Model

Before presenting the results from the full demand model, I start by examining a naive model in which I interact the availability of the website and the price coefficient rather than explicitly model individuals beliefs.[61]

Table A-5 presents the coefficient estimates and standard errors from the simple logit model. The magnitude of the price coefficient is larger when consumers have access to the price transparency website, indicating that the website increases the effective demand elasticity of the population. The difference is statistically significant. This provides further evidence that the website had a meaningful impact on consumer behavior.

It is important to note that the estimates from this model lack a straightforward interpretation and do not allow for welfare calculations. The full model is needed to recover individuals' underlying taste parameters, including price sensitivity, in order to evaluate counterfactuals and conduct welfare analysis.

Provider Choice and Website Usage Estimates

Table 3 presents estimates for parameters of the full demand model. I focus on specification 1, which reflects the baseline model presented in Section 3. The first column reports the mean of the estimated posterior distribution of each parameter implied by the MCMC estimation procedure. The second column reports the standard deviation of the posterior distribution.[62]

The magnitude of mean price sensitivity, $\bar{\gamma}$, is much larger than the price coefficient in the simple logit model presented in the previous section. This reflects the fact that γ_i can now be

[61] I assume representative utility takes the form $-\gamma_1 q_{mt} p^{OP}_{ijkmt} - \gamma_2(1-q_{mt})p^{OP}_{ijkmt} + \delta_{ijkmt}$ where q_{mt} is an indicator for whether procedure m is available on the website at time t. Therefore, γ_1 is the price coefficient when the website is available and γ_2 is the price coefficient when the website is not available. I also include δ_{ijkmt}, which contains the same non-price characteristics as in Equation 1.

[62] Note that for explanatory variables that overlap with the simple logit model, the standard deviation of the parameter posterior distributions are similar to the standard errors reported in Table A-5.

Table 3
MCMC Estimates for Demand Model

	Specification 1		Specification 2	
	Estimate	SD	Estimate	SD
Provider Choice Parameters				
OOP Price Mean ($-\bar{\gamma}$)	−0.0110	(0.0003)	−0.0172	(0.0002)
OOP Price SD (σ^{γ})	0.0003	(0.0002)	0.0004	(0.0001)
OOP Price × Cost Sharing (ρ)	−0.0081	(0.0012)	−0.0004	(0.0002)
Distance (α_1)	−0.0351	(0.0018)	−0.0351	(0.0017)
Distance Squared (α_2)	0.0027	(0.0002)	0.0027	(0.0002)
Referral Indicator	2.581	(0.025)	2.544	(0.024)
Hospital×Age 19-35	−0.018	(0.084)	−0.024	(0.084)
Hospital×Age 36-50	0.166	(0.073)	0.180	(0.074)
Hospital×Age 51-64	0.113	(0.077)	0.097	(0.076)
Hospital×Male	−0.018	(0.052)	−0.048	(0.052)
Hospital×Income	−0.003	(0.001)	−0.002	(0.001)
Hospital×BA	−0.003	(0.003)	−0.003	(0.003)
Hospital×Charlson	−0.078	(0.036)	−0.066	(0.035)
Hospital×Emergency	1.353	(0.076)	1.283	(0.076)
Website Choice Parameters				
Benefit (θ)	0.012	(0.006)	0.004	(0.005)
Cost (ϕ)				
Constant	1.392	(0.482)	1.723	(0.575)
Age 19-35	−1.421	(0.382)	−1.648	(0.489)
Age 36-50	−1.558	(0.342)	−1.954	(0.438)
Age 51-64	−1.739	(0.331)	−2.115	(0.421)
Male	0.085	(0.161)	0.108	(0.179)
Income	0.023	(0.006)	0.024	(0.006)
BA	−0.036	(0.008)	−0.041	(0.009)
Charlson Comorbidity	0.254	(0.088)	0.307	(0.096)
Outpatient Emergency	14.986	(5.811)	15.043	(5.946)
Year: 2007	0.384	(0.081)	0.387	(0.081)
Year: 2008	0.296	(0.073)	0.315	(0.073)
Year: 2009	0.226	(0.075)	0.231	(0.076)
Price Signal (σ)	176.3	(9.3)	96.7	(10.1)
Observations	109,626		109,626	

Notes: Table shows the mean and standard deviation of the posterior distribution estimated via MCMC. Specification 1 refers to the model in which consumers know the mean and variance of the price distribution and use this information to form a prior about prices. Specification 2 assumes consumers have an uninformative prior about prices. The provider-choice equation also includes provider-procedure group fixed effects (not shown). For the website choice model, the omitted year is 2010 and the omitted age group is $\leq$18.

interpreted as consumer's underlying price sensitivity when prices are known, i.e. underlying marginal utility of income, rather than observed price sensitivity. There is heterogeneity in the price sensitivity parameter, which is negatively correlated with consumer cost sharing. This implies that consumers with high price sensitivity select into generous insurance plans. Coefficients on other variables are largely consistent with the results from the naive logit model.

The estimate of σ is shown at the bottom of Table 3. The estimates imply that, in the absence of price information, individuals have a large degree of uncertainty about prices. Given that the interpretation of σ is complex, it is useful to consider an example from the data. Figure A-3 shows a sample individual choosing between six providers that range in price from about \$200 to \$600. Using the estimate of σ, the individual's beliefs about the price of each option can be simulated given different potential draws from the distribution of signal noise. The 95 percent confidence interval for these beliefs is shown for each option in the choice set. Beliefs are quite heterogenous, implying that there is a non-trivial chance that the individual will believe the expensive options (such as option 6), are actually inexpensive.

I compare uninformed consumers beliefs about prices with the true price. On average, there is a 28 percent absolute difference between beliefs and true prices. The gap is even larger for individuals under the deductible—41 percent. These information frictions effectively make residual demand more inelastic. The implied price elasticity of demand evaluated at mean prices when consumers are uninformed is only -0.19, however it would be -0.38 if they were fully informed.[63]

Turning to the website choice parameters, the coefficient on the monetary benefit of using the website, θ, is positive. This implies that consumers are more likely to use the website if the potential benefit is large, either because of the potential savings or individual-specific price sensitive. Examining the coefficients on explanatory variables that make up the observable part of the cost of using the website, there is evidence that higher income consumers have a higher cost, perhaps because of higher opportunity cost of time. At the same time, more educated individuals have a lower cost of using the website, consistent with the fact that they are more likely to be proficient internet users. Patients receiving a procedure after an emergency episode have a higher cost. Furthermore, there is a lower estimated cost of using the website in 2010, the omitted year. This may reflect the fact that the website became better known over time. Overall, the cost of using the website is estimated to be \$48 on average.[64] Note that the magnitude of θ is relatively small, indicating that, while selection is present, unobserved factors, such as word-of-mouth or internet proficiency, are important for determining website usage.

Specification 2 in Table 3 shows estimates for a model in which individuals do not know the distribution of prices before receiving signals. The parameter estimates are largely consistent with the main specification, however the welfare implications differ. This details of this alternative model, along with the implications, are described in greater detail in Section D. I argue that the alternative model is less realistic given that individuals are likely to ignore prices more as the variance of the signal noise increases.

[63]For each procedure at each provider, residual demand elasticity for the general case in which consumers are uninformed is calculated as $(p^{OP}_{jm}/s_{jm})\frac{1}{N}\sum_{i,k,t}\gamma_i w_{ikmt}s_{ijkmt}(1-s_{ijkmt})$, where all expressions are evaluated at the mean price. The residual demand for each procedure at each provider is then averaged.

[64]Given that this reflects awareness of the website, I do not include the cost of using the website in welfare calculations.

5.2 Estimates from Supply Model

Table 4 provides results from the bilateral bargaining model. The estimated bargaining weight is 0.29 for non-hospitals and 0.44 for hospitals, implying that insurer incentives are important for explaining equilibrium prices. Consistent with the idea that hospitals have greater leverage in negotiations all else equal, hospitals have a larger bargaining parameter. Overall, these bargaining parameters are reasonable when compared with other estimates of hospital bargaining power in the literature.[65]

Table 4
Bargaining Model Estimates

	Estimate	SE
Bargaining Weight: Base ($\tau_{h=0}$)	0.293	(0.062)
Bargaining Weight: Hospital ($\tau_{h=1} - \tau_{h=0}$)	0.146	(0.091)
Insurer CS Weight (ζ)	0.838	(0.196)
Procedure FE	Yes	
Provider FE	Yes	
Year FE	Yes	
Observations	4,832	

Notes: GMM estimates using results from the baseline demand model. Bootstrapped standard errors in parentheses.

Insurers acting as perfect agents for patients would place the same weight on cost and consumer surplus. The estimated weight on consumer surplus in the insurer's surplus function is 0.84, implying that insurers put more weight on cost than consumer surplus. This suggest that insurers are not fully internalizing the benefits to consumers, perhaps due to market power. However, the estimate is relatively imprecise as seen by the bootstrapped standard error.[66]

The estimates from the bargaining model can be used to construct the marginal cost of each procedure at each provider in each year. The marginal cost estimates are summarized by procedure group in Table 5. Although MR scans are the most expensive, the estimated marginal cost is actually slightly less than for CT scans. The large markups for MR scans may reflect the fact that there are fewer providers with an MRI machine, implying more concentrated markets. X-rays having lower marginal cost, consistent with the fact that X-rays require less complicated equipment.

6 Effect of the Price Transparency Website

In this section I use the estimates from the previous section to examine the effect of New Hampshire's price transparency website. First, I calculate the overall equilibrium effect of the website by

[65] For comparison, Ho and Lee (2017) estimate provider bargaining weights between 0.50 and 0.88. However, Gowrisankaran et al. (2015) estimate provider bargaining weights that average 0.24. These papers examine bargaining over an index of hospital services, rather than outpatient medical imaging procedures.

[66] Standard errors are calculated by resampling the set of provider-procedure-insurer-year observations used to estimate the bargaining and marginal cost parameters. In particular, 100 bootstrap samples are used. Accounting for the variance of demand model estimates when estimating the supply model is beyond the scope of this paper due to computational limitations.

Table 5
Marginal Cost Estimates

	Baseline Price		Estimated Marginal Cost	
	Mean	SD	Mean	SD
CT Scans	1,900.0	979.4	1,119.9	672.6
MRI Scans	2,167.6	999.1	994.6	1,297.9
X-Rays	525.7	568.6	442.0	525.4

Notes: Prices are simulated using the algorithm described in Appendix F. The unit of observation is a provider, procedure, insurer, year. All prices in 2010 dollars.

simulating demand and supply with and without the price transparency website. In order to validate the model, the estimated spending change can be compared to reduced-form estimates. The structural model also allows for an analysis of the welfare effects as well as the effect conditional on using the website.

I start by estimating the effect of the website on average spending for all individuals in the sample.[67] Overall, counterfactual simulations imply that the website reduced overall spending by 3.9 percent. The reduction in out-of-pocket costs is especially important. Out-of-pocket costs declined by 7.6% while insurer cost declined by 3.5%. In Appendix G I compare these estimates to the reduced-form intent-to-treat effect using a difference-in-difference approach. The results are quite similar, helping to validate the model and lending credence to the counterfactual simulations in the remainder of the paper that cannot be analyzed using reduced-form methods.

Next, I examine the effect conditional on using the website, i.e. treatment-on-the-treated effect. The first panel of Table 6 summarizes the effect of using the website holding prices fixed.[68] First, I examine individuals that are not subject to a deductible, either because they have surpassed their annual deductible amount or because they have a plan that does not have a deductible. These individuals pay a relatively small portion of the total negotiated prices, therefore the savings from using the website are only $16 per visit on average. Although consumers only take into account the out-of-pocket price, there is correlation between the provider out-of-pocket price and the insurer price. Therefore, insurers also benefit from the increased price shopping (insurers save $18 on average).

Consumers subject to a deductible benefit most from the price transparency website. Individuals who used the website and have a deductible saved an estimated $200 per visit, a savings of 36 percent compared to prices they would have paid in the absence of the website. Given that these individuals paid the full negotiated price, there are no insurer savings.

I compute the change in consumer surplus for individuals who use the website using Equation 3 and Equation 10.[69] The gain is smaller than the cost savings—$103 for individuals subject

[67] The iterative algorithm used to simulate prices is described in Appendix F. These prices are then used to calculate the average percent change in spending due to the website.

[68] Demand-side results hold prices fixed using simulated prices for the baseline case in which the website does not exist.

[69] The implied cost of using the price transparency tool, given in Equation 13, is not included in the calculation of consumer surplus since it likely reflects lack of awareness about the website rather than an actual pecuniary cost.

Table 6
Effect for Individuals Predicted to have Used the Transparency Website

	Patient				Insurer		
	OOP Price wo/ Website	OOP Price w/ Website	Δ Price	Δ CS	Insurer Price wo/ Website	Insurer Price w/ Website	Δ Price
	(a) Demand-Side Effects Only						
Over/No Deductible	70.2	53.7	−16.5	9.2	828.5	810.3	−18.1
Under Deductible	561.5	361.9	−199.7	103.2			
	(b) Demand- and Supply-Side Effects						
Over/No Deductible	70.2	51.8	−18.4	11.9	828.5	775.4	−53.1
Under Deductible	561.5	349.7	−211.8	135.0			

Notes: Weighted prices calculated using estimated probability of using website. Demand-side effects are calculated holding observed prices fixed. When analyzing supply-side effects, prices are recomputed for the baseline case (with the website) and the counterfactual scenario in which the website did not exist. All prices in 2010 dollars.

to a deductible. This is due to the fact that, without price information, individuals place less weight on price (since w_{ikmt} is low) and choose providers based on non-price characteristics, such as distance and perceived quality, that are known. With price information, individuals tend to choose less expensive providers, however these providers tend to have worse non-price attributes. Although individuals with a deductible save \$200 when they have price information, the providers they choose are \$97 worse on non-price characteristics.

In the second panel of Table 6, I account for the fact that the website changed negotiated prices in addition to consumer choices. Rather than hold prices fixed, I re-simulate prices for the case in which some individuals used the price transparency website. Accounting for the equilibrium effects, the savings from the website were slightly larger. Consumers without a deductible saved \$18 while individuals subject to a deductible saved \$212. In contrast, the insurers saved \$53 per visit. Overall, the supply-side effects are modest, consistent with the fact that a relatively small fraction of consumers use the price transparency website. However, the supply-side effect also benefited consumers who did not use the website, which is reflected in Table A-10. The next section examines counterfactuals in which a larger fraction of consumers were informed about prices, thus potentially generating larger supply-side effects.

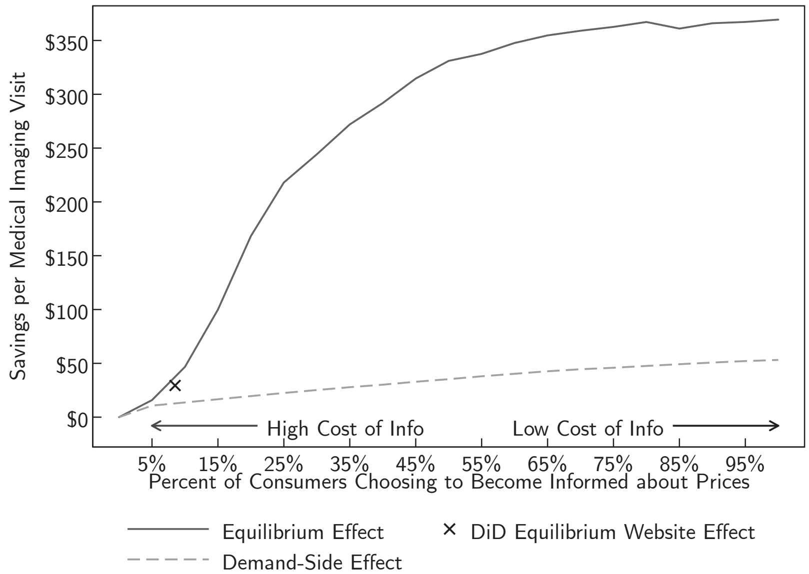
7 Out-of-Sample Counterfactuals

I now use the estimates from the demand and supply model to examine counterfactual policy simulations and explore the broader implications of price uncertainty.

7.1 Effect of Increased Price Transparency on Overall Savings

Only about 8 percent of consumers used the price transparency tool when it was available, implying that there is a large cost of using the website. Much of this cost is likely non-pecuniary, i.e. individuals may not have even known that the website existed. Interventions that reduce this implicit cost, such as advertising the website or even subsidizing usage, would increase the

Figure 4
Counterfactual Simulation Results
Effect of Price Transparency by Fraction of Individuals with Information



Notes: Demand-side effect holds prices fixed at distribution simulated with no price transparency. Equilibrium effect re-simulates equilibrium prices for each level of price transparency. All figures in 2010 dollars.

fraction of informed consumers. A hypothetical policy could even require that all individuals receive a personalized price schedule before choosing where to receive outpatient services, effectively making them fully informed.

In order to analyze increased price transparency, I examine counterfactuals in which I incrementally reduce the cost of becoming informed about prices, increasing the fraction of consumers with price information. Figure 4 summarizes the main effect on total cost for the patient and insurer. I begin by simulating prices for the case in which no individuals have price information, then simulating demand for various cases holding the distribution of prices fixed. This demand-side effect is given by the dashed line in Figure 4. As more individuals choose to use the price transparency effort, average savings increases. However there are decreasing returns due to the fact that website usage is endogenous—the benefit for the marginal consumers is smaller when the cost of using the website is low. There are savings of less than $50 per visit if all consumers are informed. This is modest given the large dispersion in prices, but is consistent with the fact that many individuals have limited incentive to price-shop even with full information given limited cost sharing.

As more consumers become informed about prices, the demand curve facing providers effectively becomes more elastic. The change in demand affects equilibrium prices, as determined by the bargaining first order condition, potentially generating a positive externality for consumers even if they do not use the price transparency website. I examine the equilibrium effect by simulating prices at each point in Figure 4. I then use these prices to compute consumers choices and overall spending.

Table 7
Counterfactual Simulations for Negotiated Provider Prices

	Mean Price	%Δ Price	Mean Price Dispersion	%Δ Price Dispersion
No Transparency (base)	843		545	
Price Transparency Website	800	−5.1%	535	−1.7%
Full Price Transparency	656	−22.2%	376	−31.0%

Notes: Shows unweighted prices across all providers/procedures. For the baseline case, prices are computed assuming all individuals have uncertainty about prices. For the price transparency website case, I analyze the case in which the website is available for all procedures in all years. Website usage probabilities are recomputed and then prices are simulated. Price dispersion refers to the interquartile range of prices.

The equilibrium effect of increased price transparency is shown by the solid line in Figure 4. This is the primary counterfactual of interest. As more individuals are informed, the amount saved per visit is highly non-linear. Initially, the supply-side effects are modest—when only a few consumers are informed about prices, equilibrium prices remain relatively constant. When a larger fraction of consumers are informed, there are increasing returns.These supply-side effects imply a large externality for uninformed patients given the lower prices. Once about half of consumers are informed, savings grow only slightly.

It is important to note that the shape of the curve in Figure 4 could theoretically take almost any form depending on the parameters of the model. The primary reason for the large increase in savings when roughly 10 to 50 percent of individuals is the more vigorous price competition in this range. Not only is residual demand for each provider more elastic, but competitors are also reducing prices, creating a "race to the bottom." Put another way, insurers are increasingly able to negotiate lower prices given that other hospitals are reducing prices. Once about half of consumers are informed, price-cost margins decline and insurers become limited in their ability to negotiate ever lower prices. Therefore, supply-side effects become less relevant once enough consumers are informed.

7.2 Effect of Increased Price Transparency on Consumers, Insurers, and Providers & Welfare Analysis

I examine the counterfactual simulations in greater detail for consumers, insurers, and providers. I focus on three counterfactuals: no price transparency for all procedures in all years, a price transparency website available for all procedures in all years, and full price transparency.

Table 7 shows the supply-side effect of price transparency, i.e. the effect on unweighted prices. When no individuals have price information, the average price of the medical imaging procedures is \$843. If a price transparency website is available for all medical imagining procedures in all years, the average price declines 5 percent to \$800.[70] Finally, I examine the counterfactual scenario in which all individuals are fully informed about prices. This would be the case if, for instance, primary care providers were required to provide a price schedule for all options. In this case,

[70] This is broadly consistent with difference-in-differences estimates that isolate the supply side. However, note it is not directly comparable to the estimates from the difference-in-differences model or the results in Section 6 since it is the unweighted effect across procedures, insurers, and years.

Table 8
Counterfactual Simulations for Cost, Welfare, and Expenditure

	Patient					Insurer			
	Per Visit			Total		Per Visit		Total	Total
	OOP Cost	Δ OOP Cost	Δ CS	Δ Spending (millions)	Δ CS (millions)	Insurer Cost	Δ Insurer Cost	Δ Spending (millions)	Δ Spending (millions)
No Transparency (baseline)	84.3					756.6			
Website	75.1	−9.2	8.4	−0.3	0.2	713.1	−43.5	−1.2	−1.5
Full Transparency	44.8	−39.4	36.1	−1.1	1.0	475.9	−280.7	−8.0	−9.2

Notes: Transaction prices are calculated using recomputed prices for each counterfactual. Counterfactual with price transparency website assumes website is available for all imaging procedures in all years. Consumer surplus does not include website usage cost. All figures in 2010 dollars.

prices would be 22 percent lower than the baseline case.

In the third and fourth column of Table 7, I examine the effect on price dispersion, as measured by the interquartile range of prices. An increase in price information reduces the degree of price dispersion. Although the mechanism differs, these results are broadly consistent with the literature stressing that price dispersion can result from search frictions.[71]

Panel (a) of Table 8 presents the overall effect on spending taking into account both supply and demand-side effects, i.e. the effect on transaction prices. If the website were available for all procedures in all years, consumers would save $9 and insurers would save $44 on average, generating $1.2 million in total savings on X-ray, CT scans, and MR scans in New Hampshire. Full price transparency generates savings of $39 for consumers and $281 for insurers.

The effect for providers is shown in Panel (a) of Table A-6. The savings that accrue to individuals and insurers are, in large part, a result of smaller markups for the provider. However, the change in provider markups is smaller than the savings for consumers and insurers. This is due to the fact that individuals with price information switch to providers that have lower estimated marginal cost, e.g. from hospitals to medical imaging centers.[72] The overall net welfare impact for consumers, insurers, and providers is shown in Panel (a) of Table A-8. The net welfare effect of the website is quite small, but becomes economically meaningful when there is full price transparency.

7.3 Effect of Price Transparency Combined with High Cost Sharing

One potential reason that current price transparency tools are not widely used is that many consumers, especially those that pay a small coinsurance rate, have modest private gains from becoming informed and price shopping. Therefore, it is also important to understand how price transparency interacts with cost sharing.

Health insurance plans with high cost sharing, such as high-deductible plans, potentially give consumers more “skin in the game”, increasing the incentive to make cost-effective decisions. Partially for this reason, policies such as tax-advantaged Health Savings Accounts have encouraged high cost sharing plans. However, if consumers cannot observe prices, high cost sharing alone may

[71] See, for instance, Stigler (1961), Salop and Stiglitz (1977), and Burdett and Judd (1983).

[72] It is also important to note that, on average, providers still have positive markups even with full price transparency. The fact that there are positive margins helps mitigate concerns about exit from the market.

Table 9
Counterfactual Simulation Results
Negotiated Provider Prices with High Cost Sharing

	Mean Price	%Δ Price	Mean Price Dispersion	%Δ Price Dispersion
No Price Transparency	757	−10.2%	585	7.4%
Price Transparency Website	715	−15.2%	468	−14.1%
Full Price Transparency	641	−24.0%	366	−32.7%

Notes: Shows counterfactual unweighted prices across all providers/procedures for the case in which all individuals are enrolled in a high cost sharing plan with a 50% coinsurance rate and no deductible. Percent change is relative to the baseline case in which prices are computed assuming all individuals have uncertainty about prices and cost sharing is fixed at the actual level (see baseline in Table 7). Price dispersion refers to the interquartile range of prices. All prices in 2010 dollars.

not lead consumers to switch to less expensive options. For instance, Brot-Goldberg et al. (2017) do not find evidence that high deductible plans increase price shopping.[73]

In Table 9, I consider the case in which individuals all have plans with a 50 percent coinsurance rate and no deductible. This hypothetical plan is useful for demonstrating how price transparency interacts with cost sharing. Simulations imply that website usage increases 20 percentage points under the high cost sharing scenario since potential savings from using the website are larger. This puts additional downward pressure on prices, resulting in mean prices that are 11 percent lower than with the price transparency website alone. Comparing full price transparency with baseline cost sharing and full price transparency with high cost sharing, the resulting equilibrium prices are similar. The fact that prices are not lower under full price transparency with high cost sharing is partially due in part to the fact that insurers have less incentive to negotiate lower prices if they incur a smaller portion of the negotiated price. Similar to the case in with cost sharing is held fixed, price dispersion decreases as price transparency increases in the high cost sharing case.

When the website is combined with high cost sharing, the annual savings for patients and insurers are over 50% larger than with the website alone. Full price transparency results in $10 million in savings. Due to the high cost sharing, these savings accrue to the insurer, whereas the consumers have higher out-of-pocket cost.[74] The impact of high cost sharing on transaction prices, welfare, and total annual spending taking into account both the demand- and supply-side effects can be found in Table A-7. Depending on the incentives of insurers, premiums may adjust or, given that many individuals are in are in employer-sponsored plans, firms may internalize these costs.

Although much of the reduction in health care spending is due to a transfer from providers to insurers, there are still meaningful net welfare gains according to the model. When full price transparency is combined with high cost sharing, consumers tend to switch to lower marginal cost providers, resulting in a net welfare gain of $4.3 million. Panel (b) of Table A-8 shows the overall

[73] Although the sample of consumers examined by Brot-Goldberg et al. (2017) had access to a price transparency tool, they note that only a small fraction of consumers knew about it.

[74] Depending on the level of insurer competition, these savings could potentially be passed on to consumers in the form of lower insurance premiums, however, given data limitations, I do not model insurance premiums.

welfare impact in greater detail.

Overall, these results highlight that the degree of cost sharing is an important factor affecting an individual's decision to use the price transparency website. In other words, moral hazard effects impede take-up of the price transparency tool. I find that an increase in cost sharing can incentivize more individuals to become informed, generating large positive spillovers in the form of lower prices. The results suggest that a rather high cost sharing policy is needed to incentive enough patients to become informed and shop. However, greater cost sharing also potentially exposes patients to greater risk.[75] One potential policy implication is that high cost sharing be applied only to "shoppable" procedures such as medical imaging when price transparency tools are available.

8 Discussion and Robustness

8.1 Marginal Cost Measures and Supply-Side Effects

Negotiations between hospitals and insurers are complex and the Nash-in-Nash bargaining model, while theoretically well-grounded, is ultimately a somewhat stylized modeling device. It is reassuring that the bargaining model fairly accurately recovers the supply-side effect of the website estimated using reduced-form methods.

As an additional check, I compare marginal cost estimates to the medicare reimbursement rates for the same bundle of procedures that make up each visit, which, in theory, are meant to reflect procedure cost. Medicare rates also reflect the opportunity cost for providers. While I estimate that the average marginal cost for medical imaging procedures is \$546, the average Medicare reimbursement for the same set of procedures is \$474 or \$501 depending on the provider type.[76] Medicare rates for X-rays, CT scans, and MR scans are all somewhat lower than estimated marginal cost, but are largely comparable. See Table A-9.

Given that there are some differences with Medicare rates, I also examine how counterfactual simulations would change if Medicare reimbursement rates were used in place of estimated marginal cost. Using Medicare rates, the nonlinear relationship between spending and the fraction of informed patients is quite similar to the baseline result in Figure 4 even though the model can theoretically emit a very different relationship depending on the underlying parameters. See Figure A-5. Overall, these results suggest that increasing returns to price transparency are robust to alternative marginal cost measures.

8.2 Information Frictions With Respect to Quality and Price as a Signal of Quality

In general, patients may have uncertainty about provider quality, and price may act as a signal of quality (Wolinsky 1983). The demand model includes provider fixed effects and patient char-

[75] The model assumes risk-neutrality on the part of consumers, and therefore welfare calculations do not take this into account.

[76] These are the non-facility and facility reimbursement rates respectively. I use the fee schedule for the bundle of procedures in the visit and then average after aggregating to the procedure-provider-insurer-year level. Medicare reimbursement rates are also inflation adjusted to 2010 dollars.

acteristics interactions, which I interpret as a measure of observed quality or amenities such as whether a provider is in a convenient location. The primary concern is that patients use the price transparency website to choose expensive options perceived to be high quality, especially if they know insurers will pay most of the cost. This would mean that perceived quality is a function of price transparency.

I address this issue in two ways. First, I find no evidence that individuals with low cost sharing choose more expensive providers when the price transparency website becomes available.[77] Second, I directly examine whether the website changes perceived quality in Appendix H. The distribution of provider fixed effects is statistically identical before and after the introduction of the website, providing additional evidence that price information does not change patients' perception of quality.

These results are consistent with the fact that medical imaging procedures are relatively standardized and individuals do not view higher prices as reflecting higher quality. Indeed, surveys find that the vast majority of New Hampshire residents say higher prices do not reflect higher provider quality.[78] Nevertheless, unobserved quality may play a more important role for complicated procedures. Analogous to information frictions related to price, information frictions related to quality may generate muted provider incentives and could have important implications for consumer surplus (e.g. Dranove 1995). With variation in information about provider quality, the model developed in this paper could be used to estimate the welfare effects of information frictions with respect to quality.

9 Conclusion

This paper examines the effects of price transparency in the market for medical imaging procedures. I develop an empirical model of competition in the market for medical procedures that separately accounts for consumer preferences and consumer uncertainty about prices. A key feature of the model is the fact that consumers choose options they believe to be optimal, but are often surprised by the bill they receive. The model provides insight into the welfare effects of these information frictions, as well as the mechanisms by which price transparency affects provider competition. In particular, I use the model to examine the broader implications of price transparency on prices, spending, and welfare.

These results highlight the importance of information frictions as a cause of high prices and price dispersion in health care. Counterfactual simulations imply that there are considerable spending reductions when roughly half of consumers are informed about prices. The savings are due in large part to the fact that demand effectively becomes more elastic when a large fraction of consumers are informed, allowing insurers to negotiate lower prices with most providers. In general, this also decreases price dispersion.

The results also shed light on two barriers that can explain low take-up of price transparency tools. First, individuals do not internalize the supply-side effects when choosing whether to

[77] See Brown (2019).

[78] In a 2016 survey, 79 percent of New Hampshire residents say higher prices are not a sign of better quality medical care. See "How New Hampshire Residents Use Health Care Price Information," April 2017. Public Agenda Research Brief.

shop for medical services, implying that price information is underutilized relative to the social optimum. Second, patients do not internalize the savings to health insurers. High cost sharing is predicted to increase take-up of price transparency tools, but with important drawbacks.

Although this paper focuses on medical imaging, consumer likely have uncertainty about prices for a wide array of medical procedures. However, price transparency tools may only be effective for procedures that are "shoppable", estimated to comprise 30 to 40 percent of health care spending.[79] It is very difficult to shop for procedures that have prices that differ on a case-by-case basis, such as complicated surgeries. In these cases, price transparency tools are unlikely to provide much useful information unless prices are standardized and providers take on the risk of unexpected costs. In any case, information frictions likely lead to higher prices for these procedures as well.

I conclude that information frictions are important for understanding the effect of competition in the market for health care services. Similar methods as those used for this analysis may be used to examine the consequences of information frictions in other contexts, whether with respect to price, quality, or other product characteristics.

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[79] Examples of shoppable procedures include outpatient procedures and services such as primary care office visits, simple elective surgeries, and diagnostic testing procedures, as well as some inpatient procedures such as newborn delivery. See White and Eguchi (2014) and Health Care Cost Institute Issue Brief 11 (2016).

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EQUILIBRIUM EFFECTS OF HEALTH CARE PRICE INFORMATION

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Abstract—Do information frictions in health care markets lead to higher prices and price dispersion? Focusing on medical imaging procedures, this paper examines the equilibrium effect of a unique statewide price transparency website. Price information leads to a shift to lower-cost providers, especially for patients subject to a deductible. Furthermore, supply-side effects play a significant role in the long run, benefiting all insured individuals. Supply-side effects reduce price dispersion and are especially relevant in concentrated markets. These effects are important given that high prices are thought to be a primary cause of high private health care spending.

I. Introduction

WHILE the price of health care procedures varies widely across medical providers, these prices are often difficult for patients to observe. Consequently, individuals often choose providers without comparing prices.[1] A large theoretical literature, beginning with Stigler (1961) and Diamond (1971), argues that information friction can impede competition and lead to higher prices. Technological innovations have made it easier for consumers to compare prices in a number of markets, potentially increasing price competition.[2] At the same time, information about prices may facilitate collusion, potentially decreasing price competition.[3]

In this paper, I ask how information about health care prices affects the market for health care services. Exploiting the introduction of a unique website that provided market-wide information for a subset of procedures in a state, I provide evidence on the long-run equilibrium effect of information about health care prices. I emphasize that the supply-side response to price transparency is particularly important. By observing detailed information on copay, coinsurance, deductible, and insurer payments, I also provide evidence about how insurers and patients split the savings that result from price transparency.

While we expect consumers to benefit from price transparency by choosing low-cost providers, price transparency may also allow insurers to negotiate lower prices with health care providers. This is because price transparency effectively increases residual demand elasticity, potentially incentivizing high-cost providers to lower prices. These supply-side effects could benefit all consumers, including those who do not use the information. The presence of this externality may imply a role for the public provision of information. Effects on negotiated health care prices are especially important given that high health care expenditure in the United States is often attributed to high prices, and there is currently limited evidence on policies that can reduce these prices.[4]

I exploit the introduction of a publicly provided website that allows individuals to access information about their insurer-specific out-of-pocket price for certain medical procedures. While previously studied price transparency efforts have primarily been conducted by specific employers, the website provided information that could be used by all privately insured individuals in the state. Since the intervention was market-wide, it potentially generated significant supply-side effects in addition to demand-side effects. In the main specification, I employ a difference-in-difference methodology that takes advantage of two sources of variation: the timing of the website introduction and variation among procedures available on the website. I also show that results are robust to exploiting cross-state variation. I focus on the universe of outpatient medical imaging visits, which account for over 9 million claims. I argue that the medical imaging procedures that were on the website are quite similar to the medical imaging procedures that were not on the website, allowing for a useful comparison. I also provide empirical support for the assumption that procedures on the website are unlikely to be differentially affected by time-varying demand and cost factors that affect prices in other ways.

First, I examine transaction prices, which include both demand- and supply-side effects. Over the five-year period after the website started, there is a 3% reduction in total visit cost for medical imaging visits on the website relative to medical imaging procedures not on the website. Much of this savings goes to consumers, reducing out-of-pocket costs by 5%. This effect increases over time, and by the fifth year, out-of-pocket prices are 11% lower relative to the control group. Individuals with the most to gain from using the website—those under their deductible—see almost double the savings over the period. These results are highly significant and robust to the inclusion of individual fixed effects and detailed insurer and individual controls.

Next, I examine the mechanisms driving the reduction in transaction prices. On the demand side, individuals with access to the website are more likely to choose a low-cost provider. Next, I analyze the supply-side effects using

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[1] Surveys show that consumers rarely compare prices for medical services. See Public Agenda (2015).

[2] See Clay et al. (2001), Morton, Zettelmeyer, and Silva-Risso (2001), Brown and Goolsbee (2002), and Goldmanis et al. (2010).

[3] For example, see Cutler and Dafny (2011).

[4] For instance, see Anderson et al. (2003), Koechlin, Lorenzoni, and Schreyer (2010), and Cooper et al. (2018).

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a difference-in-difference specification that controls for demand-side effects. Specifically, I include provider-procedure-insurer fixed effects that control for transaction price differences due to switching across providers. Since providers and insurers negotiate a new price schedule at most once a year, the supply-side effect may take time to materialize. The estimates imply that providers reduce their prices in the long run, defined as more than two years after the introduction of the website. Visit prices decline by 2%. The effect is greater for providers operating in concentrated markets that are likely to have the highest margins in the absence of the website. Although these effects are relatively modest, consistent with the fact that price transparency tools currently receive modest use, they suggest that supply-side effects could be quite large if more consumers were informed about prices. One concern is that prices for procedures not on the website are indirectly affected. I show that these results are robust to an alternative identification strategy using cross-state variation that helps address this concern.

A theoretical literature has found that price dispersion can result from information frictions in the market.[5] In order to test whether price dispersion in the market for health care services is due in part to information frictions, I use a difference-in-difference methodology to directly examine the effect on price dispersion. The estimates imply that the website reduces price dispersion for affected procedures, as measured by the interquartile range of negotiated prices, by $159 on average relative to the price dispersion of the control procedures.

Prior research has focused on the demand-side response to health care price transparency efforts by individual employers and has found relatively small effects in the short run (Lieber, 2017; Whaley, 2015a; Desai et al., 2016). In particular, Desai et al. (2016) finds no reduction in spending in the year after an employer offers a price transparency tool. However, the previous literature has focused on price transparency efforts that are available to a small subset of consumers. In contrast, the New Hampshire website was publicly available to all consumers in the state; therefore, as I argue, supply-side effects may be important in the long run. In addition, New Hampshire's price transparency tool differed from other tools due to the quality of the underlying price information and the ease of use.

There is little evidence on the supply-side effects of market-wide price transparency. Whaley (2015b) focuses on a website providing information to specific employers and finds a reduction in the price of laboratory tests using an event-study methodology. While the previous literature has focused on price transparency tools for individual employers, I examine the introduction of a first-of-its-kind website that was available to all insured individuals in a state.[6] In a discussion of price transparency, Sinaiko and Rosenthal (2011) note that tools like New Hampshire's website may generate supply-side effects; however, the effects may take time to materialize.[7] In addition, the effect of price transparency on prices is theoretically ambiguous given the possibility that price transparency may facilitate provider collusion (Cutler & Dafny, 2011). Using individual-level data on outpatient medical imaging visits by all insured individuals in New Hampshire, this paper provides the first evidence quantifying the overall equilibrium effects of price transparency for both individuals and insurers in a state. Understanding the equilibrium effect is particularly relevant given that many states are currently considering price transparency legislation.[8]

The remainder of this paper is as follows. Section II provides additional background on the website and health care pricing, and Section III, describes the data. Section IV describes the main empirical strategy and discusses the demand-side and supply-side effects on prices. Section V concludes.

II. Institutional Details and Background

Recent research has documented a large degree of price dispersion in health care, especially in the private sector (Philipson et al., 2010; Newhouse et al., 2013).[9] Even relatively homogeneous medical services vary in price. For instance, Cooper et al. (2018) find that MRI prices vary by a factor of 12 across the country.

There is a large degree of price dispersion even within a geographically constrained area. For example, the total price of a back MRI in New Hampshire for individuals covered by Anthem, the largest insurer in the state, varies widely, with an upper and lower quartile of $1,085 to $2,472, respectively. Consequently, the out-of-pocket price that individuals pay ranges as well, especially for those under their deductible (the out-of-pocket interquartile range is $143). More generally, table 1 shows the potential savings if all consumers switched to a low-cost provider, defined as a provider in the first quartile of the price distribution in the state.[10] Often these lower-cost providers are outpatient facilities, such as medical imaging centers, rather than hospitals. Across a range of procedure categories, savings would be between 44% and 73%. Even if

[5] Even markets with homogeneous products can exhibit price dispersion in equilibrium in the presence of information frictions. This is true with heterogeneous consumers (Salop & Stiglitz, 1977) as well as homogeneous consumers (Burdett & Judd, 1983).

[6] Note that Christensen, Floyd, and Maffett (2015) examine the effect of information about list prices (rather than out-of-pocket prices) and find little evidence of effects on negotiated prices.

[7] The authors hypothesize that price transparency could either lower or raise prices, but note that "it is too early to tell what the outcome of experiments with increased transparency will be."

[8] A majority of states and the federal government have proposed some form of price transparency. See Nicholson (2015).

[9] Note that a large literature also focuses on variation in Medicare spending (Fisher et al., 2003; Fisher, Bynum, & Skinner, 2009).

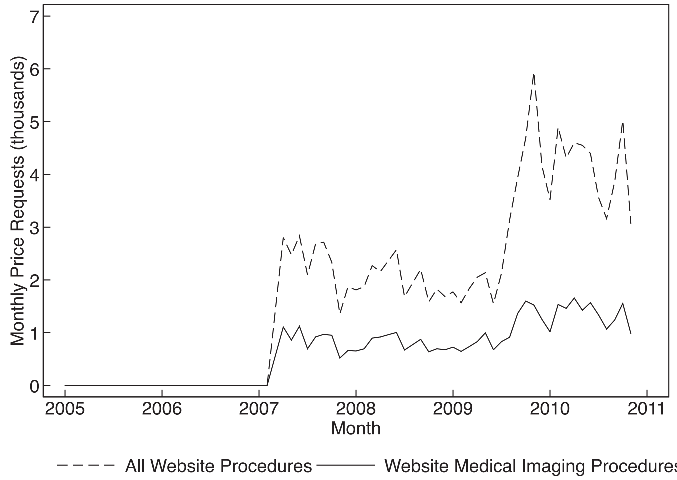
[10] I calculate the first quartile of the price distribution conditional on individuals' insurance and procedure. I consider the case in which all individuals paying about this price switch to the provider charging the first quartile price.

TABLE 1.—POTENTIAL COST SAVINGS IF CONSUMERS SWITCHED TO LOW-PRICE PROVIDERS

		Consumers Switch to 1st Quartile Provider		Consumers Switch to Median Provider	
Procedure Class	Mean Total Visit Price	Mean	% Savings	Mean	% Savings
Computed tomography (CT)	1,604	659	58.9%	995	37.9%
Magnetic resonance Imaging (MRI)	1,767	989	44.0%	1,283	27.4%
X-ray	593	152	74.3%	240	59.5%

The table shows the average transaction price paid in 2006, along with the potential savings if every patient paid at most the 25th or 50th percentile of visit price in New Hampshire for each procedure given the patient's insurance company and insurance type. All prices in 2010 dollars. Figures reflect the potential demand-side savings (e.g., hold negotiated prices fixed).

FIGURE 1.—WEBSITE SEARCHES FOR HEALTH CARE PRICES, BY MONTH



The figure shows the number of times the price transparency tool is used to acquire price information in each month. Includes all searches using "Health Costs for Insured Patients" wizard on either nhhealthcost.nh.gov or nhhealthcost.org. Website traffic data is not available for the period after 2010 due to a change in the website host.

individuals switched to the provider with the median price, they would save 16% to 58% on average.

One explanation for why these price differences persist even for relatively homogeneous products is that patients lack information about prices. Health care prices are determined through bargaining between insurers and providers, and insurers often agree not to publicly disclose the negotiated contracts. Perhaps for this reason, surveys show that the majority of individuals do not compare prices before receiving medical care.[11]

In order to allow health care consumers to find low-cost options, the state of New Hampshire began requiring health insurers operating in the state to submit medical claims to a centralized database in 2005. These data were then used to calculate the median bundled out-of-pocket prices for various medical procedures. In March 2007, New Hampshire launched its HealthCost website.[12] Individuals enter the procedure, their insurance information (including remaining deductible), their postal code, and search radius and obtain information about each provider's expected out-of-pocket price, insurer price, and total price. The site automatically takes into account copayment and coinsurance levels given their insurance. Results are sorted by out-of-pocket price, making it easy to select the least expensive provider from the point of view of the patient. More recently, the tool has provided additional information.[13] Although other states have since started price transparency websites of their own, including California, Maryland, Florida, Oregon, and New Jersey, New Hampshire's price transparency efforts are the most comprehensive.[14] It should be noted that although the New Hampshire tool is relatively easy to use, compared to other tools, it still requires individuals to understand basic information about their health insurance.[15] There may be additional scope to lessen the burden for patients using these tools.

At the time it was introduced, the website had price information for about 35 procedures. The website focuses on outpatient procedures since patients often schedule these appointments ahead of time and may have more scope for choosing among providers.

The HealthCost website has received significant attention in the state, with over forty articles in the local public press. In addition, the New Hampshire Insurance Department promoted the website by encouraging primary care doctors to tell patients about it. Insurers were also encouraged to inform their enrollees of the website.

Among individuals who could have benefited from the website, there was meaningful take-up. I construct a measure of website usage with monthly website traffic logs provided by the New Hampshire Insurance Department. Figure 1 shows the number of price searches on the website since 2005. When the website began, there were roughly 1,000 searches per month for the price of medical imaging procedures, which grew over time. Searches for the price of medical imaging procedures make up about half of all searches using the website.

It has been noted that the use of price transparency tools, including the New Hampshire tool, is low relative to the number of total patients (Mehrotra, Brannen, & Sinaiko, 2014; Sinaiko & Rosenthal, 2016). In contrast to the previous

[11]According to a nationally representative survey, 79% of individuals stated that they could not compare prices (or did not even try) before receiving medical care (Public Agenda, 2015).

[12]Originally nhhealthcost.org; the website can now be found at nhhealthcost.nh.gov.

[13]In early 2016, after my period of analysis, the website added information about provider quality and a guide to health insurance. The website also has a separate feature providing price information for uninsured individuals. I do not observe uninsured individuals and therefore do not examine the effect of this information.

[14]New Hampshire was the only state to receive a grade of A from Catalyst for Payment Reform's 2015 Report Card on State Price Transparency Laws.

[15]For instance, the website requires individuals to know their remaining deductible. However, there is evidence that some people may not know this information (Cunningham, Denk, & Sinclair, 2001; Handel & Kolstad, 2015).

literature, I use website traffic logs to examine take-up.[16] The website has price information for only a limited number of procedures, and individuals are unlikely to use it if they find that their procedure is not listed.[17] They are also unlikely to use it if they are receiving inpatient care. Focusing on privately insured individuals in New Hampshire receiving an outpatient medical imaging procedure that is listed on the website, I find that take-up is 8%. Take-up is lower for other procedures available on the website, perhaps because medical imaging procedures tend to be more standardized. Although I focus on medical imaging procedures, I argue that understanding the high prices for these procedures is particularly important given that medical technology, especially related to medical imaging, is often cited as one of the key drivers of health care cost growth.[18]

In addition to immediate demand-side effects from the website, there is anecdotal evidence of supply-side effects. Analysts have noted that "the balance of plan-provider negotiating power began shifting significantly in New Hampshire, a result in large part of public transparency efforts."[19] For instance, Exeter Hospital and Anthem, the largest insurer in New Hampshire, had a public dispute over contract terms in 2010. Anthem argued that prices at Exeter Hospital were too high, pointing to the website as evidence, and it was eventually able to negotiate rate cuts.[20]

Why might provider prices respond to price information? First, consider the case in which providers have market power and are able to unilaterally set price. If consumers become more price sensitive due to better information about prices, the profit-maximizing price will decline. In the market for private health care, prices are determined through bilateral negotiations between providers and insurers rather than set unilaterally. In this case, a similar mechanism applies. However, equilibrium-negotiated prices may also depend on insurer incentives (Ho, 2009; Gowrisankaran, Nevo, & Town, 2015; Ho & Lee, 2017). To the extent that the website affects either provider or insurer gains from trade, negotiated prices may be affected in equilibrium.[21]

III. Data

The main data set covers the universe of private insurance enrollment and medical claims in the state of New Hampshire from 2005 to 2011. These data were collected as part of the New Hampshire Comprehensive Health Care Information System, which assembled data from all commercial insurers with enrollees who were state residents or receive services under a policy issued in the state. These are the same data used to construct prices for the website.

Table 2.—Availability of Outpatient Medical Imaging Procedure Price Information on Website

	Number or Unique Procedures	
Procedure Category	On Website	Not on Website
Computed tomography (CT)	15	47
Magnetic resonance imaging (MRI)	21	65
X-ray	34	107
Total	70	219

Table shows the number of unique outpatient medical imaging procedures, as identified using CPT/HCPCS codes, on the price transparency website versus not on the website. Procedure codes with updated descriptions are considered separate procedures.

Each outpatient claim has a CPT/HCPCS code to identify procedures.[22] These codes are very specific (e.g., code 72120 is "X-ray examination, spine, lumbosacral; bending views only, 2 or 3 views"). I limit the sample to the universe of outpatient medical imaging claims, which includes 289 procedures related to X-rays, computerized tomography (CT) scans, and magnetic resonance imaging (MRI) scans. These procedures all use imaging to diagnose internal conditions. The number of procedures in each category are listed in table 2.

Inpatient medical imaging procedures, such as those that are part of major surgeries, are excluded from the analysis. Since individuals have little ability to choose a provider when medical imaging procedures are part of an inpatient episode, the website includes information only about outpatient medical imaging procedures.[23]

In addition to the principal medical imaging procedure, there are often supplemental procedures such as contrast agents that are billed along with the main procedure. The quantity and price of these supplemental procedures may also vary across providers. When comparing the cost across medical providers, the relevant price is determined by the entire bundle of procedures. For this reason, the website has information about the cost of an entire visit. For the same reason, my analysis focuses on the price of the visit. I also examine the principal procedure price alone. The construction of the visit price and principal procedure price is described in more detail in the online appendix, section A. Conducting analysis at the visit level has important implications for the interpretation of the results and comparisons with the large literature that conduct analysis at the claim level.

There are 811,553 individuals under age 65 with at least one medical imaging claim between 2005 and 2011. Using individuals' postal code, I merge on additional demographic

[16] Mehrotra et al. (2014) examine usage of the New Hampshire HealthCost tool from 2011 to 2013 using Google Analytics data and find small take-up relative to the state population. I use server traffic logs starting in 2007, a period in which Google Analytics data were not available. In conversations with the administrators of the HealthCost website, there was concern that Google Analytics data were not capturing all of the ways in which individuals accessed the HealthCost website.

[17] If individuals visit the website but do not use the search tool because their procedure is not listed, they are not counted in the website traffic data.

[18] See, for example, Newhouse (1992).

[19] See Tu and Gourevitch (2014).

[20] For more information, see "Exeter Hospital Says Costs Being Used as Negotiating Tactic," Seacoastonline.com, November 14, 2010.

[21] I explore these mechanisms in more detail in a follow-up work.

[22] Current Procedural Terminology (CPT) are codes developed and maintained by the American Medical Association. Healthcare Common Procedure Coding System (HCPCS) codes are an extension of CPT codes that include additional procedures, such as nonphysician services.

[23] The website does include prices for a few inpatient procedures that are not related to medical imaging (e.g., newborn delivery).

905000

TABLE 3.—SUMMARY OF PRIVATELY INSURED INDIVIDUALS WITH MEDICAL IMAGING CLAIMS

	Mean	SD	Minimum	Maximum
Male	0.48	0.50	0	1
Age	36.9	17.6	0.0	64.0
Charlson Comorbidity Index	0.5	0.7	0	2
Zip income (1000s)	68.5	21.2	4.9	240.8
Zip more than B.A. degree	33.8	13.8	0.0	100.0
Insurance type				
PPO	0.32	0.47	0	1
POS	0.14	0.34	0	1
HMO	0.39	0.49	0	1
EPO	0.07	0.25	0	1
Other	0.09	0.29	0	1
Insurance company				
Anthem	0.45	0.50	0	1
Cigna	0.24	0.43	0	1
Harvard Pilgrim	0.13	0.33	0	1
Other	0.18	0.38	0	1
Plan characteristics				
Plan has deductible	0.45	0.50	0	1
Plan has copay	0.83	0.38	0	1
Plan has coinsurance	0.24	0.43	0	1
Number of individuals			811,549	

Summary statistics are for all unique privately insured individuals in New Hampshire over the period 2005 to 2011 with at least one outpatient medical imaging visit.

information, including income and education, using the 2007–2011 American Community Survey. I also construct each individual's Charlson Comorbidity Index using International Classification of Diseases (ICD) codes in the claims data set (Charlson et al., 1987; Stagg, 2006). The Charlson Comorbidity Index is an integer score that summarizes comorbid conditions that predict mortality. Individual demographics are summarized in the first panel of table 3.

Each medical claim is also associated with an anonymized provider identifier that can be linked to additional information such as provider postal code and whether the provider is a hospital or a nonhospital facility. This information is used to construct provider concentration in each county.

The vast majority of individuals in the sample are covered by a managed care organization, either a health maintenance organization (HMO) plan, preferred provider organization (PPO) plan, point-of-service (POS) plan, or an exclusive provider organization (EPO) plan. The defining feature of managed care plans is that insurers negotiate lower prices with a selected network of providers. The plan types differ according to the standards used when individuals select providers within the network. Only 3% of individuals have an indemnity (fee-for-service) plan. Plan type is summarized in the second panel of table 3. Three main insurers are operating in New Hampshire: Anthem, Cigna, and Harvard Pilgrim. Less than a fifth of individuals are enrolled in another plan (see the third panel of table 3).[24]

The plans offered in New Hampshire over the period differ in their cost-sharing characteristics. In particular, 45% of individuals pay a deductible at some point over the period (see the last panel of table 3). In general, individuals are responsible for all health care costs under the deductible amount in a given year. Although I do not observe the deductible amount associated with each plan, I do observe the deductible paid on each visit. Using observed deductible payments, I construct an indicator for whether each individual is under or over her deductible in a given year in order to test whether individuals benefit more from the website when they are subject to a deductible.[25]

Over the period, there are 9.2 million claims that constitute 2.1 million medical imaging visits (i.e., there are about three supplemental procedures on average per medical imaging visit). For each health claim, I observe the copayment, coinsurance, and deductible paid by the individual, which together make up the out-of-pocket price. In addition, I observe the insurer-paid amount. Together, the out-of-pocket price and insurer-paid amount constitute the total price received by the provider, often called the allowed amount.[26]

The average price paid by individuals and insurers is presented in table 4. Insurers pay the majority of the cost for medical imaging procedures. Although out-of-pocket prices are low on average, there is high variance, and some individuals are fully exposed to the total price.

The summary statistics presented in table 4 preview the results. Although the price of all procedures is increasing over time, the simple difference-in-difference estimate using the average total price implies that the price of procedures on the website declined by \$64 relative to the price of procedures not on the website. However, it is important to control for changes in the composition of procedures and changes across time affecting the control group.

IV. Effect on Prices

I begin by examining the overall effect on transaction prices, including total visit amount, out-of-pocket amount, and insurer amount. I examine the heterogeneous effects and show that results are robust to a number of specifications. Using a similar identification strategy, I show that this effect is due to both demand-side and supply-side factors.

A. *Empirical Strategy*

In order to estimate the causal effect of price transparency on prices, I exploit two sources of plausible exogenous variation: the timing of the website introduction and the availability of medical imaging procedures on the website. In particular, I construct OnWeb_m, which indicates whether procedure

[24] For more detail on the construction of demographic covariates, see online appendix, section A.

[25] Individuals who know they will fulfill their deductible over the course of the year should not be price sensitive. However, to the extent that they have uncertainty about their future health care use or are myopic, individuals will be price sensitive even if they are close to hitting their deductible. For this reason, I consider all individuals who have not passed their deductible.

[26] Capitation payments for medical imaging procedures were negligible during the period.

TABLE 4.—SUMMARY OF OUTPATIENT MEDICAL IMAGING VISIT PRICE

	Visits on Website				Visits Not on Website			
	Prewebsite		Postwebsite		Prewebsite		Postwebsite	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Patient cost								
Copayment	15.6	41.4	19.2	39.0	15.4	53.2	18.6	40.4
Coinsurance	12.5	81.8	21.0	111.9	14.6	87.1	25.6	132.7
Deductible	46.1	181.7	84.3	298.0	58.1	206.4	103.4	331.2
Total out-of-pocket cost	76.6	226.5	124.8	331.4	90.8	253.8	148.0	371.9
Insurance cost								
Paid amount	634.4	1,381.4	793.5	1,737.6	740.8	1,730.7	970.9	2,141.8
Total								
Allowed amount	846.1	1,716.7	942.9	1,848.3	989.2	2,113.1	1,149.6	2,269.7
Charge amount	1,236.6	2,861.4	1,602.5	3,393.9	1,471.4	3,331.5	1,947.2	3,976.6
Observations (visits)	501,358		1,176,476		124,017		301,902	
Total procedures	2,018,224		5,376,584		464,574		1,325,082	

Table shows summary statistics related to transaction prices. Note that prices are lower when the website is available. Includes all outpatient medical imaging visits for privately insured individuals in New Hampshire from 2005 to 2011. All prices in 2010 dollars.

m is ever available on the website. I also construct Post_t, which indicates if the website is available at month t. This takes the value of 1 if the date of admission is March 2007 or later. The baseline difference-in-difference specification is given by

$$\log(1 + p_{imjkt}) = \beta(\text{OnWeb}_m \times \text{Post}_t) + \alpha X_{it} + \lambda_m + \lambda_k + \lambda_t + \varepsilon_{imjkt}. \quad (1)$$

The outcome of interest is p_{imjkt}, the price of a visit for individual i with insurance k obtaining procedure m from provider j at time t. I consider both the patient's out-of-pocket cost, as well as the cost to the insurer. The baseline specification controls for individual covariates X_{it}, which includes age, gender, Charlson comorbidity index, income, education, rural classification, and member plan characteristics (deductible, coinsurance, and copay). I also include procedure fixed effects, λ_m, and insurer fixed effects, λ_k, which control for time-invariant factors that may be correlated with prices and the availability of the website.[27] I include as well month fixed effects, λ_t, which control for time-varying factors that may be correlated with prices and website availability. Finally, ε_{imjkt} is a vector of idiosyncratic random errors. Prices are highly correlated within each month since individuals tend to be subject to a deductible in the beginning of the year but not at the end of the year. To account for correlation within a month, standard errors are clustered at the month level. The unit of analysis is an individual medical imaging visit.

The dependent variable is transformed using $\log(1 + y)$ since the out-of-pocket price and the insurer price can be 0, making $\log(y)$ undefined. An alternative to using OLS with a log-transformed dependent variable is to use GLM with a log-link function. I discuss this alternative model along with robustness results in section IVC.

[27]For the insurer fixed effects, I define an insurance plan as a unique combination of insurance firm and insurance type (e.g., Anthem HMO).

The coefficient of interest, β, is interpreted as the change in prices due to the presence of the website in log points. This should be interpreted as the intent-to-treat effect, keeping in mind that take-up was 8% and individuals who did not use the website may be indirectly affected due to supply-side effects. The main identifying assumption is that in the absence of the website, the procedures on the website and the procedures not on it would follow common trends. I use a number of methods to examine the validity of this assumption, including examining trends prior to the introduction of the website and a falsification test.

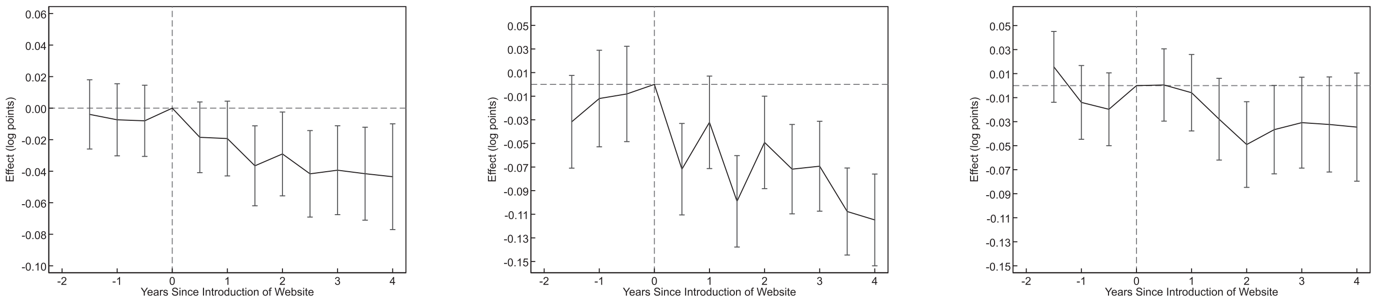
In order to isolate the supply-side effect of price transparency, I use a similar identification strategy but control for the demand-side effects. In particular, I include fixed effects that control for the variation in price of each procedure across providers and insurers. This approach is similar to that of Christensen et al. (2015). The specification is now

$$\log(1 + p_{imjkt}) = \beta(\text{OnWeb}_m \times \text{Post}_t) + \alpha X_{it} + \lambda_{jmk} + \lambda_t + \varepsilon_{imjkt}, \quad (2)$$

where the vector λ_{jmk} includes an indicator for each combination of provider, procedure, and insurer. Any variation in transaction prices due to the fact that individuals switch to lower-cost providers after the introduction of the website is absorbed by these fixed effects. Another way to see this is to note that conditional on going to the same provider, with the same insurance, and receiving the same procedure, a change in transaction prices must be due to a supply-side effect. Note that these fixed effects also absorb changes in prices due to the entry of providers over the period. The remaining variation in price identifies β, which can now be interpreted as the reduction in transaction prices due to lower negotiated prices for a given provider.

Due to the fact that the regression is run at the individual level, β can be interpreted as the supply-side effect weighted by quantity demanded after taking into account demand-side

FIGURE 2.—EQUILIBRIUM EFFECT OF PRICE TRANSPARENCY WEBSITE ON SPENDING, BY TIME FROM WEBSITE INTRODUCTION



(a) Total Negotiated Price (b) Patient Out-of-Pocket Price (c) Insurer Price

The charts show point estimates for each half-year using the difference-in-difference baseline specification as described in section IVB. The estimates reflect the overall equilibrium effect, including both demand-side and supply-side effects. The omitted period is the half-year prior to the start of the price transparency website. Error bars indicate 95% confidence interval using standard errors clustered at the month-year level.

effects. For instance, if only rarely chosen providers reduce their price, β will be smaller than the average unweighted effect on provider prices.[28] I focus on the weighted results since from a policy perspective, it is important to understand the effect the average patient experiences.

It is important to note that these supply-side factors could be driven by a number of factors. One mechanism is that insurers negotiate lower prices for specific procedures; however, this need not be the case. Providers may reduce list prices (i.e., Chargemaster prices), which then get passed on to insurers if contracts are negotiated as a discount relative to list prices. Alternatively, providers could bill less aggressively (either less up-coding or fewer supplemental procedures). Distinguishing between these explanations is difficult given the secrecy around provider-insurer negotiations; however, I provide some evidence on this issue by examining the effect on the entire visit price (which includes all supplemental procedures), as well as the effect on the principal procedure price alone.

An identifying assumption is that the website affected prices only for procedures on the website; there are no spillover effects to procedures not featured on the website. This would be violated if, for instance, hospitals responded to the website by cutting prices for all medical imaging procedures. This assumption would also be violated if providers raised prices for procedures not on the website to compensate for lower prices for procedures on the website. I address these concerns by exploiting cross-state variation. In particular, the specification is

$$\log(1 + p_{imjkt}) = \beta(\text{InNH}_j \times \text{Post}_t) + \alpha X_{it} + \lambda_{jmk} + \lambda_t + \varepsilon_{imjkt}, \tag{3}$$

where InNH_j indicates if provider j is in New Hampshire, and thus had information available on the website. The identifying assumption is that prices for providers outside New Hampshire that are in the NHCHIS database do not change in response to the website given that New Hampshire patients make such a small part of their demand. I discuss this in more detail in section IVG.

I also examine how the supply-side effect varies by the degree of local competition among providers. In particular, I use the Herfindahl index in each county for each procedure category, which is defined as $\text{HHI}_{cl} = \sum_j s_{jcl}^2$, where s_{jcl}^2 is the market share of provider j in county c among all procedures in procedure category l. The period prior to the introduction of the website is used to calculate HHI_{cl} in order to address concerns that the market structure may have been endogenously affected by the website.

Finally, I examine price dispersion directly as measured by the interquartile range of prices. I exploit the same sources of variation but aggregate to the procedure-month level and use the interquartile range of prices, IQR_{mt}, as the outcome variable. To examine the dispersion in transaction prices, IQR_{mt} is defined as the difference between the third and first quartile of transaction prices for each procedure in each month. To examine the dispersion in provider prices (or negotiated prices), IQR_{mt} is defined as the difference between the third and first quartile of prices for each procedure in each month after aggregating to the provider-procedure-month level.[29] Under the same assumptions as previous specifications, β can be interpreted as the dollar change in the interquartile range of prices due to the website.

B. *Effect on Transaction Prices*

Figure 2 presents the main results for transaction prices by half-year with the full set of controls and fixed effects.[30] In the periods before the website, there is no significant price effect for procedures that were eventually on the website and those that were never on it. This provides evidence that the procedures on the website had similar trends in the preperiod

[28] I do in fact find that the magnitude of estimated effects is larger when examining the unweighted supply-side effect using a similar specification after aggregating the data to the provider-procedure-insurer level.

[29] Providers that perform a given procedures five or fewer times over the period are removed when calculating the interquartile range.

[30] The specification used for figure 2 is $\log(1 + p_{imjkt}) = \sum_t \beta_t(\text{OnWeb}_m \times \text{SemiYear}_t) + \alpha X_{it} + \lambda_m + \lambda_k + \varepsilon_{imjkt}$. The interaction with the time period before the introduction of the website is omitted.

TABLE 5.—EFFECT OF PRICE TRANSPARENCY WEBSITE ON VISIT PRICE BASELINE DIFFERENCE-IN-DIFFERENCE ESTIMATES

	All	No Deductible	Deductible: Not Past	Deductible: Past
Dependent Variable: Log(1 + Total Visit Amount)				
OnWeb$_m$ × Post$_t$	−0.031***	−0.029***	−0.044***	0.014
	(0.004)	(0.006)	(0.007)	(0.010)
Mean level	950.47	835.65	1038.61	1121.35
Adjusted R^2	0.368	0.367	0.360	0.371
Observations	1,984,798	1,004,200	633,716	346,843
Dependent Variable: Log(1 + Patient Out-of-Pocket Amount)				
OnWeb$_m$ × Post$_t$	−0.055***	−0.043***	−0.109***	−0.032
	(0.009)	(0.011)	(0.015)	(0.020)
Mean level	115.26	23.27	295.91	51.54
Adjusted R^2	0.323	0.168	0.200	0.091
Observations	1,984,798	1,004,200	633,716	346,843
Dependent Variable: Log(1 + Insurer Paid Amount)				
OnWeb$_m$ × Post$_t$	−0.038***	−0.030***	−0.026*	0.012
	(0.005)	(0.006)	(0.014)	(0.010)
Mean level	777.11	756.81	680.18	1012.49
Adjusted R^2	0.305	0.380	0.202	0.383
Observations	1,984,798	1,004,200	633,716	346,843
Individual controls	Yes	Yes	Yes	Yes
Insurance FE	Yes	Yes	Yes	Yes
Month-year FE	Yes	Yes	Yes	Yes
Procedure FE	Yes	Yes	Yes	Yes

Estimates from the baseline difference-in-difference specification presented in equation (1). The unit of observation is a patient visit, which may contain multiple medical claims. The sample consists of all commercial claims related to outpatient medical imaging procedures in New Hampshire from 2005 to 2011. OLS regression standard errors clustered at the month-year level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

as the procedures that were not on the website, supporting the common trends assumption. Once the website launched, the total visit amount (i.e., allowed amount) declined for procedures on the website relative to procedures not on the website. The effect becomes significant in the second year. This effect grows over time, eventually leading to a 4% reduction in the total visit amount (figure 2a) and 11% reduction in patients' out-of-pocket amount (figure 2b) five years after the introduction of the website. As I discuss in subsequent analysis, this is partially due to the fact that supply-side effects take time to materialize because prices are renegotiated infrequently. In addition, the website was being used more often in the later period (see figure 1).

The first panel of table 5 presents the average effect on visit amount over the five-year period. The estimates imply a 3.1% reduction from a mean of \$950. This can be interpreted as the reduction in spending per visit due to both demand- and supply-side factors. For patients, the estimates imply a 5.4% reduction in out-of-pocket prices due to the website from a mean of \$115.45 (see second panel of table 5). These results are significant at the 1% level. Next, I examine how the effect varies by deductible status. Individuals who are not past their deductible are potentially exposed to the full cost of the procedure, and thus have the most to gain from choosing a low-cost provider.[31] Consistent with this fact, I find that individuals subject to a deductible see a much larger reduction in out-of-pocket cost: a 10.3% decline (from a mean of \$295).[32]

Individuals who are subject to a coinsurance payment may still have an incentive to find a low-cost provider and benefit from the website.[33] In addition, individuals who do not use the website and find a low-cost provider may still benefit if providers reduce their prices. This is the supply-side effect that I explore in detail in following sections. The results imply that individuals who do not have a plan with a deductible see a significant reduction in prices of about 4% (see column 2 in table 5). I find no evidence of an effect for individuals past their deductible. These individuals often have little exposure to prices.

Although individuals are not likely to internalize the cost to the insurer when choosing a provider from the website, there may be an indirect benefit to the insurer. In particular, there is a mechanical correlation between the individual's out-of-pocket price and the insurer price when the individual is subject to a coinsurance payment. To test whether insurers also benefit from the website, I use the same specification but with the insurer-paid amount as the dependent variable. The third panel of table 5 presents the results. The insurers save 3.7% on average over the period (from a mean of \$777), a highly statistically significant amount. Much of this savings is due to individuals without a deductible, consistent with the fact that most of the savings when there is a deductible accrue to the individual.

The magnitude of the effect is larger for patients and insurers than for the total visit amount. Although it may initially seem that the total effect should be between the effect for patients and the effect for insurers, this is not necessarily the case given that the effect is measured in percentage terms and the fraction of the cost paid by the insurer is not constant. It also should be noted that although the percent change in prices is larger for out-of-pocket amount than insurer amount, the insurers actually benefit more from the website in absolute terms. This is because the insurer covers the majority of the cost: 88% of the total price on average.

C. *Robustness of Demand-Side Effects*

Online appendix table A-2 shows that out-of-pocket price and insurer-paid amount results are robust to a number of specifications. In particular, the results are not driven by changes in observable characteristics of individuals. In

[31] Depending on the specifics of the plan design, some procedures may not count toward an individual's deductible. In addition, some individuals classified as under their deductible hit their deductible on the current visit. For these reasons, the out-of-pocket cost is often less than the full price when an individual is not past the deductible.

[32] I conduct a Wald test and determine the difference between the effect for an individual subject to a deductible and those not subject to a deductible is significant.

[33] Coinsurance payments are a set percentage of the total price, often between 5% and 25%, that the individual pays.

addition, the fact that the results are robust to insurance fixed effects implies that effects are not driven by changes in insurance enrollment over the period. In the online appendix, section B, I provide additional evidence that the website did not affect insurance enrollment.

Another concern is unobservable individual characteristics. In particular, individuals who obtain private health insurance after the introduction of the website could be different on unobservable dimensions. In the online appendix, table A-2, column 5, I control for individual fixed effects. Identification now comes from the same individuals who received medical imaging procedures before and after the introduction of the website. Although this results in a much smaller sample size, the results are largely robust to this specification; however, the effect on insurer-paid amount become insignificant.

A related concern is that the website changed the complexity of procedures due to an increase (or decrease) in the probability that an individual has a procedure when information is available. This concern is somewhat mitigated by the fact that medical imaging procedure codes are quite specific and are standardized across providers. In addition, in the online appendix, section C, I show that the website did not have a meaningful effect on the probability of receiving any medical imaging procedure or the number of medical imaging procedures.

The out-of-pocket price may be 0 if the insurer pays the full cost due to full insurance. Similarly, the insurer price may be 0 if the individual pays the full cost because the individual is under the deductible. Due to this issue, the dependent variable is transformed using $\log(1+y)$ to avoid undefined values. One alternative to this transformation, which generates point estimates with a similar interpretation, is to use GLM with a log-link function and an untransformed dependent variable (Manning & Mullahy, 2001). For computational tractability, I aggregate to the procedure-month level and use a weighted GLM approach. Column 6 in the online appendix, table A-2, shows that results are similar to the baseline case, although standard errors are slightly larger. For completeness, column 5 shows the weighted OLS results, which are also similar.

In table A-3 in the online appendix, I conduct a falsification exercise in which I test whether there was an effect on prices in the one-year period before the website actually existed. Consistent with the assumption that results are not driven by differential price trends, all of the estimates are quite close to 0. Eleven of the twelve estimates are not statistically significant, and the one that is significant implies that there was an *increase* in transaction prices for procedures eventually on the website.

D. *Heterogeneous Effects*

I examine results by demographic characteristics to examine which groups benefit the most from the price information. These results are presented in table 6. First, I examine individuals who received a medical imaging procedure immediately after having an emergency. Note these are relatively minor emergency visits since I exclude inpatient admissions. I find no statistically significant effect for outpatient emergency visits. The difference between the effect for emergency and nonemergency visits is statistically significant, consistent with the idea that nonemergency procedures could potentially be scheduled further in advance, allowing time to use the website. The third and fourth columns of table 6 examine the effect for rural and urban patients, who may benefit differently from price information due to the availability of providers. The magnitude of the effect is larger for urban patients, although the difference is statistically significant only at the 10% level.

Table 6.—Effect of Price Transparency Website on Visit Out-of-Pocket Price, by Patient Characteristics

	Emergency Visit		Urbanicity	
	Yes	No	Rural	Urban
$\text{OnWeb}_m \times \text{Post}_t$	−0.018	-0.057^{***}	−0.007	-0.060^{***}
	(0.014)	(0.009)	(0.030)	(0.009)
F statistic of difference	5.862^{**}		2.960^{*}	
Adjusted R^2	0.399	0.325	0.358	0.320
Observations	198,041	1,786,758	189,240	1,795,559
	Age		Income	
	≤ 35	> 35	$\leq$ Mean	$>$ Mean
$\text{OnWeb}_m \times \text{Post}_t$	-0.060^{***}	-0.051^{***}	-0.049^{***}	-0.066^{***}
	(0.018)	(0.011)	(0.011)	(0.011)
F statistic of difference	0.163		1.103	
Adjusted R^2	0.349	0.315	0.324	0.322
Observations	325,523	1,305,073	1,179,840	804,959
Full controls	Yes	Yes	Yes	Yes
Month-year FE	Yes	Yes	Yes	Yes
Procedure FE	Yes	Yes	Yes	Yes

Estimates from baseline difference-in-difference specification for various subpopulations. The dependent variable is log(1 + patient out-of-pocket price). OLS regression standard errors clustered at the month-year level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

At the time of the website launch, younger and higher-income individuals were more likely to have broadband Internet.[34] This may have increased access to the price transparency website. The bottom row of table 6 shows that the magnitude of the effect is larger for younger and higher-income individuals; however, the differences are not statistically significant.

Taken together, these results imply that price transparency provides benefits across a range of demographic groups. However, the benefits accrue most to groups that had the highest ability to shop around, potentially exacerbating health inequality.

E. *Demand-Side Effects*

The primary motivation for the website was to allow individuals to shop around for medical care. In table 7, I directly

[34] Individuals age 18 to 29 were 23 percentage points more likely to have broadband Internet than those age 50 to 64. Those with income over $75,000 were 46 percentage points more likely than those with an income under $30,000. See Pew Internet and American Life Project, Home Broadband Adoption, July 2007.

TABLE 7.—EFFECT OF PRICE TRANSPARENCY WEBSITE ON SEARCH BEHAVIOR AND PROVIDER TYPE

	Dependent Variable:			
	Same Provider as Last Medical Imaging Visit	Low-Cost Provider	Provider in New Hampshire	Distance to Provider (miles)
$\text{OnWeb}_m \times \text{Post}_t$	-0.0209^{**}	0.0652^{***}	0.0036^{***}	0.1756^{**}
	(0.0095)	(0.0077)	(0.0012)	(0.0739)
Full controls	Yes	Yes	Yes	Yes
Month-year FE	Yes	Yes	Yes	Yes
Procedure FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.044	0.038	0.458	0.426
Observations	806,294	1,642,953	1,984,799	1,984,799

Estimates from a linear probability model using the same controls as the baseline difference-in-difference specification presented in equation (1). A low-cost provider is defined as a provider with an average out-of-pocket cost in the lowest decile in each county conditional on procedure, insurer, and year. OLS regression standard errors clustered at the month-year level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

examine provider choice outcomes using the same difference-in-difference specification to provide evidence that price effects are mediated by changes in demand.

Over the period, 34% of individuals with repeat visits went to the same provider as their prior visit. Using a difference-in-difference linear probability model where the dependent variable is an indicator for whether the chosen provider is the same as the prior visit, I examine whether the website made individuals more likely to switch providers. Column 1 in table 7 implies that the website significantly reduced the probability of going to the same provider as the previous visit by about 6% (2 percentage point reduction from the mean).

New Hampshire is a relatively small state, and many residents work in surrounding states, particularly in Massachusetts.[35] Almost a third of the individuals in the sample go to medical imaging providers outside the state; however, the website provides only information about the price of providers within the state. The third column of table 7 shows that the website significantly increased the probability that individuals went to a provider within New Hampshire.

Table 7, column 4, presents the results using distance between the individual and provider zip code as the dependent variable. When individuals lack price information, they may choose a provider close to their home since distance is a known characteristic. Conversely, if prices are known, they may be willing to drive farther.[36] I find evidence for this hypothesis: when the website is available, individuals drive farther on average.

One limitation of the data is that there is no information about patient referrals. The website may have affected individuals' choice of provider, or it may have affected physicians' referrals. Since I do not observe referrals, I do not differentiate between these mechanisms.

F. *Supply-Side Effects*

Given that individuals switch to lower-cost providers, did this put downward pressure on prices? I examine supply-side effects by estimating a model with controls for demand-side factors, namely, provider-procedure-insurer fixed effects.

The supply-side effect for each time period is shown in figure 3.[37] Panel a shows the effect on the total visit price, which includes all supplemental procedures. Compared to the equilibrium effect presented in figure 2a, the point estimates are smaller in magnitude, especially in the period right after the introduction of the website. However, the estimates are still highly significant, especially in the later period, implying that provider prices decline in the long run.

Recall that the visit price is determined by the prices of a bundle of procedures. The primary way that the provider can change the price of the bundle is by changing the price of the principal medical imaging procedure, which makes up more than half of the cost of the bundle on average. Figure 3b examines the effect on the principal procedure price. There is a large supply-side effect three to five years after the website, which I interpret as evidence that the website reduced negotiated prices in the long run.

Columns 1 and 2 in table 8 formalize these results. When isolating the supply side, the short-run effect is quite small. Visit prices declined by 1.0% while the principal procedure price declined is negligible. The long-run effects are larger: a 1.7% reduction in visit prices and 3.0% reduction in principal procedure price. These results are statistically significant. These results should be interpreted as the supply-side effect experienced for the average consumer in the sample.

Overall, this is evidence of a significant reduction in negotiated prices, especially in the long run. The fact that the principal procedure price is most affected in the long run is consistent with the fact that prices are renegotiated infrequently.

One caveat is that the changes in demand caused providers to reduce the price of supplemental procedures in addition to principal procedure prices. Since supplemental procedures, such as contrast agents and examinations related to medical imaging procedures, are common across procedures on the website and procedures not on the website, these reductions in prices would be differenced-out. This would lead to an underestimate of the supply-side effects of price transparency. Thus, table 8's estimates of the savings from the website are conservative.

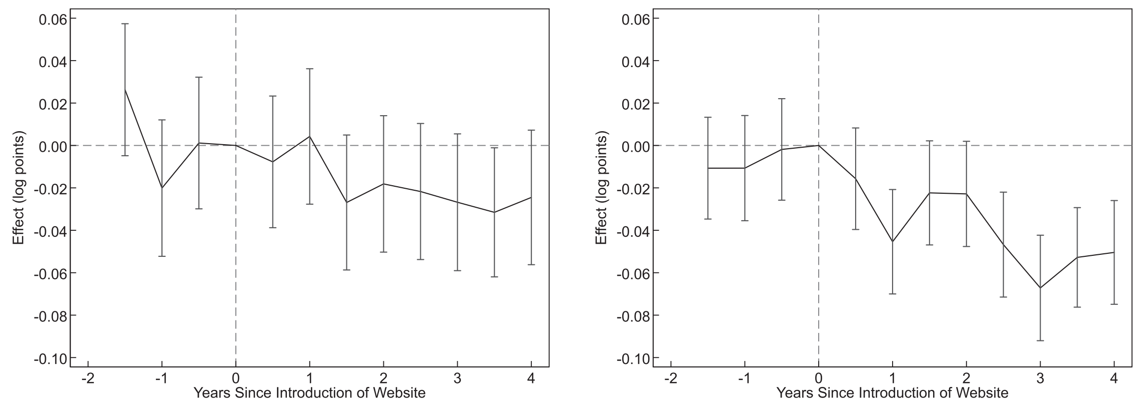
Providers operating in concentrated markets may be able to negotiate higher prices with insurers (Dranove, Shanley, & White, 1993; Town & Vistnes, 2001; Gowrisankaran et al., 2015). I define the Herfindahl index by county and procedure category in the period prior to the introduction of the website. There is significant variation in competition: some counties

[35] About 17% of workers living in New Hampshire work in a different state, one of the highest rates in the nation. See Out-of-State and Long Commutes, Census 2011.

[36] In follow-up work, I present a model that formalizes this intuition.

[37] The specification used for figure 2 is $\log(1 + p_{imjkt}) = \sum_t \beta_t(\text{OnWeb}_m \times \text{SemiYear}_t) + \alpha X_{it} + \lambda_{mjk} + \lambda_t + \varepsilon_{imjkt}$. The interaction with the time period before the introduction of the website is omitted.

FIGURE 3.—SUPPLY-SIDE EFFECT OF PRICE TRANSPARENCY WEBSITE, BY TIME PERIOD



a. Total visit price

b. Principal procedure price

The charts show point estimates for each half-year using the difference-in-difference specifications described in section IVF. The specification controls for demand-side changes; therefore point estimates reflect only supply-side effects. The omitted period is the half-year prior to the start of the price transparency website. The chart on the left shows estimates using the entire visit price as the dependent variable, while the chart on the right shows the effect when the dependent variable does not include supplementary procedures. Error bars indicate 95% confidence interval using standard errors clustered at the month-year level.

TABLE 8.—SUPPLY-SIDE EFFECT OF PRICE TRANSPARENCY WEBSITE

			Total Visit Effect by County HHI		Total Visit Effect by Provider Type	
	Total Visit Price	Principal Procedure Price	$\leq$ First Quartile HHI	$>$ Forth Quartile HHI	Hospital	non-hospital
$\text{OnWeb}_m \times \text{PostShortRun}_t$	-0.010^{*}	-0.005	0.007	-0.042^{***}	-0.009	-0.009
	(0.006)	(0.006)	(0.012)	(0.014)	(0.011)	(0.007)
$\text{OnWeb}_m \times \text{PostLongRun}_t$	-0.017^{***}	-0.030^{***}	0.000	-0.048^{***}	0.016	-0.024^{***}
	(0.006)	(0.006)	(0.012)	(0.015)	(0.013)	(0.006)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Provider × Procedure × Insurer FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic of difference (SR)			7.355^{***}		0.002	
F-statistic of difference (LR)			6.723^{**}		7.393^{***}	
Mean level	950.38	450.01	6.01	5.99	6.60	5.95
Adjusted R^2	0.497	0.807	0.475	0.467	0.559	0.464
Observations	1,967,086	1,967,083	609,793	441,664	338,478	1,628,608

Estimates from the difference-in-difference specification that controls for demand-side factors presented in equation (2). The dependent variable is $\log(1 + y)$, where y is either the visit price or principal procedure price. For visit price, the unit of observation is a patient visit, which may contain multiple medical claims. For principal procedure price, the unit of observation is the primary medical imaging procedure within each visit. HHI is calculated for individuals' county for each procedure class in the period before the website. The sample consists of all commercial claims related to outpatient medical imaging procedures in New Hampshire from 2005 to 2011. OLS regression standard errors clustered at the month-year level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

have a single provider in the market for certain procedure categories, while others are relatively unconcentrated.

Columns 3 and 4 of table 8 present the supply-side effect on total visit price by market concentration. In both the short run and long run, there is a larger effect of the website in high-concentration markets (those with Herfindahl index above the fourth quartile) compared to low-concentration markets (those at or below the first quartile). This difference is statistically significant for both the short and long runs. This is evidence that price transparency put the most downward pressure on prices in markets where price cost margins were likely the highest.

Finally, columns 5 and 6 of table 8 compare results for hospitals and nonhospital providers, which are likely free-standing outpatient facilities. The results are insignificant for hospitals, although there is a smaller sample. The supply-side effects are primarily driven by nonhospital providers, which decrease prices by 2.4% in the long run. The difference between the effect for hospitals and nonhospitals is statistically significant at the 1% level. I also examine a similar specification after aggregating to the provider-procedure-insurer level, thus capturing the unweighted effect across all providers regardless of market share. The magnitude of the supply-side effect is slightly larger, indicating that the providers with low market share decreased prices even more.[38]

G. *Robustness of Supply-Side Effects*

One important concern is that the supply-side effects may be biased due to the fact that procedures not on the website are affected due to providers' reducing all prices in response to the website or due to increasing prices for procedures that are not on the website to compensate for lost profits from procedures on the website. Although there is little theoretical justification for why profit-maximizing providers would not optimize prices for each procedure individually (see Frakt,

[38] Results available upon request.

2011), I address this concern by exploiting cross-state variation in price information.[39]

Although the NHCHIS data set includes only individuals insured in New Hampshire, many of these individuals live or work outside New Hampshire and go to providers outside New Hampshire, largely in Massachusetts and Vermont. Therefore, prices for medical imaging providers outside New Hampshire can be used as a control group since the website listed prices only for providers within New Hampshire. Unlike prices for medical imaging procedures that are not on the website at providers in New Hampshire, the prices for medical imaging procedures outside the state are not affected by cost shifting.[40] I limit the sample to procedures available on the website, exploiting variation across time and across state borders. The specification is presented in section IVA.

The results, which can be found in table A-4 are qualitatively similar as the baseline specification. In the short run, the estimates do not imply a statistically significant effect on negotiated prices. However, there is a negative and significant effect in the long run. The magnitude of the effect is larger than the specification presented in table 8, implying almost a 5% reduction in prices in the long run. Overall, these estimates provide evidence that the supply-side results presented in table 8 do not reflect providers that raised the price of procedures not on the website to offset lower negotiated prices for procedures on the website. The downside of this approach is that there is a smaller sample.

H. *Price Dispersion*

Theoretical work has emphasized that information frictions can give rise to price dispersion in equilibrium even when products are homogeneous (Salop & Stiglitz, 1977; Burdett & Judd, 1983). At the same time, recent work has documented the large degree of price variation for privately provided health care, even for relatievely standardized procedures (Cooper et al., 2018), raising questions about the underlying cause of this variation. In this section, I examine whether a reduction in information frictions can reduce price dispersion, as measured by the interquartile range of prices. I find evidence that the website reduced the range of transaction prices, as well as the range of negotiated provider prices.

Columns 1 and 2 in table 9 present the results for transaction prices. There is a $231 reduction in the interquartile range of visit prices on the website relative to those not on the website (a 19% reduction from the mean of $1,184). There is also a $104 reduction in the interquartile range of principal procedure prices. Both results are significant at the 1% level.

Table 9.—Effect of Price Transparency Website on Price Dispersion

	Interquartile Range of Transaction Prices		Interquartile Range of Provider Prices	
	Total Visit Price	Principal Procedure Price	Total Visit Price	Principal Procedure Price
$\text{OnWeb}_m \times \text{Post}_t$	-231.0^{***}	-103.7^{***}	-158.9^{**}	-96.3^{***}
	(63.8)	(24.0)	(68.7)	(20.7)
Individual controls	Yes	Yes	Yes	Yes
Procedure FE	Yes	Yes	Yes	Yes
Month-year FE	Yes	Yes	Yes	Yes
Mean IQR	1183.5	658.5	992.4	541.4
Adjusted R^2	0.307	0.447	0.271	0.465
Observations	13,572	13,572	13,572	13,572

Estimates from the difference-in-difference specification described in section IVA. The unit of observation is a procedure-month. Interquartile range is defined as the difference between 75th and 25th percentiles price for each procedure-month. OLS regression standard errors clustered at the month-year level in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

More important, I examine the effect on the interquartile range of negotiated provider prices (see columns 3 and 4 in table 9). The interquartile range of visit prices declines by $159, a 16% reduction from the mean. Focusing on the principal procedure price, which was likely most affected by the website, the interquartile range of provider prices declined by $96, or 17.8% of the mean. These results are also statistically significant.

Together with the previous results, these results imply that the website decreased both the mean and variance of the distribution of transaction prices. This was due in large part to a shift in the distribution of negotiated prices. Consistent with the theoretical literature on information frictions and price dispersion, lower information friction allows patients and insurers greater ability to discipline the market.

V. Discussion and Conclusion

The health care system can be complicated to navigate, and information frictions are thought to be pervasive (Reinhardt, 2012). In this paper, I examine how a publicly available website providing price information affected the market for medical imaging procedures. While previous research has focused on the demand-side effect of information supplied by employers, I examine the equilibrium effects of a statewide initiative.

Overall, the HealthCost website reduced the cost of medical imaging procedures by 5% for patients and 4% for insurers. A simple calculation implies that individuals saved around $7.9 million and insurers saved $36.0 million on x-ray, CT scan, and MRI scans over the five-year period.[41] While demand-side effects are important, there are significant supply-side effects in the long run when information is available to all individuals. In other words, this is evidence that price opacity softens provider competition, leading to higher prices. This is particularly important given that the

[39] Note that the cross-price elasticity between different procedures is likely 0 (e.g., there is no substitution between arm X-rays and leg X-rays). Therefore, there is little theoretical justification why a change in demand for one procedure would generate spillover effects for other procedures when firms are profit maximizing.

[40] In particular, any changes in demand due to the website are unlikely to affect prices outside New Hampshire, given that New Hampshire patients likely make up a very small fraction of patients in these states.

[41] All figures in 2010 dollars.

average price of medical imaging procedures in the United States is roughly double that of other OECD countries.[42]

Previous research has found modest effects of price transparency initiatives at the employer level. However, this paper provides evidence that price transparency can be effective in the long run, especially when it is available to the entire market. The presence of supply-side effects also implies that usage of the price transparency tool generates positive spillovers for other consumers due to lower prices, motivating the public provision of price information. Given that a sizable portion of benefits accrues to individuals under their deductible, it also implies that insurers may not have a strong incentive to provide these tools.

While this paper focuses on x-rays, CT scans, and MRI scans, it is important to consider whether the results apply more broadly. It has been estimated that 30% to 40% of spending on medical services is for procedures that are shoppable, and price transparency may be able to generate equilibrium effects for these procedures as well.[43] Price transparency tools are unlikely to have an effect for other procedures, such as complicated surgeries with prices that are determined on a case-by-case basis.

Finally, this paper does not examine other margins of adjustment such as the entry and exit of providers. All specifications implicitly control for changes in the set of providers; however, it may be that the website caused new, low-cost medical imaging providers to enter the market.[44] In fact, there was entry of free-standing outpatient medical imaging facilities after the website started, although it is not clear that it was due to the website.[45] At the same time, price transparency could negatively affect the profitability of more expensive providers, such as hospitals, potentially leading to exit. Future work should examine these additional margins.

Given that website traffic logs reveal that only a small fraction of individuals receiving medical imaging procedures in New Hampshire use the website, the supply-side effects may be quite large if all consumers were informed about prices. This is particularly important because policies that lower prices are seen as key for lowering the cost of privately provided health care in the United States. I examine these issues in future work.

[42] The average price of an MRI scan is $1,200 in the United States but only $569 in other OECD countries with available data. The average price of CT scan is $228 in the United States but only $98 in other OECD countries with available data. See Squires (2011).

[43] See White and Eguchi (2014) and Health Care Cost Institute (2016).

[44] In particular, month fixed effects absorb entry and exit of providers.

[45] Analyzing these issues would require a different identification strategy beyond the scope of this paper.

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Executive Summary

In 2018, California lawmakers sought to design and create a state Health Care Cost Transparency Database, an all-payer claims database (APCD), to collect information on the cost of health care in the state. The law tasks the Office of Statewide Health Planning and Development (OSHPD) with designing a database to best fit the needs of the state. Of specific interest for this project, California's APCD may collect information about amounts paid for health care services, including data about negotiated rates between insurance plans and providers. Many health care providers and payers seek to maintain the confidentiality of these paid amounts as trade secrets, claiming their secrecy provides a competitive advantage. Yet the public has begun to demand greater price transparency in health care. This report examines the legal and economic implications of collecting and releasing these paid amounts, reviews the practices of existing APCDs, and concludes with recommendations for California's policymakers about best practices to ensure the effective use of increased transparency to control costs and increase access to health care services.

Part I of this report reviews trade secret statutes and case law regarding the protection of negotiated prices as trade secrets. While some negotiated prices may constitute trade secrets in some circumstances, trade secret law is extremely fact specific, and no court has definitively ruled on the issue of whether negotiated rates can be protected as trade secrets. Furthermore, even if a court finds that certain price information constitutes a trade secret, that protection is not absolute. State freedom of information acts and free speech protections can allow disclosure of trade secrets when disclosure of that information is in the public interest. Specifically, Part I demonstrates that California can allow or require disclosure of information that is in the public interest, including negotiated rates for health care services, as long as the state articulates the conditions and policies for disclosure at the time of data collection and follows state and federal patient privacy statutes.

Part II of the report presents economic evidence about when disclosing negotiated rates is in the public interest. Part II begins by explaining theories forwarded by economists and antitrust enforcers about how disclosure of negotiated rates in health care markets could facilitate price collusion and drive price increases. The report then reviews evidence demonstrating that in rare circumstances, in other industries and in other countries, mandated transparency reports have allowed tacit collusion. To date, however, no state with an existing APCD has experienced competitive harm, and, in fact, a decade of public disclosure of negotiated rates in New Hampshire resulted in increased competition and reduced prices for health care services.[1] Part II concludes that while disclosure of negotiated health care rates in some markets could theoretically result in price collusion and increased prices, concerns over disclosure of negotiated rates for health care services in California are likely overstated and can be mitigated by proper safeguards. Furthermore, this part of the paper discusses why, with appropriate safeguards, the procompetitive effects of APCDs are likely to outweigh any anticompetitive harms.

Part III compiles and compares the current and planned price dissemination practices for 18 states with mandatory APCD data collection programs. The variation in legislation and regulation governing APCD data release is discussed, and this information is summarized in a chart that includes collection and disclosure requirements. This research shows that the state has the legal authority to collect and, in many cases, disclose negotiated rates. All states with active APCDs collect information about paid amounts and release reports of aggregated information, but a few states, including Maine and New Hampshire, disclose plan- and provider-specific median paid amounts for the most commonly used health care services on publicly accessible websites. This part of the report also offers best practices for California based on the experience of other states.

Drawing from this research, Part IV makes the following recommendations for California as the state seeks to create an APCD that furthers the legislative intent of increased transparency in health care pricing:

1. **OSHPD should provide all data submitters with clear information and policies regarding data release prior to data collection.** Data collected from other state agencies may be subject to confidentiality agreements and require amendments to the Knox-Keene Act and California Public Records Act.

2. **OSHPD should create a data release committee and declare that all information submitted to the APCD will be released in accordance with data release guidelines at the discretion of the data release committee.** To avoid any claim of trade secret misappropriation, OSHPD should inform data submitters that decisions regarding confidentiality and data release will be made by the data release committee to avoid the expectation that labeling data as confidential will prevent disclosure of that data.

3. **The data release committee should establish guidelines for data release that weigh competitive effects and public interest.** Specifically, the committee should release data only when the procompetitive effect of the data release or the public interest outweighs the anticompetitive effect.

4. **The data release committee should implement a tiered data release policy, which would base oversight and access to data on the data requested and the nature of the requester.** The committee should review requests for data containing negotiated payment amounts on the basis of the nature of the entity making the request, the justification for the request, the proposed usage of the data, the nature of the information requested, the requesting entity's technical and physical safeguards for maintaining the security of the data files, and whether the entity has misused data or violated prior data use agreements. For example, a tiered data release policy could include these provisions:

   - ***Tier 1:*** *Data release to the public.* OSHPD releases price reports and other consumer- or policy-relevant findings on a publicly available website. Some aggregated and/or anonymized data should also be available to the public.[2]

   - ***Tier 2:*** *Data release to academic or governmental entities.* The committee should presume data requests from academic or governmental agencies to be procompetitive. These requests should be limited to the minimum data sets necessary to conduct the proposed research and subject to a data use agreement (DUA) that would allow only anonymized or aggregated data to be included in published study results without committee approval.

   - ***Tier 3:*** *Data release to private entities or industry participants.* Industry participants and other private entities may request additional data from the APCD. The committee should consider comments from other industry participants and competitors before releasing data. Released data should be the minimum amount needed based on the reason for the request, and the requester should be required to demonstrate why the aggregated and anonymized data are insufficient for the requester's intended use.

   To streamline data review, the committee could consider allowing the committee chair to review Tier 2 requests or Tier 3 requests that do not include negotiated rates. The committee chair could then approve these requests or pass them on to the committee for further review.

5. **The data release committee should establish a data use agreement that provides requirements for accessing data.** The DUA should require that the data be used only for the approved use, that the recipient keep all nonpublic data confidential unless nonconfidentiality is approved by the committee, and that the recipient of the data implement appropriate privacy and encryption protections. The DUA should establish civil monetary penalties for using the data in illegal ways, including misappropriation, intentional and unauthorized data

release, and price-fixing or collusion, and should exclude offending individuals, institutions, and companies from accessing APCD data for up to 10 years or more. The DUA should include procedural guidance for inadvertent data release and require data recipients to indemnify the state of California and OSHPD for any misuse or misappropriation of released APCD data.

6. **OSHPD or its designee should monitor annual claims data for anticompetitive behavior.** OSHPD should look for evidence of tacit collusion or price shadowing, especially in highly concentrated markets, and should remove data from public display if anticompetitive effects are found.

Introduction

In 2018, California lawmakers sought to enhance price transparency by passing Assembly Bill 1810 to create a Health Care Cost Transparency Database. By establishing an all-payer claims database (APCD), the legislature aimed to "provide greater transparency regarding health care costs, and . . . [to use the data] to inform policy decisions regarding the provision of quality health care, reduce disparities, and reduce health care costs . . . [and] to encourage health care service plans, health insurers, and providers to use such data to develop innovative approaches, services, and programs that may have the potential to deliver health care that is both cost effective and responsive to the needs of enrollees, including recognizing the diversity of California and the impact of social determinants of health."[3]

California's Office of Statewide Health Planning and Development (OSHPD), with guidance from the Healthcare Payments Data Program Review Committee, must design data collection and release policies to fulfill the legislature's intent. To assist in that design, this report examines the legal and economic implications of different data release strategies and reviews the current data release practices of existing APCDs to provide recommendations for policymakers. The research in the report shows that the state has the legal authority to collect and, in many cases, disclose negotiated rates. All states with active APCDs collect information about paid amounts and release reports of aggregated information, but a few states, including Maine and New Hampshire, disclose plan- and provider-specific median paid amounts for the most commonly used health care services on publicly accessible websites.

This report is divided into three parts, which can be read independently. Part I reviews trade secret statutes and case law and concludes that although some negotiated prices may constitute trade secrets in some circumstances, not all disclosures of negotiated prices will result in a misappropriation of trade secrets. Specifically, California can allow or require disclosure of information that is in the public interest, including negotiated rates for health care services, as long as the state articulates the conditions and policies for disclosure at the time of data collection and follows state and federal patient privacy statutes.

Some economists and antitrust enforcers, however, have theorized that disclosure of negotiated rates in health care markets could facilitate price collusion and drive price increases. Part II reviews these theories and the related evidence. To date, no state with an existing APCD has experienced competitive harm. In fact, a decade of public disclosure of negotiated rates in New Hampshire resulted in increased competition and reduced prices for health care services in that state.[4] As a result, competitive concerns over disclosure of negotiated rates in California may be overstated, but should still be protected against, especially in highly concentrated provider markets.

Part III of this report compiles and compares the current and planned price dissemination practices for 18 states with mandatory APCD data collection programs. This part of the paper discusses the variation in legislation and regulation governing APCD data release and summarizes the information in a chart that includes collection and disclosure requirements. Finally, Part IV presents recommendations and best practices for California as it designs and implements a Health Care Cost Transparency Database.

I. Legal Protection for Trade Secrets

Trade secret protection is a legal construct designed to benefit society by promoting innovation.[5] Throughout history, trade secret law has protected key business information, such as the Coca-Cola formula and the Google search algorithm, from theft and misappropriation to the detriment of the trade secrets' creators and inventors. Over time, trade secret protections have expanded to protect a much broader set of information, but the exact boundaries of these protections have not been clearly defined.[6] This section discusses state and federal statutes and case law related to the protection of negotiated prices as trade secrets. Trade secret law is highly fact specific, and, to date, no court has definitively held that negotiated rates between health care providers and insurers constitute trade secrets. Furthermore, even if a court finds that certain price information constitutes a trade secret, that protection is not absolute. This part of the report also explains how and when state freedom of information acts and free speech protections allow disclosure of trade secrets in the public interest.

Establishing Trade Secret Protection

Historically, trade secret law primarily arose from common law established in property, tort, and contract law cases.[7] Over time, however, trade secret protections have been codified in both state and federal statutes.

State Trade Secret Law

In 1979, the Uniform Law Commission (ULC) published the Uniform Trade Secrets Act (UTSA) to codify state trade secret protection. As of 2018, every state except New York and North Carolina had adopted some form of the UTSA.[8] According to the definition in the current UTSA, a **trade secret** is "information, including a formula, pattern, compilation, program, device, method, technique, or process, that: (a) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and (b) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy."[9]

Many states, however, modified the UTSA, so that trade secret law varies considerably among states.[10] Meaningful variations exist among state laws including in the definition of "trade secret"; what constitutes "reasonable measures" to prevent disclosure; what constitutes "readily ascertainable information"; the applicable statute of limitations; and the amount of damages available for trade secret misappropriation, including the availability of punitive damages.[11] Nonetheless, the foundations of the UTSA remain largely similar.

The UTSA also prohibits the misappropriation of trade secrets, which can occur in several ways. First, an individual can misappropriate a trade secret by acquiring information that the individual knows or has reason to know was obtained by improper means, which include theft, bribery, misrepresentation, breach of a duty to maintain secrecy, or espionage through electronic or other means.[12] Second, an individual can misappropriate a trade secret by (a) disclosing or using a trade secret obtained by improper means; or (b) disclosing or using a trade secret that the individual knew or had reason to know was derived from improper means, acquired under circumstances that gave rise to a duty to maintain the trade secret's secrecy or limit its use, or derived from or through a person who had a duty to maintain the trade secret's secrecy or limit its use.[13] These provisions form the foundations of modern-day trade secret protections. For APCDs and other state databases, therefore, the greatest risk for trade secret misappropriation claims arises when the state disseminates data that it acquired subject to a duty of confidentiality. In the data collection process, therefore, the state should make clear that the data submitter will not be able to assert confidentiality protections for any data submitted to the database.

California Trade Secret Protection

California adopted the California Uniform Trade Secret Act (CUTSA) in 1984 and modified the UTSA in ways that may both broaden and narrow the scope of trade secret protection for negotiated reimbursement rates between health care providers and insurers. The CUTSA defined a trade secret as follows: "information, including a formula, pattern, compilation, program, device, method, technique or process, that: (a) [d]erives independent economic value, actual or potential, from not being generally known to the public or to other persons who can obtain economic value from disclosure or use; and (b) [i]s the subject of efforts that are reasonable under the circumstances to maintain its secrecy."[14] Notably, the California law deviates from the UTSA's definition of trade secret by not exempting from trade secret protection information that is "readily ascertainable by proper means." This change implies that information could constitute a trade secret even if others could obtain the same information through proper means.[15] As a result, the California law protects a broader swath of information than the UTSA does.

The California law also deviates from the UTSA in the definition of "improper means." The CUTSA states specifically that "reverse engineering or independent derivation alone shall not be considered improper means."[16] Certain forms of reverse engineering or independent derivation may be considered so difficult that information obtained that way is not considered "readily ascertainable", and therefore this information may be offered trade secret protection under the UTSA, but not under the CUTSA. In particular, because California does not consider reverse engineering alone to be "improper means," in situations in which reverse-engineered information is not readily ascertainable, the scope of trade secret protection in California may be narrower than under the UTSA. This distinction may prove relevant to negotiated rates between health care providers and insurers. Specifically, one may not consider a full hospital price list obtained from numerous Explanation of Benefits forms sent to patients to be readily ascertainable; however, if someone actually did create such a list independently, use or disclosure of that list would not be considered a misappropriation of trade secrets.

Federal Trade Secret Protection

In 2016, amid growing fears of international trade secret theft, Congress enacted the Defend Trade Secrets Act of 2016 (DTSA)[17] to fortify perceived weaknesses in some state trade secret protections by crafting a cohesive federal intellectual property policy. The DTSA defines **trade secrets** as "all forms and types of financial, business, scientific, technical, economic, or engineering information, including patterns, plans, compilations, program devices, formulas, designs, prototypes, methods, techniques, processes, procedures, programs, or codes, whether tangible or intangible, and whether or how stored, compiled, or memorialized physically, electronically, graphically, photographically, or in writing if — (A) the owner thereof has taken reasonable measures to keep such information secret; and (B) the information derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable through proper means by, another person who can obtain economic value from the disclosure or use of the information."[18]

With one exception,[19] the DTSA explicitly states that it does not preempt state trade secret law, but rather serves to make available an alternative venue for trade secret holders to seek remedies for trade secret misappropriation. As a result, the DTSA essentially creates a national minimum standard for what constitutes a trade secret, while states are allowed to adopt broader definitions.

The creation of the DTSA therefore offers plaintiffs the opportunity to shop for both jurisdiction and law in trade secret cases. For instance, plaintiffs in California can bring a claim for misappropriation of trade secrets in federal court for violation of the DTSA, or in state court for violation of the CUTSA.[20] If someone disclosed information that met California's definition of a trade secret but did not meet the DTSA's definition because the information was reasonably ascertainable by proper means, the owner of the trade secret could still file a claim against that person in California, as long as the business or defendant was located there or harm was suffered there.[21] The DTSA shifts the balance of power to the trade secret owner, who can now choose between federal law and any applicable state laws when deciding where to pursue a case; often, the trade secret owner will select the venue where greater damages are available or more favorable case law applies.

Prices as Trade Secrets

Even a critical reading of the trade secret statutes leaves ambiguity about whether negotiated prices can be trade secrets. While insurers and providers claim there is economic value in negotiated fee schedules and that reasonable measures are taken to maintain their secrecy, the validity of these claims remains largely untested. In fact, the research for this report did not uncover a single case in which a court directly ruled that negotiated payment rates between insurers and providers constitute trade secrets. Nonetheless, the general assumption of confidentiality in negotiated rates may lead courts in future cases to determine that these rates are trade secrets. Trade secret determinations depend heavily on the particular facts in any given case; therefore, even a clear determination in one case that negotiated payment rates between providers and insurers constitute a trade secret would not settle the issue for all future cases.

Courts that have examined this issue indirectly have done little to unmuddy the waters. In certain cases, while not reaching the issue of whether prices constitute a trade secret, courts have been willing to use protective orders to maintain the secrecy of negotiated price information to overcome provider resistance to discovery. For example, in *Children's Hospital v. Blue Cross of California*, Children's Hospital argued that its contracted rates with other health insurance plans were not discoverable because disclosure of these rates would disclose proprietary financial information and trade secrets.[22] The court held that the hospital's concerns could be "handled through appropriate protective orders" (i.e., the information could be submitted under seal) and remanded the case for retrial without conducting an analysis of whether these prices amounted to trade secrets.[23]

Other courts have opined on whether negotiated rates constitute trade secrets but have not made formal determinations because other laws, commonly state public record acts, clearly established a duty to disclose. For instance, the Pennsylvania Supreme Court, in *Com., Dep't of Pub. Welfare v. Eiseman*, expressed doubt that negotiated rates between managed care organizations that administered the state Medicaid program and dental providers met the definition of a trade secret under the UTSA and Pennsylvania's state trade secret law, stating "[i]nitially, we observe that contractual payment rates are not a close fit with the concept of a 'trade secret,' as it is substantially debatable whether such rates are in the nature of a 'formula, drawing, pattern, compilation including a customer list, program, device, method, technique, or process.'"[24] The Pennsylvania Supreme Court, however, held that even if those lists were trade secrets, Pennsylvania's Right to Know Law exempts financial records of public agencies from trade secret protection.[25]

Similarly, the North Carolina Court of Appeals considered whether negotiated prices in public hospital agreements with health maintenance organizations (HMOs) constitute trade secrets in *Wilmington Star-News, Inc. v. New Hanover Regional Medical Center, Inc.*[26] In Wilmington Star, the court noted that, at the time of the opinion in 1997, "[n]o decisions in North Carolina have concluded that a negotiated price list is a trade secret within the meaning of [trade secrets as defined in North Carolina law,] G.S. 66-152(3)."[27] The court then used the six factors listed in the Second Restatement of Torts to consider whether the negotiated pricing lists in the case could be trade secrets.[28] In contrast to the court in *Eiseman*, the court in *Wilmington Star* concluded that "a reasonable trier of fact could conclude that the price lists were trade secrets."[29] Although this conclusion would have been sufficient to have the court consider whether the negotiated price lists constituted trade secrets, the court did not do so, because it held that the North Carolina's Public Records Act required disclosure of the price lists irrespective of their trade secret status.[30]

The case law demonstrates that trade secret protection for negotiated hospital prices remains largely undefined, with many courts deciding these cases on other grounds. As a result, it remains uncertain whether and under what circumstances negotiated rates between providers and insurers constitute trade secrets, and a court's decision will depend largely on the facts of any particular case.

The Duty to Keep Confidential and the Risk of Misappropriation

Furthermore, trade secrets laws do not prohibit the disclosure of all trade secrets; instead, they prohibit the "misappropriation" of trade secrets. The UTSA definition of "misappropriation" includes "disclosure or use of a trade secret of another without express or implied consent by a person who . . . at the time of disclosure or use, knew or had reason to know that his knowledge of the trade secret was . . . acquired under circumstances giving rise to a duty to maintain its secrecy or limit its use."[31] As a result, an entity (such as a state APCD) must not disclose information that it expressly or impliedly agreed to keep confidential. For example, in *Emergency Care Research Inst. v. Guidant Corp.*, a medical device manufacturer, Guidant, argued that a nonprofit health services research company that acquired and published price lists for medical devices from hospitals misappropriated trade secrets by obtaining the confidential prices Guidant charged hospitals.[32] The court held that trade secret protection depended on Guidant's efforts to require hospital purchasers to keep prices confidential.[33]

Contractual agreements or statutory provisions requiring a state APCD to keep information confidential create a duty to do so, which can make disclosure of such information a misappropriation of trade secrets. Even in the absence of direct contractual or statutory language ensuring the confidentiality of particular information, courts have also supported the creation of an "implied duty of confidentiality" when statutory or contractual language suggests such a duty.[34] As a result, state APCDs must be very specific at the time of data collection regarding confidentiality and the specific guidelines for data release.

To avoid claims of misappropriation, California also should take precautions when linking any data from outside sources to the APCD. In certain circumstances, California has already agreed to protect the confidentiality of negotiated rates between health care providers and payers; these rates must be distinguished and kept separate from APCD data submitted to the Office of Statewide Health Planning and Development (OSHPD). Specifically, with respect to rate review information submitted to the California Department of Managed Health Care (DMHC), the Knox-Keene Act states that "[t]he contracted rates between a health care service plan and a provider shall be deemed confidential information that shall not be made public by the department and are exempt from disclosure under the California Public Records Act."[35]

Furthermore, the California Public Records Act (CPRA) contains provisions that keep certain contracts between the Department of Health Care Services and providers of inpatient health care services confidential for one year, except for any portion of the contract that contains the rates of payment, which is kept confidential for four years.[36] For these reasons, California should not directly deposit in the APCD information collected by other agencies or for other purposes, because releasing that information, with its presumption of confidentiality, may risk claims of trade secret misappropriation. Instead OSHPD should directly collect the information, stating clearly how and when data will be released and that confidentiality determinations will be made solely by the data release committee.

Although sections of the Knox-Keene Act and the CPRA allow negotiated rates to be kept confidential, these laws did not have the purpose of promoting price transparency to improve health care markets, so legislators did not consider the procompetitive potential of an APCD when drafting the laws. Even if negotiated rates between providers and insurers constitute a trade secret, trade secret protection is not absolute. States can disclose information gathered by a state entity via the state public records act or if disclosure serves a public purpose.

Public Interest in Prices

State courts have noted that "[t]he UTSA contains no specific exemption of trade secrets from public disclosure laws."[37] As a result, state freedom of information statutes or public records acts can require public access to information otherwise considered a trade secret.[38] In addition, the decisions in *Eiseman* and *Wilmington Starr* demonstrate that states can pass laws to enable state agencies to disclose information that might otherwise be considered a trade secret. As a result, states have begun to specify instances that warrant disclosure of trade secrets either through public records requests or public interest exemptions to trade secret protection.

Currently, California has a public interest exemption to the CPRA that allows the state to refuse to disclose information that the CPRA would ordinarily require be disclosed, if "on the facts of the particular case, the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record."[39] This provision grants the state the ability to refuse to disclose any information submitted when disclosure of the information would harm the public interest. This provision would serve to protect against the kind of competitive harms health care providers, insurers, and antitrust enforcers warn may arise from APCD disclosure of negotiated health care rates.

On the other hand, the CPRA does not include a public interest exemption that would allow the state to disclose otherwise protected information in the name of the public interest. Yet California courts have created such an exemption in instances where the First Amendment interests of the public outweigh the quasi-property rights of the business holding the information. In *O'Grady v. Superior Court*, the court held that that California trade secret law was intended to promote innovation but was not absolute when disclosure of information benefited the public.[40] Specifically, the court held that the reporter's shield law protected a news website that published confidential marketing materials, even if those materials were obtained by an employee who passed trade secrets to the website. The court stated, "It is true that trade secrets law reflects a judgment that providing legal protections for commercial secrets may provide a net public benefit. But the Legislature's general recognition of a property-like right in such information cannot blind courts to the more fundamental judgment, embodied in the state and federal guarantees of expressional freedom, that free and open disclosure of ideas and information serves the public good. When two public interests collide, it is no answer to simply point to one and ignore the other. . . . [W]hatever is given to trade secrets law is taken away from the freedom of speech. In the abstract, at least, it seems plain that where both cannot be accommodated, it is the statutory quasi-property right that must give way, not the deeply rooted constitutional right to share and acquire information."[41] While this case concerns the right of a newspaper to publish information, the case identifies the limits to trade secret protection when disclosure is in the public interest.

In summary, trade secret law is highly fact specific, and courts have not definitively stated that negotiated rates between health care providers and insurers constitute trade secrets. Furthermore, even if a court finds that certain price information constitutes a trade secret, protection of the trade secret is not absolute. States can allow or require disclosure of information in the public interest as long as they articulate the conditions and policies for disclosure at the time of data collection. California has the authority to collect and disclose negotiated rates for health care services as long as the state follows state and federal patient privacy statutes. With that knowledge, California should seek to determine when the public benefit of disclosure of negotiated rates outweighs any anticompetitive harms.

II. Economic Concerns About Transparency for Negotiated Rates

Standard economic theory reasons that price transparency benefits the public interest by allowing consumers to compare prices, by increasing competition, and by lowering overall spending.[42] Following this logic, disclosure of health care prices through an all-payer claims database (APCD) should serve the public interest by improving the market, leading to lower and more uniform prices. Some experts, however, have expressed concern that additional price transparency could lead to price increases in some health care markets.

The Potential for Anticompetitive Pricing

In theory, disclosure of negotiated provider rates in markets with high levels of health care provider concentration[43] and weak consumer response to disclosure of health care pricing data[44] may facilitate provider collusion by enabling a provider receiving a lower rate than a competitor (often a dominant provider) to "shadow price" the higher-cost peer, raising prices and expenditures overall.[45] For example, economists Cutler and Dafny describe a hypothetical situation in which a well-regarded hospital contracts with two insurers and offers a lower price to Insurer 1 because otherwise Insurer 1 would steer patients to a different institution: "If the hospital must publicly reveal both prices, it will be less likely to offer the low price to Insurer 1, because Insurer 2 would then pressure the hospital to lower its price as well."[46] In this case, disclosure of negotiated rates publicly or to a competitor "would create a perverse incentive for the hospital to raise prices (on average), and as a result, its rivals could do the same."[47] Cutler and Dafny acknowledge that the ability to raise prices in response to price transparency requires sufficient market leverage by the buyer (to steer patients) or the supplier (to demand the price increase), but these situations are common in highly concentrated health care markets.

In a companion paper, Sinaiko and Rosenthal also acknowledge the potential for shadow pricing or increased costs following the advent of price transparency, but these authors express doubt that the increased prices would persist over time. The authors note that "[i]n reasonably competitive provider markets, purchasers and health plans should be able to use price information to pressure providers to lower their prices or to improve the efficacy of tiered networks or other similar efforts."[48]

Evidence of Price Increases Following Increased Transparency

Until very recently, little empirical evidence existed on the impact of greater price transparency in health care, so researchers and federal regulators relied on evidence from other markets to predict how price transparency initiatives would affect prices for health care services. Specifically, many experts have cited the experience of Danish antitrust authorities, who in 1993 began publishing invoice prices for concrete because the highly concentrated supplier market allowed companies to charge widely varying prices to buyers that lacked market power.[49] In the year following the disclosures, prices in one region rose 15% to 20% as the concrete sellers raised the prices to the highest rate for all buyers.

More recently, economists Byrne and de Roos have described how a government website that posted daily prices for gasoline allowed Australian gas companies to engage in "tacit collusion" by signaling future price increases and raising prices in concert without direct communication.[50] Over a period of six years, a dominant firm, BP, used price signaling to "coordinate market prices, soften price competition, and enhance retail margins."[51] Rather than offering a cautionary example, however, Byrne and de Roos argue that their "study highlights the value of detailed data for informing antitrust investigations into conduct." While transparency may offer a chance for price collaboration in specific markets, transparency may also be the best tool for identifying and validating suspected anticompetitive conduct that might otherwise go unnoticed. Similarly, in discussing price transparency the Maine

Health Data Organization (MDHO) acknowledged both a concern about concerted price increases and also the potential for the state's APCD to identify price shadowing, stating that "[e]ven without overt price-fixing or illegal conduct price transparency may lead to price uniformity at the highest level. . . . Ironically, [though] any tacit collusion would likely appear in the MHDO data."[52]

These examples demonstrate the potential for price transparency to be exploited by oligopolistic suppliers in order to increase prices.[53] These examples, however, are atypical of health care price transparency efforts and may have minimal correlation with US health care markets. First, the quality of health care services, unlike concrete and gasoline, is highly differentiated, and providers compete on dimensions other than cost. Second, health care consumers often have strong loyalty to their existing providers and are less price sensitive. Third, the costs of health care services are typically negotiated on an annual basis, rather than daily (like gasoline) or at the time of the sale (like concrete), making rival price matching or tacit collusion much more difficult. Fourth, annual health care price negotiations are often informed by a range of factors, including experience of the group, changes in coverage benefits, and legal changes making the kind of direct signaling done by BP in the Australian example much more difficult to detect and mimic. Nonetheless, APCDs that release negotiated health care claims data should weigh these concerns about price collusion and overall rate increases in their data release decisions.

Federal Trade Commission and Department of Justice Antitrust Enforcement Policy Statement 6

In Statement 6 of the 1996 Antitrust Enforcement Policy in Health Care, the Federal Trade Commission (FTC) and the Department of Justice (DOJ) ("the Agencies") provided guidance on the use of surveys to allow health care providers to exchange price data.[54] The Agencies immediately acknowledged the "significant benefits" of such surveys for both health care consumers and providers, who "can use information derived from price and compensation surveys to price their services more competitively."[55] The Agencies also noted that the price survey information could help purchasers make more informed decisions when buying health care services.[56]

The Antitrust Safety Zone

The Agencies did, however, express some concern that "[w]ithout appropriate safeguards" price information exchanges among competing providers could facilitate collusion or reduce price competition.[57] As a result, the Agencies identified an "antitrust safety zone" and agreed not to challenge the exchange of price and cost information among competing health care providers "absent extraordinary circumstances," if the following conditions were met:

- The survey was managed by a third party (e.g., a purchaser, a government agency, or an academic institution);
- The data provided were more than three months old; and
- At least five providers reported data on each disseminated statistic, no individual provider's data represented more than 25% of each statistic, and disclosed information was sufficiently aggregated to avoid identification of any particular provider.[58]

The Agencies stated that they designed these conditions to ensure that the exchange of cost or price data would not be used by competing providers to engage in price collusion. The conditions "represent a careful balancing of a provider's individual interest in obtaining information useful in adjusting the prices it charges . . . against the risk that the exchange of such information may permit competing providers to communicate with each other regarding a mutually acceptable level of prices."[59]

Exchanges of information that do not meet these conditions may still be lawful even though the exchanges fall outside of the antitrust safety zone. The Agencies stated that they will evaluate exchanges of price and cost information that fall outside the safety zone "to determine whether the information exchange may have an anticompetitive effect that outweighs any procompetitive justification for the exchange."[60] For instance, the Agencies noted that "[d]epending on the circumstances, *public, non-provider initiated surveys may not raise competitive concerns*" and may provide information that purchasers can use for procompetitive purposes.[61] Importantly, the Agencies clearly distinguished between exchanges of future prices for provider services, which "are very likely to be anticompetitive,"[62] and exchanges of current or prior prices. Despite the fact that Statement 6 is more than 20 years old and in need of updating to reflect modern health care markets, the statement remains the best guidance state APCDs have to guide their disclosure practices.

The Example of Minnesota

In 2014, Minnesota revised the Minnesota Government Data Practices Act (MGDPA) by reclassifying health plan provider contracts with state agencies as "public data."[63] In response to a request, the FTC's Office of Policy Planning "recognize[d] the laudable goals of the MGDPA, including improving government accountability via increased transparency with respect to the use of public funds in government contracting," but also warned that "greater price transparency in concentrated health care markets may impede, rather than enhance, the ability of the Health Plans in Minnesota to selectively contract with health care providers and to negotiate lower reimbursement rates."[64] Because Minnesota did not host a consumer-facing webpage and did not disclose the information in a consumer-friendly way, few procompetitive effects existed to outweigh the anticompetitive risks. As a result, the FTC urged Minnesota to consider focusing its transparency efforts on the types of information important to consumers, while cautioning against public disclosure of negotiated fee schedules in Minnesota's highly concentrated provider markets.

The Example of California

In contrast to the Minnesota example, the DOJ Antitrust Division supported a database created by the Pacific Business Group on Health, the California Public Employees Retirement System, and the California Health Care Coalition. The database was created to collect claims data from hospitals and provide de-identified hospital rate indexes to member organizations, which would inform employers about how their negotiated prices compared with the average prices. The DOJ concluded that this type of disclosure "is not likely to produce any anticompetitive effects. . . . Rather, the most likely effect of [the database] is that greater information about the relative costs and utilization rates of hospitals in California will lead payors and employers to make more informed decisions when purchasing hospital services."[65]

These examples demonstrate that while acknowledging a risk of tacit collusion from complete transparency of all contracted information in highly concentrated markets, the Agencies often find procompetitive benefits in transparency initiatives and data releases that enable consumers and payers to comparison shop for higher-value health care. State APCDs also often use this balancing of pro- and anticompetitive effects to inform data release decisions.

The Example of Colorado

Colorado requested legal advice to analyze the implications of Statement 6 for the release of negotiated rates by the Center for Improving Value in Health Care (CIVHC), the entity that administers the Colorado APCD.[66] CIVHC's attorney found that "[m]ost reports and analytic data sets generated based on APCD data would fall within the antitrust Safety Zone because they can be designed to meet all three conditions [of Statement 6]."[67] Conditions 1 and 2 are easily satisfied by state APCDs. For their own reporting and data dissemination, APCDs can largely satisfy condition 3 through use of price aggregation, medians, or averages. CIVHC's legal analysis also argues that reports or data sets that fall outside the safe harbor because they fail to sufficiently de-identify the provider "would generally be lawful and are highly unlikely to be challenged by the Agencies because they will have little or no anticompetitive effect and may have substantial procompetitive benefits."[68] This argument is also persuasive in California.

The Role of a Data Release Committee

Concerns regarding provider and price identification arise in highly concentrated markets that do not have sufficient provider numbers to conceal identity and when the requested disclosure includes raw data on provider- and payer-specific pricing information. In these instances, a data release committee can provide valuable analysis and review of the potential pro- and anticompetitive effects of a particular data release request, including receiving input from the Agencies regarding the potential impact. Furthermore, the CIVHC analysis found that APCD reports would be unlikely to cause anticompetitive harms that outweigh procompetitive benefits unless "competitor recipients of the reports used the information to enter into price-fixing agreements."[69] If anticompetitive harms do occur, state action immunity[70] and indemnity clauses in data use agreements will shield state agencies from liability. Overall, state APCDs should be able to issue reports and analysis designed to remain within the safety zone, and then institute policies and guidelines for use by a data release committee in balancing the pro- and anticompetitive implications of releases that fall outside the safety zone.

Evidence of Procompetitive Effects from Disclosure of Negotiated Prices

Overall, the history of data releases by APCDs supports the notion that responsible data release policies can stem anticompetitive harm while harnessing the potential procompetitive benefits of releasing price data, including negotiated reimbursement rates. Recent evidence from some of the oldest APCDs suggests that disclosure of negotiated rates can increase competition and reduce costs.

The Example of New Hampshire

In particular, in 2007 New Hampshire created HealthCost, a publicly accessible website that lists provider- and insurer-specific median amounts paid for common health care services to encourage patients to comparison shop for care. An initial analysis of health care prices in 2009 showed that HealthCost had almost no impact on prices or price variation across providers.[71] Few patients price shopped for care, and many payers had difficulty using the information effectively in negotiations.[72] Nonetheless, over the next decade, HealthCost proved influential in reducing prices.[73]

Specifically, recent economic analysis by Zach Brown found that HealthCost reduced the price of medical imaging procedures in New Hampshire, saving individuals $7.9 million and insurers $36 million over five years.[74] These savings resulted from both a small number of patients choosing lower-cost providers and also a "significant reduction in negotiated prices" as providers lowered their prices to maintain market share.[75] Perhaps most encouragingly, the price decreases were largest in regions with the most highly concentrated markets (those with a Herfindahl-Hirschman Index above the fourth quartile).[76] Brown's study found that "price transparency put the most downward pressure on prices in markets where price cost margins were likely the highest,"[77] suggesting that even patients who do not price shop can benefit from the increased competition from public databases. During the first year HealthCost listed prices, Brown found almost no effect, but prices dropped significantly after three years or longer. This delayed price response likely results from supply-side effects, such as provider price reduction and changes in health plan design, which take longer to materialize because of annual contracting cycles.

In addition to increasing competition for shoppable services like medical imaging, HealthCost highlighted wide geographic variations in provider prices, especially for hospital outpatient departments.[78] As a result, "the balance of plan-provider negotiating power began shifting significantly . . . [as the database] highlight[ed] wide variation in hospital prices."[79] Analysts credit the state APCD for providing evidence of high-outlier prices at one hospital system in the state. The intense public scrutiny that followed allowed one of the state's largest insurers to demand significantly lower rates with that facility. "As one market observer suggested, 'The sunshine effect [of price transparency] . . . changed the ground rules [of plan-provider contracting]. . . . There's recognition now that contractual negotiations are going to be somewhat in the public eye, in a way they never were in the past.'"[80]

Experts also credit HealthCost with catalyzing the shift to new benefit designs to reward higher-value care, including tiered copayments.[81] In response to the tiered copayments, many hospitals offered laboratory services at facilities with lower pricing structures than the hospitals' outpatient departments and negotiated lower payment rates for some services to qualify at the lowest cost tier. Perhaps most importantly, public price transparency has "helped inject competition into the rural critical-access hospital market. These hospitals have long held geographic monopolies, and until the new benefit designs incentivized consumers to travel to minimize out-of-pocket costs, there had been little reason for the hospitals to compete on price."[82]

The Example of Maine

While experts have most carefully studied the results from New Hampshire's APCD, the state's experience is consistent with results in other states. According to Karynlee Harrington, director of the Maine Health Data Organization (MHDO), Maine has released raw claims data with negotiated rates to numerous stakeholders, including competitors, for more than 10 years.[83] MDHO reports that "[t]o date, there is no evidence that the release of MHDO claims data has resulted in an anticompetitive market. In fact, quite the opposite, . . . transparency is what fosters a competitive market."[84]

Increased Price Competition

Overall, this research suggests that although theoretically providers may be able to use price transparency to leverage competitors' negotiated rates and demand higher reimbursement rates, that concern has not materialized in the health care context. Rather, such transparency-driven price collusion has occurred only in isolated incidents in very different foreign markets. The extensive and detailed research on prices in New Hampshire, however, shows that transparency may be one of the few meaningful ways to increase price competition in these areas. Therefore, California should develop guidelines for public release of insurer- and provider-specific rates, with appropriate limitations, monitoring, and penalties for misuse.

III. Collection and Dissemination Policies of States with Mandatory APCD Programs

State all-payer claims databases (APCDs) vary in data collection and release procedures.[85] Generally, states have combated trade secret and anticompetitive concerns through strict data release procedures that limit the scope of data disclosures. Specifically, states have employed data release agreements and data release committees to analyze and protect confidential information. As explained in Parts I and II of this report, the risk of misappropriation of trade secrets is minimal for states that have clear release policies and, to date, release of data from an APCD has not been shown to increase health care prices. To assist California in designing an APCD that maximizes the procompetitive effects of price transparency, this paper offers recommendations for best practices based on analysis of the current practices of 18 states with mandatory APCD data collection programs.[86]

Financial Information Commonly Collected

State APCDs collect many data elements relating to price and payment (see Table 1, page 16). Many states collect data based on the common data layout (CDL) developed by the APCD Council.[87] Uniformity in state data collection, including use of the CDL, may minimize the administrative burden on data submitters with claims data from multiple states. California should consider adopting similar collection practices as a baseline for uniformity, and then expanding upon the CDL baseline as needed. Many state APCDs collect more financial data elements than they release.[88] Among these data elements, all state APCDs except

Table 1. Financial Data Most Commonly Collected by APCDs

	AR	CO	CT	DE	HI	ME	MD	MA	MN	NH	OR	RI	UT	VT	WA
Paid amount (plan)	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔
Allowed amount	✔		✔		✔		✔	✔		✔	✔				
Capitation / Prepaid amount (fee-for-service equivalent amount)	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔
Charge amount	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Cost sharing (copay, coinsurance, deductible)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Dispensing fee amount	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔
Ingredient cost / List price	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔
Postage amount (for pharmacy)	✔	✔	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔

Notes: This table includes financial information collected by at least three-quarters of state APCDs. The table excludes Florida, Kansas, and New York because those states do not have a data submission manual available online.

for those in Minnesota and Maryland collect and release the following five elements:

1. **Paid amount.** The amount the insurer or health plan paid the provider (in addition, nine states release allowed amount: the maximum amount the insurer would pay for that service)
2. **Charge amount.** The total charges billed for the service
3. **Cost sharing of the consumer.** The amount of copay, coinsurance, and deductible the consumer paid
4. **Dispensing fee amount.** The amount charged for dispensing a prescription
5. **Ingredient cost / list price.** The amount charged for the drug that was dispensed

Public Release of Data

While APCD data collection is relatively uniform, states vary in their data release policies. Most states provide access to APCD data through a price transparency website or online data sets. Publicly available information typically includes aggregated price information by service and zip code. Maine and New Hampshire release the most comprehensive information on public websites, including median payment and estimated total cost, respectively, by procedure, insurance carrier, provider, zip code, and plan type (individual and group). Washington publicly releases the range and average price of a service by zip code.[89] Even Minnesota, despite stating that it will keep all information nonpublic, offers public data sets upon request that include the aggregate amount paid for a specific claim (by the plan and the member) by age group (e.g., under 18 years old), procedure, and zip code.

Such public release of data has significant benefits for health care consumers. The experience of New Hampshire described in Part II of this report demonstrates how a consumer-facing price transparency website can facilitate price reductions. Further, the FTC's response to the Minnesota Government Data Practices Act emphasizes the importance of consumer-facing initiatives that establish procompetitive benefits that surpass the potential for anticompetive harms when creating state health care price transparency tools.[90] Because of the benefits that result from public disclosure, California should consider creating a similar price transparency website that details median prices by payer, provider, service, and zip code, as well as patient out-of-pocket expenses specific to the patient, plan, procedure, and provider.

Restrictions on Data Requests

In addition to the publicly accessible data, all states allow entities to request additional data. Nonetheless, to prevent the potential for anticompetitive use of the data discussed in Part II,[91] states have adopted appropriate safeguards to ensure that when releasing data sets with information not available on a public website, the procompetitive benefits of the release outweigh the anticompetitive concerns.[92] Specifically, to prevent potential anticompetitive use of the data, all states, to varying degrees, limit data release to specific data elements, entities, or purposes.

Limited Disclosure of Data Elements

Many states allow disclosure of most of the financial data elements the states collect (see Table 2). Specifically, Colorado, Utah, Washington, and Vermont allow the release of all financial data elements submitted. Maine allows release of all the financial data elements submitted except for the charge amount — the amount the provider charges the payer for the service — to prevent the calculation of charge/paid ratio. Rhode Island, in contrast, allows the release of all submitted financial data elements as well as calculating, for release, the allowed amount — the maximum amount that a carrier will pay to a provider for a particular procedure or service.

Disclosure for Limited Purposes

Some states, however, restrict data releases to specific purposes. For example, Washington requires data requesters to assert a public benefit justification, which may include the promotion of competition. Delaware allows access to "pricing information and other sensitive financial data elements" for the purposes of improving public health via a data release process.[93] On the other hand, New Hampshire releases data only for the purpose of research.[94]

Disclosure to Limited Parties

Other states limit who can request data from the APCD. For example, in Colorado, only a "state agency or private entity engaged in efforts to improve health care quality, value or public health outcomes for Colorado residents" may request custom data.[95] Washington has a more complex scheme, releasing different levels of data elements to different categories of users: (a) researchers, (b) government agencies, (c) other agencies and entities, and (d) the public.[96] Such a tiering scheme allows the release of "proprietary financial information" only to researchers with institutional review board (IRB) approval, federal agencies, Washington state agencies, and local governments.[97]

Table 2. Data Elements Most Commonly Available for Release by APCDs

	AR	CO	CT	DE	ME	MD	MA	MN	NH	OR	RI	UT	VT	WA
Paid amount (plan)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Allowed amount	✔	✔	✔			✔	✔		✔	✔	✔		✔	
Capitation / Prepaid amount (fee-for-service equivalent amount)	✔	✔	✔	✔	✔		✔		✔	✔	✔	✔	✔	✔
Charge amount	✔	✔	✔	✔		✔	✔		✔	✔	✔	✔	✔	✔
Cost sharing (copay, coinsurance, deductible)	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔
Dispensing fee amount	✔	✔		✔	✔		✔		✔	✔	✔	✔	✔	✔
Ingredient cost / List price	✔	✔		✔	✔		✔		✔	✔	✔	✔	✔	✔
Postage amount (for pharmacy)		✔		✔	✔		✔		✔		✔	✔	✔	✔

Notes: This table excludes Florida, Hawaii, Kansas, and New York, which do not have a data dictionary or data release manual available online. For Minnesota, the "paid amount" field identifies the sum of all plan and member payments for encounters within this record's utilization category.

Conversely, Maine has no prohibitions on who can request the data, but the state requires approval from its data release committee for release of most financial information. Massachusetts views data release to academic researchers as lacking potential anticompetitive effects and presumes that procompetitive benefits of the research outweigh the risk of causing anticompetitive behavior.

While other states allow limited disclosures by statute, statutory requirements may unnecessarily limit disclosures that could be procompetitive and publicly beneficial. To maximize the utility of its APCD, California should allow disclosure of all information upon review by a data release committee, in a process similar to the practices in Maine and Massachusetts. When making disclosure determinations, the review committee should consider the minimum data required to do the study, the purpose of the study, and the entity making the request. Furthermore, the committee should presume that requests from academic researchers and government agencies are procompetitive.

California should also consider adopting a tiered data release policy that improves upon Washington's tiering scheme. Tier 1 would comprise data releases to the public, including price reports and other consumer- or policy-relevant findings, on a publicly available website. Tier 2 would include data releases to government or academic researchers. While these data releases should be reviewed, they should be presumed to be procompetitive. Tier 3 would include data releases to private entities or industry participants. These requests would require review by a data release committee (described later, in "Data Release Committees and Data Use Agreements to Prevent Inappropriate Disclosures" on page 18) that considers the competitive effects of the requested data release.

Restrictions on Disclosure of Trade Secrets

In addition to imposing restrictions based on anticompetitive concerns, some states have limited the disclosure of information that submitters have labeled as trade secrets. For example, Florida allows data submitters to clearly designate information as a trade secret and then prohibits disclosure of that information.[98] Oregon specifically prohibits disclosure of trade secrets[99] and specifies in its Data User Guide that "allowed amount" is "considered" a trade secret and "never or nearly never available for its request."[100] Oregon will disclose an "allowed amount" data element only after Department of Justice review.[101] Delaware provides that "trade secrets and commercial or financial information . . . [are] of a privileged or confidential nature" and are not public records.[102] As a result, data submitted to Delaware's APCD is not subject to public records requests but can be requested through the state's data release process.

Although some states allow designation of submitted information as trade secrets, this designation unnecessarily hampers transparency efforts. As demonstrated in Part I, states have the authority to release trade secrets with proper notification as long as the disclosure is in the public interest. As a result, California should not agree to keep confidential any information designated as a trade secret by a data submitter. Instead, Delaware's model, which allows disclosure of data through the data release committee but not through the state public records act, strikes a potential compromise. Rather than allowing complete access to the data by any party filing a public records act request, Delaware ensures that any data releases from the state ACPD go through data release review. The state can thus ensure that appropriate protections for sensitive data are followed while allowing disclosure of information for academic and government research and procompetitive purposes.

California should consider similar provisions exempting APCD from the California Public Records Act, but the state should emphasize that the data release committee may disclose any data after proper review. California should empower its data release committee to disclose data when the committee determines that the procompetitive effects of doing so and the public interest outweigh any anticompetitive harms that might result.

Data Release Committees and Data Use Agreements to Prevent Inappropriate Disclosures

Nearly every state requires the APCD director or a data review committee to approve data release requests for data not available on a publicly accessible website.[103] After data release approval, all states require the parties to enter into a data use agreement to ensure adequate protections for sensitive financial information and proper use of the data.

Data Release Committees

Data release committees are tasked with reviewing requests for APCD data that are not publicly available. Typically, statutes or regulations determine representation on the data release committee, and committee members are appointed by state officials. In Colorado, for example, the data release review committee must include a "representative of a physician organization, hospital organization, non-physician provider organization and a payer organization on the data release review committee."[104] Similarly, the executive director of the Massachusetts APCD names the data release committee but must include, at a minimum, "representatives from health care plans, health care providers, health care provider organizations and consumers." In New Hampshire, the APCD commissioner may also determine members of the committee but must include one representative from each of the following stakeholder categories: insurance carriers, health care facilities, health care practitioners, the general public, purchasers of health insurance, and health care researchers.[105]

In California, although industry membership on the data release committee will be important, data releases should benefit all stakeholders, including patients, employers, government entities, and the public. Therefore, at least half of the committee's voting membership should be nonsubmitting entities. Determining appropriate data release practices will require input from a range of experts who understand health care markets, trade secret and privacy protocols, and consumer behavior and interests, in addition to industry experts.

Data Use Agreements

Data use agreements (DUAs) serve to protect financial information and ensure proper use of data and are employed by all state APCDs (see Table 3). All existing state DUAs prohibit disclosure of data without the express permission of the APCD. Additionally, nearly all DUAs prohibit entities from reverse engineering APCD data to identify patients and from using the data in ways other than the proposed usage. DUAs in Washington, Vermont, and Utah further prevent the data user from reverse engineering provider reimbursements or specific contract terms. To prevent disclosure of identifying information, most DUAs explicitly require requesting entities to have a cell suppression policy.[106]

Importantly, all DUAs require a data management plan or some form of administrative, physical, or technical safeguards to protect the data from unintended or unauthorized use or disclosure, although those technical standards vary substantially.[107] For example, several APCDs prohibit use of unsecured telecommunication or internet services. New Hampshire requires appropriate password complexity to protect data sets. Maine and Florida set minimum standards for encryption in their DUAs.[108] Maine's DUA also specifies that the APCD data will "not be accessed, tested, maintained, backed-up, transmitted, or stored outside of the United States." In addition, DUAs typically require certification of data destruction after project completion.

Finally, most states include indemnification clauses and penalties to protect the state against misuse of the APCD data. DUAs often include an indemnification clause to hold state APCDs harmless from the actions of data users. In particular, Colorado and Washington include an indemnification clause for antitrust liability. These states' DUAs explicitly hold the state APCD harmless if the data are used for any anticompetitive conduct, such as price-fixing. States have also designated penalties for violation of their DUAs. Some states simply use boilerplate language to subject data users to civil or criminal charges, penalties, and fines under applicable state and federal law.

Alternatively, Washington, New Hampshire, and Rhode Island have the power to immediately recall the data following a DUA violation. In Massachusetts and Delaware, a violation prohibits the data user from making future requests for data from the APCD. In addition, Maine may seek a court injunction to force compliance with the DUA and to prohibit use of the data by any researcher at the same institution for up to five years. Furthermore, most DUAs require, at a minimum, prior notice or approval before the publication of any findings. Utah and Maine, for example, require prior notification of publication in any academic journal 30 days or 20 days, respectively, before submission.

California should follow the example of other states and ensure proper use of the data by means of a DUA. California's DUA should ensure adequate protections for the data, including mandated data destruction, data management plans, and penalties for misuse of the data and inadvertent data releases. Data misuse, including use for anticompetitive purposes, should result in civil or potentially criminal charges, penalties, fines, and a ban from making future APCD data requests for five to 10 years, depending on the circumstances. California should also include an indemnification clause to protect the state from any recriminations from the misuse, misappropriation, or inappropriate release of the data. Finally, California should require data users to submit notification of any publication resulting from the data and require approval by the data release committee if the publication contains nonanonymized or unaggregated data.

In summary, states are relatively uniform in the type of data they collect and in making at least some of the data publicly available. States vary substantially, however, in what data are publicly accessible and what entities can access data through a data request.

Table 3. Common Elements in Data Use Agreements Among Active APCDs

	CO	DE	FL	ME	MA	NH	RI	UT	VT	WA
APCD retains ownership		✔	✔	✔	✔		✔	✔	✔	✔
Certificate of data destruction	✔	✔		✔	✔	✔	✔	✔	✔	✔
Data management plan / Requirement of safeguards	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Data only to be used as described in application	✔	✔	✔	✔	✔	✔		✔	✔	✔
Indemnification	✔	✔	✔	✔	✔	✔	✔	✔		✔
Prohibition of disclosure (of reports *or* data) without prior notice	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Prohibition on identification of patients (including reverse engineering)	✔	✔	✔	✔	✔	✔	✔		✔	✔

Notes: The following states are excluded from this table for the reasons stated: Minnesota does not have a DUA. Arkansas, Oregon, Maryland, and Connecticut do not have DUAs available online. New York and Hawaii are still implementing their APCDs and do not have DUAs set up.

IV. Recommendations

This part of the report offers specific recommendations for policymakers to help them navigate trade secret protections and antitrust concerns regarding the disclosure of negotiated rates between providers and payers and other sensitive information. More generalized recommendations regarding the contours of a data release committee, data use agreements (DUAs), and guidelines for data release are offered in Part II of this report.

1. **OSHPD should provide all data submitters with clear information and policies regarding data release prior to data collection.** Data collected from other state agencies may be subject to confidentiality agreements and require amendments to the Knox-Keene Act and California Public Records Act.

2. **OSHPD should create a data release committee and declare that all information submitted to the APCD will be released in accordance with data release guidelines at the discretion of the data release committee.** To avoid any claim of trade secret misappropriation, OSHPD should inform data submitters that decisions regarding confidentiality and data release will be made by the data release committee to avoid the expectation that labeling data as confidential will prevent disclosure of that data.

3. **The data release committee should establish guidelines for data release that weigh competitive effects and public interest.** Specifically, the committee should release data only when the procompetitive effect of the data release or the public interest outweighs the anticompetitive effect.

4. **The data release committee should implement a tiered data release policy, which would base oversight and access to data on the data requested and the nature of the requester.** The committee should review requests for data containing negotiated payment amounts on the basis of the nature of the entity making the request, the justification for the request, the proposed usage of the data, the nature of the information requested, the requesting entity's technical and physical safeguards for maintaining the security of the data files, and whether the entity has misused data or violated prior data use agreements. For example, a tiered data release policy could include these provisions:

- ***Tier 1:*** *Data release to the public.* OSHPD releases price reports and other consumer- or policy-relevant findings on a publicly available website. Some aggregated and/or anonymized data should also be available to the public.[109]

- ***Tier 2:*** *Data release to academic or governmental entities.* The committee should presume data requests from academic or governmental agencies to be procompetitive. These requests should be limited to the minimum data sets necessary to conduct the proposed research and subject to a data use agreement (DUA) that would allow only anonymized or aggregated data to be included in published study results without committee approval.

- ***Tier 3:*** *Data release to private entities or industry participants.* Industry participants and other private entities may request additional data from the APCD. The committee should consider comments from other industry participants and competitors before releasing data. Released data should be the minimum amount needed based on the reason for the request, and the requester should be required to demonstrate why the aggregated and anonymized data are insufficient for the requester's intended use.

To streamline data review, the committee could consider allowing the committee chair to review Tier 2 requests or Tier 3 requests that do not include negotiated rates. The committee chair could then approve these requests or pass them on to the committee for further review.

5. **The data release committee should establish a data use agreement that provides requirements for accessing data.** The DUA should require that the data be used only for the approved use, that the recipient keep all nonpublic data confidential unless nonconfidentiality is approved by the committee, and that the recipient of the data implement appropriate privacy and encryption protections. The DUA should establish civil monetary penalties for using the data in illegal ways, including misappropriation, intentional and unauthorized data release, and price-fixing or collusion, and should exclude offending individuals, institutions, and companies from accessing APCD data for up to 10 years or more. The DUA should include procedural guidance for inadvertent data release and require data recipients to indemnify the state of California and OSHPD for any misuse or misappropriation of released APCD data.

6. **OSHPD or its designee should monitor annual claims data for anticompetitive behavior.** OSHPD should look for evidence of tacit collusion or price shadowing, especially in highly concentrated markets, and should remove data from public display if anticompetitive effects are found.

Endnotes

1. Zach Y. Brown, "Equilibrium Effects of Health Care Price Information," *Review of Economics and Statistics* (forthcoming), published ahead of print, doi:10.1162/rest_a_00765.
2. The research presented in this report demonstrates that the committee would have the authority to release provider- and plan-specific prices on a public website; still, the committee should consider competitive effects when deciding to release negotiated rate data on the public website, especially in highly concentrated markets.
3. Cal. Health and Safety Code §§ 127671(a), (c).
4. Brown, "Equilibrium."
5. Deepa Varadarajan, "Trade Secret Fair Use," *Fordham Law Review* 83, no. 3 (2014), ir.lawnet.fordham.edu.
6. See Annemarie Bridy, "Trade Secret Prices and High-Tech Devices: How Medical Device Manufacturers Are Seeking to Sustain Profits by Propertizing Prices," *Texas Intellectual Property Law Journal* 17 (2009): 188, ssrn.com.
7. See Peabody v. Norfolk, 98 Mass. 452, 458 (1868) (acknowledging that a trade secret is property even without a patent).
8. "Trade Secrets Act," Uniform Law Commission, www.uniformlaws.org.
9. Uniform Trade Secrets Act § 1(4)(i–ii) (Unif. Law Comm'n 1985).
10. For a 50-state comparison, see Russell Beck, *Trade Secrets Acts Compared to the UTSA*, Beck, Reed, and Ridden, August 8, 2018, www.faircompetitionlaw.com (PDF).
11. Beck, *Trade Secrets Act*.
12. Uniform Trade Secrets Act § 1(1) (Unif. Law Comm'n 1985).
13. Uniform Trade Secrets Act § 1(2)(i–ii).
14. Cal. Civ. Code § 3426.1(d).
15. Snelling Servs., LLC v. Diamond Staffing Servs., Inc., No. A135049, 2013 WL 3947175, at *10 (Cal. Ct. App. July 30, 2013) (holding that customer lists can be protected as trade secrets even if it is possible to re-create them); and Bancroft-Whitney Co. v. Glen, 64 Cal. 2d 327, 352 (1966) (stating "[i]t requires little talent to distinguish between a situation in which an individual voluntarily discloses his own salary to another and one in which the unpublished salary list of a group of prospective employees is revealed to a competitor for the purpose of facilitating the recruitment of the corporation's personnel").
16. Cal. Civ. Code § 3246.1(a).
17. Defend Trade Secrets Act of 2016, Pub. L. No. 114–153, 130 Stat. 376 (to be codified at 18 U.S.C. § 1836, et seq.).
18. 18 U.S.C.A. § 1839(3).
19. 18 U.S.C.A. § 1833(b) provides protection for "whistleblowers." As long as the disclosures are filed under seal, this section protects individuals who disclose trade secrets to government officials, the individuals' attorneys, or both as part of a complaint or lawsuit alleging violation of a law or defensively when an employer claims that the individual has disclosed a trade secret. This section has been called a "public-interest exemption" to trade secret law, but this exemption is distinct from the public-interest exemptions discussed in this report.
20. Cal. Civ. Code § 3426 (2019).
21. Trade secret cases can be heard in "the state of the plaintiff's place of business or incorporation; the state of an individual defendant's domicile; the state of a defendant corporation's place of incorporation or principal place of business; any state where the defendant's 'affiliations with the State are so "continuous and systematic" as to render them essentially at home in the forum state;' the state where the alleged misappropriation occurred (location where the conduct causing the injury occurred); the state where the trade secrets were allegedly transported to (place where the injury occurred); or the state where harm was felt, if the defendant directed activity toward that forum." See Brittany S. Bruns, "Criticism of the Defend Trade Secrets Act of 2016: Failure to Preempt," *Berkeley Technology Law Journal* 32, no. 9 (2018): 469, scholarship.law.berkeley.edu.
22. Children's Hosp. Cent. California v. Blue Cross of California, 226 Cal. App. 4th 1260, 1277 (2014).
23. *Children's Hosp. Cent. California*, 226 Cal. App. 4th.
24. Com., Dept. of Pub. Welfare v. Eiseman, 633 Pa. 366, 387 (2015) (citing 12 Pa. Cons. Stat. § 5302).
25. *Com., Dept. of Pub. Welfare*, 633 Pa. 366, 387.
26. Wilmington Star-News, Inc. v. New Hanover Regional Medical Center, Inc., 125 N.C. App. 174 (1997).
27. *Wilmington Star-News, Inc.*, 125 N.C. App. at 180.
28. These factors include (1) the extent to which the information is known outside of the business; (2) the extent to which it is known by employees and others involved in the business; (3) the extent of measures taken to guard the secrecy of the information; (4) the value of the information to the business and to its competitors; (5) the amount of effort or money expended to develop the information; and (6) the ease or difficulty with which the information could be properly acquired or duplicated by others. Restatement (Second) of Torts § 757 (Am. Law Inst. 1979).
29. *Wilmington Star-News, Inc.*, 125 N.C. App. at 182.
30. See *Wilmington Star-News, Inc.*, 125 N.C. App. at 182 (referring to N.C. Gen. Stat. Ann. § 66–152 (2,3) 132-1.2 and arguing on the grounds that the information did not belong to a "private person," and records of public hospitals are subject to the state Public Records Act).

31. Unif. Trade Secrets Act § 1(2)(ii) (Unif. Law Comm'n 1985).

32. Emergency Care Research Inst. v. Guidant Corp., No. CIV.A. 06-1898, 2007 WL 2702455 (E.D. Pa. Sept. 12, 2007).

33. Emergency Care Research Inst. at 4 (stating that a "genuine issue of material fact also exists as to how many of Guidant's contracts contain confidentiality agreements" and denying a motion for summary judgment).

34. See e.g., Convolve, Inc. v. Compaq Computer Corp., 527 F. App'x 910, 925 (Fed. Cir. 2013); Rogers v. Desa Int'l, Inc., 183 F. Supp. 2d 955, 957 (E.D. Mich. 2002); and Flotec, Inc. v. S. Research, Inc., 16 F. Supp. 2d 992 (S.D. Ind. 1998).

35. Cal. Health & Safety Code § 1385.07.

36. Cal. Gov't Code § 6254(q)(2–3).

37. Lyft, Inc. v. City of Seattle, 190 Wash. 2d 769, 780 (2018).

38. Some states, including Iowa, Nebraska, and Florida, have public interest exemptions that balance the potential benefit and harm to the public of trade secret disclosure under the state public records acts. Specifically, Nebraska's Public Records Act allows trade secrets and other confidential information to be withheld from public records disclosure only if the release of that information "would give advantage to business competitors and serve no public purpose." Neb. Rev. Stat. Ann. § 84-712.05.

39. Cal. Gov't Code § 6255.

40. O'Grady v. Superior Court, 139 Cal. App. 4th 1423 (Cal. Ct. App. 2006).

41. *O'Grady* at 1475–76.

42. See D. Andrew Austin and Jane G. Gravelle, Cong. Research Serv., RL34101, *Does Price Transparency Improve Market Efficiency? Implications of Empirical Evidence in Other Markets for the Health Sector*, 2007; Jihui Chen, "Differences in Average Prices on the Internet: Evidence from the Online Market for Air Travel," *Economic Inquiry* 44, no. 4 (Oct. 2006): 656, doi:10.1093/ei/cbj040; Deborah Haas-Wilson, "The Effect of Commercial Practice Restrictions: The Case of Optometry," *Journal of Law & Economics* 29, no. 1 (Apr. 1986): 165, doi:10.1086/467114; Ho Geun Lee, "Do Electronic Marketplaces Lower the Price of Goods?," *Communications of the ACM* 41, no. 1 (Jan. 1998): 73, doi:10.1145/268092.268122; Alex R. Maurizi, "The Effect of Laws Against Price Advertising: The Case of Retail Gasoline," *Economic Inquiry* 10, no. 3 (Sept. 1972): 321, doi:10.1111/j.1465-7295.1972.tb01607.x; Jeffrey Milyo and Joel Waldfogel, "The Effect of Price Advertising on Prices: Evidence in the Wake of 44 Liquormart," *Amer. Economic Review* 89, no. 5 (Dec. 1999): 1081, doi:10.1257/aer.89.5.1081; Florian Zettelmeyer, Fiona Scott Morton, and Jorge Silva-Risso, "Cowboys or Cowards: Why Are Internet Car Prices Lower?" (Working Paper No. 8667, Nat'l Bureau of Economic Research, 2001), doi:10.3386/w8667; and Florian Zettelmeyer, Fiona Scott Morton, and Jorge Silva-Risso, "How the Internet Lowers Prices: Evidence from Matched Survey and Automobile Transaction Data," *Journal of Marketing Research* 43, no. 2 (May 1, 2006): 168, doi:10.1509/jmkr.43.2.168.

43. See Brent D. Fulton, "Health Care Market Concentration Trends in the United States: Evidence and Policy Responses," *Health Affairs* 36, no. 9 (2017): 1531, doi:10.1377/hlthaff.2017.0556.

44. See Anna D. Sinaiko and Meredith B. Rosenthal, "Increased Price Transparency in Health Care — Challenges and Potential Effects," *New England Journal of Medicine* 364 (Mar. 10, 2011): 892, doi:10.1056/NEJMp1100041.

45. Specifically, the lower-cost provider has a financial incentive to remain cheaper than the dominant provider, to ensure that insurers will want to drive patients to the lower-cost provider's facility, but this provider has little incentive to offer significant discounts over its higher-cost peer.

46. David Cutler and Leemore Dafny, "Designing Transparency Systems for Medical Care Prices," *New England Journal of Medicine* 364 (Mar. 10, 2011): 894, doi:10.1056/NEJMp1100540.

47. Cutler and Dafny, "Designing," 894.

48. Sinaiko and Rosenthal, "Increased Price Transparency," 893.

49. Svend Albæk, Peter Møllgaard, and Per B. Overgaard, "Government-Assisted Oligopoly Coordination? A Concrete Case," *Journal of Industrial Economics* 45, no. 4 (1997): 429, econpapers.repec.org.

50. David P. Byrne and Nicolas de Roos, "Learning to Coordinate: A Study in Retail Gasoline," *Amer. Economic Review* 109, no. 2 (Feb. 2019): 591, doi:10.1257/aer.20170116.

51. Byrne and de Roos, "Learning," 591.

52. Deanna White, *Payments, Antitrust, Secrecy, and Transparency*, Maine Health Data Organization, June 2016, 3.

53. See also Marina Lao (director, Office of Policy Planning, Fed. Trade Commission) et al. to Minnesota Representatives Joe Hoppe and Melissa Hortman, June 29, 2015 (hereinafter "FTC Minnesota Letter"), www.ftc.gov (PDF) (citing other examples such as railroad grain, automaker marketing, long distance telephone, and inland water transportation).

54. US Dept. of Justice (DOJ) and Federal Trade Commission (FTC), *Statements of Antitrust Enforcement Policy in Health Care*, August 1996, 49–52.

55. DOJ and FTC, *Statements*, 49.

56. DOJ and FTC.

57. DOJ and FTC.

58. DOJ and FTC, 50.

59. DOJ and FTC, 50–51.

60. DOJ and FTC, 51.

61. DOJ and FTC (emphasis added).

62. DOJ and FTC.

63. Minn. Stat. § 13.387.

64. FTC Minnesota Letter, *supra* note 53.

65. Christine A. Varney (Asst. Attorney General, Antitrust Div., US Dept. of Justice) to Mit Spears, Esq., Ropes & Gray LLP, April 26, 2010, www.justice.gov.

66. *Antitrust Legality of Reports and Analytic Data Sets Generated Based on All Payer Claims Data*, Center for Improving Value in Health Care, 2014, www.apcdcouncil.org (PDF).

67. *Antitrust Legality*, 2.

68. *Antitrust Legality*.

69. *Antitrust Legality*, 3.

70. Under the state-action immunity doctrine of Parker v. Brown, state authorities are immune from federal antitrust lawsuits for actions pursuant to a clearly expressed state policy, even when anticompetitive effects were foreseeable. This immunity can extend to state-sanctioned behavior by private entities if (1) the state clearly articulates a state policy to displace competition and (2) the state actively supervises the anticompetitive conduct.

71. Ha T. Tu and Johanna R. Lauer, *Impact of Health Care Price Transparency on Price Variation: The New Hampshire Experience*, Issue Brief 128, Center for Studying Health System Change, November 2009, www.apcdcouncil.org.

72. Tu and Lauer, *Impact*.

73. See Ha T. Tu and Rebecca Gourevitch, *Moving Markets: Lessons from New Hampshire's Health Care Price Transparency Experiment*, California Health Care Foundation, 2014, www.chcf.org; and Brown, "Equilibrium," *supra* note 4.

74. Brown, *supra* note 4.

75. Brown, 25.

76. Brown.

77. Brown, 26.

78. See Tu and Gourevitch, *Moving Markets*; Tu and Lauer, *Impact*.

79. See Tu and Gourevitch.

80. Tu and Gourevitch, 4.

81. Tu and Gourevitch, 5.

82. Tu and Gourevitch, 8.

83. Karynlee Harrington (executive director, Maine Health Data Organization) to Katarina M. Horyn (associate general counsel, UnitedHealthcare Insurance Co.), December 27, 2018, mhdo.maine.gov (PDF) (responding to letter dated Nov. 12, 2018, regarding Harvard Pilgrim Health Care's MHDO data Request Number 2018082201).

84. Harrington to Horyn.

85. Not all state APCDs are of equal quality. Among the states that have implemented APCDs, only Colorado, Maine, and New Hampshire received a grade higher than F on the Catalyst for Payment Reform's Annual Report Card on State Price Transparency Laws for the most recent three years available (2014–2017). This report card rewards states with APCDs that collect meaningful price information, so these three states should serve as possible models for California to emulate.

86. These 18 states are Arkansas, Colorado, Connecticut, Delaware, Florida, Hawaii, Kansas, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New York, Oregon, Rhode Island, Utah, Vermont, and Washington. The survey includes incomplete information from Kansas, which has out-of-date information, as well as from Hawaii, Delaware, Florida, and New York, which are still implementing their mandatory APCDs. In addition, the survey excludes information from APCDs in Tennessee, West Virginia, and Virginia, which either rely on voluntary submission (Virginia) or have stopped accepting data (Tennessee, West Virginia).

87. *Achieving States' Goals for All-Payer Claims Databases*, Anthem Public Policy Institute (June 2018), www.antheminc.com (PDF); and "Common Data Layout," APCD Council, www.apcdcouncil.org.

88. This comparison was done by reviewing each APCD's data submission manual and the data dictionary that contained all elements available for receipt. This review could not be made for Kansas (out-of-date information). This review could not be made for Florida, Hawaii, or New York because of the lack of a data dictionary or a data submission manual.

89. Maine recently began decoupling data from insurer. Instead of identifying each insurer, the APCD identifies only the insurer type (e.g., commercial payer). This transition is ongoing and is not fully reflected on Maine's consumer-facing price transparency website.

90. See *supra* notes 61–62 and accompanying text.

91. See *supra* notes 52–59 and accompanying text.

92. See CIVHC, *supra* note 63 ("Those reports or analytic data sets that do not satisfy the third condition would generally be lawful and are highly unlikely to be challenged by the Agencies because they will have little or no anticompetitive effect and may have substantial procompetitive benefits. . . . Many of these reports have the additional benefit of furthering public policy goals of greater price transparency and may, in turn, help to lower costs and actually be viewed as procompetitive under the antitrust laws"); Harrington, *supra* note 80 and accompanying text (affirming that release of MHDO claims data did not result in anticompetitive behavior).

93. See Del. Admin. Code 1-104(3.5.4). Here, Delaware defines pricing information to mean "any information referring to prices charged or paid, and includes the pre-adjudicated price charged by a Provider to a Reporting Entity for Health Care Services, the amount paid by a Member or insured party, including copays and deductibles, and the post-adjudicated price paid by a Reporting Entity to a Provider for Health Care Services."
94. N.H. Code Admin. R. He-W 950.05(a).
95. 10 Colo. Code Regs. § 2505-5:1.200.5.A.
96. See Wash. Rev. Code § 43.371.050; and "Who Is Eligible to Request WA-APCD Data?," Washington HealthCareCompare, accessed May 9, 2019, www.wahealthcarecompare.com.
97. Wash. Rev. Code § 43.371.050(4)(a); and Wash. Admin. Code § 82-75-510. Here, "proprietary financial information" is defined as "claims data or reports that disclose or would allow the determination of specific terms of contracts, discounts, or fixed reimbursement arrangements or other specific reimbursement arrangements between an individual health care facility or health care provider, as those terms are defined in RCW 48.43.005, and a specific payer, or internal fee schedule or other internal pricing mechanism of integrated delivery systems owned by a carrier." Wash. Rev. Code § 43.371.010(12).
98. Fla. Stat. § 408.061; Fla. Stat. Ann. § 364.183.
99. Or. Rev. Stat. § 442.466(8)(d).
100. *Oregon All Payer All Claims Database (APAC), Data User Guide — 2011–2016 Dates of Service, Release APAC 2018.2*, Oregon Health Authority, November 27, 2018, www.oregon.gov (PDF).
101. *Oregon Data User Guide*, 53.
102. Del. Admin. Code 1-103(5.1).
103. Because Minnesota does not permit use of data by third parties unaffiliated with the Minnesota Department of Health, Minnesota does not have a governance structure for data release or a data use agreement.
104. 10 Colo. Code Regs. § 2505-5:1.200.5.B.
105. N.H. Code Admin. R. He-W 950.06(c).
106. A typical cell suppression policy prohibits the data recipient from publishing any findings derived from output from cell sizes (e.g., admittances, discharges, patients, services) of 11 or fewer. This requirement ensures cells with fewer than 11 observations cannot be identified by manipulating data in the report.
107. For a review of these data security standards, see Andrew Kelley and Jaime S. King, *All-Payer Claims Databases: The Balance Between Big Healthcare Data Utility and Individual Health Privacy*, The Source on Healthcare Price and Competition, October 2017, www.sourceonhealthcare.org (PDF).
108. Entities using the data in Maine must implement block-level encryption with the strength of "a certified algorithm which is 256 bit or higher." Florida requires encryption to be "consistent with Federal Information Processing Standards (FIPS), and/or the National Institute of Standards and Technology (NIST) publications regarding cryptographic standards."
109. The research presented in this report demonstrates that the committee would have the authority to release provider- and plan-specific prices on a public website; still, the committee should consider competitive effects when deciding to release negotiated rate data on the public website, especially in highly concentrated markets.

Examination of Health Care Cost Trends and Cost Drivers

Pursuant to G.L. c. 12C, § 17

Report for Annual Public Hearing Under G.L. c. 6D, § 8

OFFICE OF THE ATTORNEY GENERAL
COMMONWEALTH OF MASSACHUSETTS

OCTOBER 11, 2018

Table of Contents

Executive Summary

This is the Office of the Attorney General's ("AGO") 2018 report of its examination[1] of health care cost trends conducted pursuant to Section 17 of Chapter 12C of the Massachusetts General Laws.

Prior AGO cost trends reports have documented inefficiencies in the distribution of health care dollars. Two of those key findings have been that there is (1) significant price variation among hospitals and physicians that is unrelated to quality[2] and (2) significantly higher per capita spending on commercially insured people in more affluent communities as compared to less affluent ones despite the higher sickness burden found in less affluent communities.[3] In this report, we examine the different ways commercial insurance companies pay health care providers for services and assess how these differences contribute to market inefficiencies.

While total health care expenditures in Massachusetts grew only 1.6% in 2017—substantially below the state cost growth benchmark of 3.6%—consumers' exposure to health care costs rose at a much higher rate.[4] On average, fully-insured commercial premiums increased 4.9% in 2017 to $483 per month, with premiums for small employer groups increasing even more (6.9%).[5] Enrollment in high deductible plans is also increasing in Massachusetts (from 20.9% in 2015 up to 28.2% in 2017),[6] exposing consumers to high out-of-pocket costs and increasing their need to shop effectively for high value health care services. Consumers and employers rely on state health care reform initiatives like alternative payment methods and price transparency to curb health care cost increases and to help manage their increased financial exposure. This report examines the underlying complexity and variation in health care payment arrangements and considers how they may increase administrative costs and impair the ability of consumers, employers, and referring providers to shop for the most cost-effective care.

Payments between payers and providers are based on complex contracts that detail how all health care services will be reimbursed. Commercial insurers negotiate these multi-year contracts with providers to establish a mutual understanding of how and how much providers will be paid for delivering health care services to their members. As we describe in detail below, these contracts use a wide range of methods for calculating the ultimate payment rates for a vast array of services. This variability and complexity in how health care services are reimbursed add significant costs to the health care market and make price comparisons more difficult for market participants.

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1 This report relies on information obtained through civil investigative demands issued to Massachusetts health insurers pursuant to Mass. Gen. Laws c. 12C, § 17. We reviewed detailed information on health care contracting, prices, utilization, claims, and spending and consulted with health care experts, market participants, consumer advocates, and other key stakeholders. To assist in its review, the AGO engaged experts with extensive experience in actuarial sciences and financial analysis, clinical quality evaluation and population health management, and insurer-provider contracting.

2 OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (Mar. 16, 2010), *available at* https://www.mass.gov/files/documents/2016/08/vn/2010-hcctd-full.pdf; OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (June 22, 2011) [HEREINAFTER AGO 2011 REPORT], *available at* https://www.mass.gov/files/documents/2016/08/uy/2011-hcctd-full.pdf; OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (Apr. 24, 2013) [HEREINAFTER AGO 2013 REPORT], *available at* https://www.mass.gov/files/documents/2016/08/xc/2013-hcctd.pdf; OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (Sep. 18, 2015), *available at* https://www.mass.gov/files/documents/2018/05/04/cost-containment-5-report.pdf.

3 AGO 2011 REPORT, *supra* note 2; OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (Oct. 13, 2016), *available at* https://www.mass.gov/files/documents/2016/10/ts/cc-market-101316.pdf.

4 CTR. FOR HEALTH INFO. & ANALYSIS, PERFORMANCE OF THE MASS. HEALTH CARE SYSTEM ANNUAL REPORT SEPTEMBER 2018 at 7 (Sept. 2018) [HEREINAFTER 2018 CHIA ANNUAL REPORT], *available at* http://www.chiamass.gov/assets/2018-annual-report/2018-Annual-Report.pdf.

5 *Id.* at 8.

6 *Id.* at 65.

This report is organized into three sections. Section 1 documents the variation and complexity in health care payment practices associated with hospital outpatient services (Section 1.A), hospital inpatient services (Section 1.B), and risk contracts (Section 1.C). To illustrate this variation and complexity, the report includes examples related to payment for hospital observation services (Section 1.A.ii) and obstetrics services (Section 1.B.ii). Section 2 reports on the implications of this complexity, highlighting the increased administrative costs (Section 2.A.) and the impact on price transparency (Section 2.B). Finally, Section 3 summarizes our recommendations.

Our principal findings are as follows:

1. Commercial health care fee-for-service payments are determined using complex and varied methods with little consistency across payers, providers, or insurance products.
   a. Hospital outpatient payment methods are particularly complex and varied, with the largest payers using different approaches to fee schedules and other forms of payment.
   b. Hospital inpatient payment methods are somewhat more consistent across the largest payers as the market has moved towards adopting DRG-based payment methods,[7] but significant variation remains across smaller payers.
2. Risk contracts are also complex and vary from payer to payer, adding another layer of complexity on top of the fee-for-service framework that underlies alternative payment methods.
3. The complex and varied payment system generates additional administrative costs that do not appear to add value to patient care, patient experience, or patient or provider engagement. It also serves as an obstacle to price transparency for consumers, employers, policymakers and providers.

Based on these findings, we make the following principal recommendations to policymakers, payers, providers, and consumer advocates:

1. Study further the administrative costs associated with the current complex and varied approaches to payment with the goal of identifying waste and achieving savings.
2. Reduce complexity and explore increased standardization where appropriate in the methods for determining health care payment rates.
3. Establish real-time, service-level price transparency for employers, consumers, policymakers, and providers.

The Office of the Attorney General looks forward to continued collaboration with the Legislature, other agencies, health care market participants, and all stakeholders in promoting the affordability and accessibility of health care for all Massachusetts residents.

7 A diagnosis related group or "DRG" is a methodology used to determine payment rates for hospital admissions. *See infra* at page 7.

I. There Are Complex and Varied Methods for Determining Commercial Health Care Payment Rates.

As part of our examination, we reviewed commercial payer contracts for the hospitals affiliated with the largest Massachusetts hospital systems.[8] As detailed below, our examination found variation in commercial payment practices across payers, insurance products, and providers for hospital outpatient services, hospital inpatient services, and risk contracts.

a. Hospital Outpatient Payment Methods Are Particularly Complex and Varied.

Hospital outpatient services account for 63% of Massachusetts hospital commercial revenue on average across all payers.[9] Hospital outpatient services account for an even higher percentage of commercial revenue for Massachusetts community hospitals. From the largest Massachusetts commercial payer, on average 74% of community hospital commercial revenue is for outpatient services, with specific hospitals ranging from 49% to 98% outpatient revenue.[10] Hospital outpatient spending is one of the service categories with the highest recent growth in total health care expenditures (4.8% growth in hospital outpatient spending as compared to growth in overall total health care expenditures of 1.6% in 2017).[11] Due to its increasing volume and significance as a health care cost driver, hospital outpatient spending should be a priority area for cost containment and transparency efforts.

i. Hospital Outpatient Fee Schedules Vary in Structure Across Payers.

The three largest commercial payers in Massachusetts typically use fee schedules as the basis for negotiating and establishing contractually agreed upon payment rates for hospital outpatient services. A fee schedule is a detailed listing of hospital outpatient services and the corresponding "list" prices payers have established. While the list of services and the codes used are generally the same across payers, the underlying base fees each commercial insurer establishes are unique to each insurer. Each provider then typically negotiates "multipliers" that are used to inflate those base fees for groups of services. For example, the parties may negotiate a multiplier of 1.2 for a certain set of hospital outpatient services, which means that the provider would receive 120% of the prices reflected in the payer's fee schedule for the specified range of services.

8 This examination included data from payers pertaining to their contracts with Beth Israel Deaconess Care Organization, Lahey Health System, Partners HealthCare System, Steward Health Care System, UMass Memorial Health Care, and Wellforce. Our examination did not address reimbursement for behavioral health services or pharmaceuticals, as the AGO has previously documented the complex reimbursement arrangements governing these areas. *See* OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (June 30, 2015), *available at* https://www.mass.gov/files/documents/2016/08/qz/hc-ct-cd-06-2015.pdf; OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (Oct. 7, 2016), *available at* https://www.mass.gov/files/documents/2016/10/wk/cc-pharma-100716.pdf.

9 Based on a simple unweighted average of payer inpatient/outpatient commercial revenue reported by the Center for Health Information and Analysis. CTR. FOR HEALTH INFO. & ANALYSIS, RELATIVE PRICE PROVIDER PRICE VARIATION IN THE MASS. COMMERCIAL MARKET DATABOOK (Apr. 2018), *available at* http://www.chiamass.gov/assets/docs/r/pubs/18/Relative-Price-Databook-2018.xlsx.

10 *Id.*

11 2018 CHIA ANNUAL REPORT, *supra* note 4, at 18.

A different multiplier (e.g. 1.4 or 140% of the base fee schedule) could be negotiated for a different set of services.

In our examination of how Massachusetts payers pay for hospital outpatient services, we found significant differences in the way the largest three payers establish and use base fee schedules.

Different Approaches to Hospital Outpatient Fee Schedules

	Payer 1	Payer 2	Payer 3
Number of outpatient billing service categories	17	12	4
Rate multipliers negotiated by outpatient billing service category?	Yes	Yes	No

Note:
1. Data is based upon an analysis of the contracts between the three largest Massachusetts payers and the six largest Massachusetts hospital systems.

As illustrated in the chart above, two of the three major commercial payers use fee schedules with different service category groupings of hospital outpatient services for purposes of negotiating multipliers. These groupings are not defined consistently across the two payers. For example, one payer negotiates a single multiplier for radiology services while the other payer negotiates two multipliers—one for general radiology and one for high tech radiology and sometimes yet a third category for "imaging agents." One payer divides its hospital outpatient fee schedule into seventeen groups of services while another payer uses twelve. This means there may be seventeen different multipliers for different hospital outpatient services for one payer and twelve multipliers for different hospital outpatient services for the other payer.

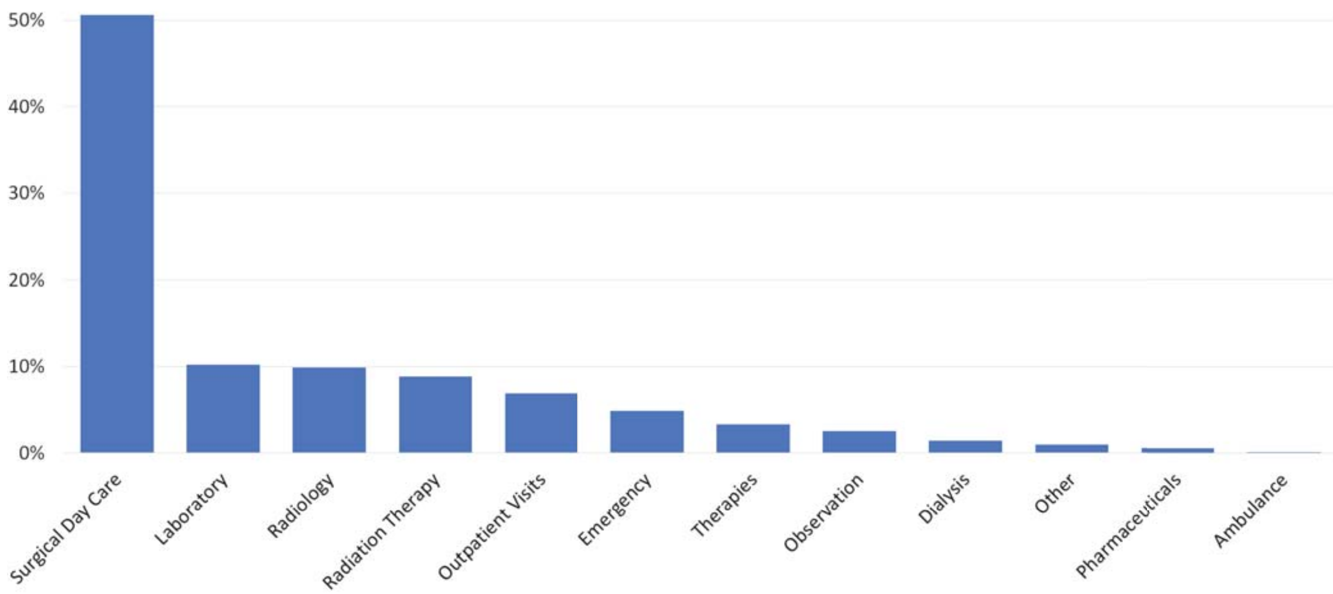
The third payer has four different service categories of hospital outpatient rates but does not use these categories as a basis for negotiating multipliers. Instead, this payer starts with a fee schedule for each hospital. It then negotiates an aggregate rate increase for that hospital's outpatient services over the prior year, which is then realized through changes to the hospital-specific fee schedule. This approach does not use negotiated "multipliers" for particular groups of services.

Adding to the complexity of service-specific multipliers, outpatient multipliers also often vary by insurance product, with different rates for health maintenance organization ("HMO") and preferred provider organization ("PPO") products. Further, some commercial payers have rates for certain hospitals that vary within products, with up to four different HMO prices for the same services and up to six different PPO prices. These different rates within a single product category (such as within a payer's PPO offerings) are differentiated based on factors such as the member's employer group or primary care provider. These rates can vary significantly: for one hospital system, PPO prices for the exact same services varied by up to 57% depending on the member's employer.

Equally important, billing requirements also vary significantly across payers and providers. Coding and authorization requirements, as well as documentation requirements for determination of medical necessity, vary significantly between commercial plans and sometimes across products within a plan. In addition, some providers are paid supplemental payments on top of their fee-based payments that are calculated without respect to claims-based billing.

The result of this approach to establishing hospital outpatient prices by service category is that a hospital may be much less expensive than average for one type of service but much more expensive than average for another type of service. To illustrate this variation, we examined three hospital outpatient services: surgical day care, laboratory, and radiology services. As reflected in the chart below, these services account for substantial hospital outpatient spending.

Outpatient Total Medical Expenses by Service Category for One Massachusetts Payer (2017)

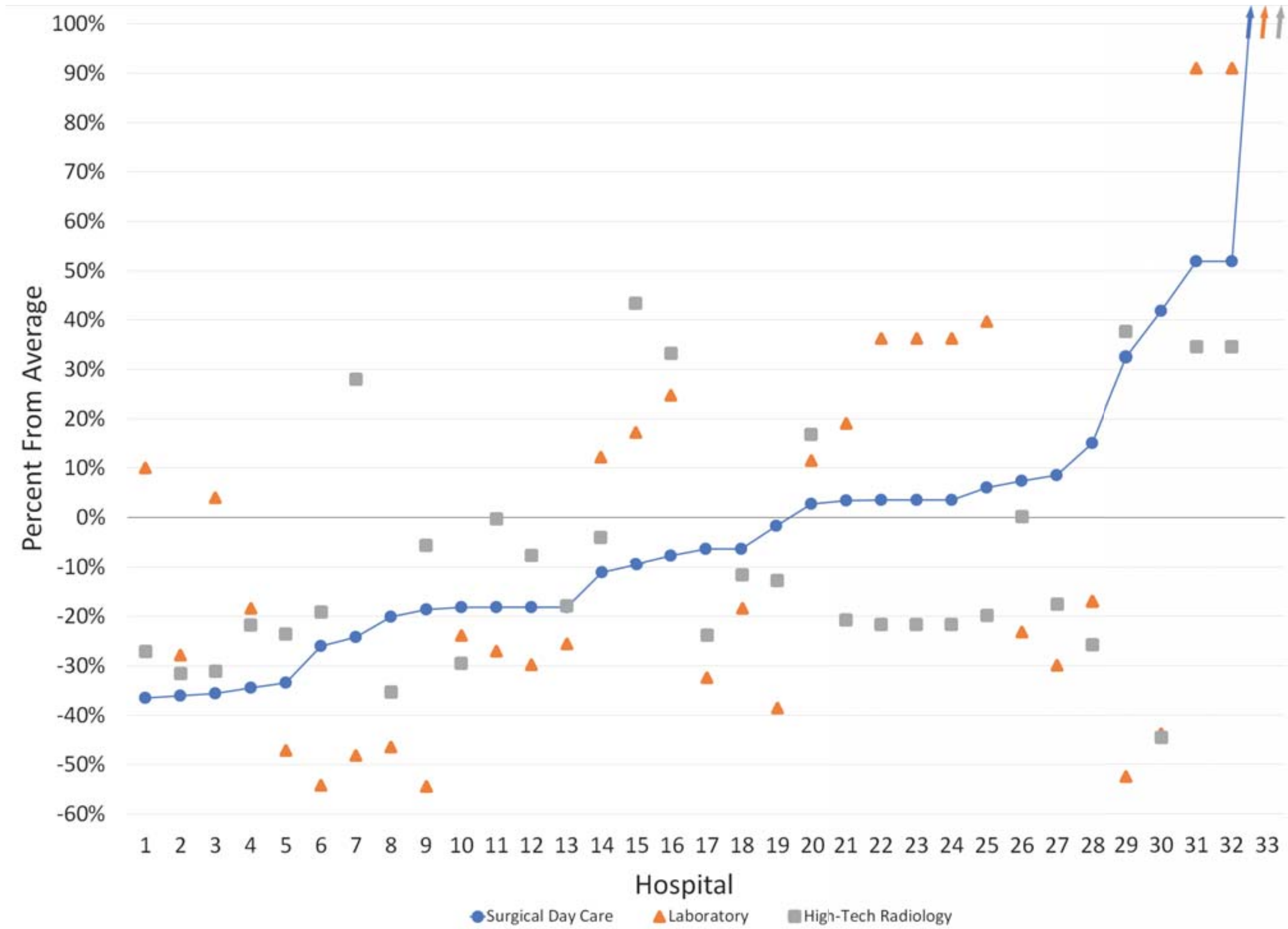


Notes:

1. Data is based on 2017 risk settlements from one payer for three large Massachusetts physician groups for an attributed population of approximately 80,000 members.
2. Data excludes behavioral health spending.

The use of multiple service categories with different negotiated multipliers within a single payer means that different services within a single hospital may vary in relative price. The chart below depicts the hospital outpatient fee schedule multipliers applicable to surgical day care, laboratory, and high-tech radiology for one product offered by one large Massachusetts payer for the Massachusetts hospitals that contract through the six largest Massachusetts hospital systems. Each number on the horizontal axis represents a different hospital, with three corresponding points plotted on the chart to represent the hospital's negotiated multipliers for each service as compared to the average multiplier for the service across this set of hospitals.

Hospital Rate Multipliers for Three Outpatient Services for One Massachusetts Payer (2018)



Notes:
1. Includes hospitals that contract through the six largest Massachusetts hospital systems but excludes hospitals that are not paid based on a fee schedule for these services.
2. The average reflected in this chart is the unweighted average multiplier for the specific service category for this set of hospitals.
3. Where a contract included negotiated multipliers for ambulatory surgery centers owned by the hospital system, those ambulatory surgery centers are included as one hospital in the chart above.
4. The multipliers for hospital 33 exceed 100% above average (Surgical Day Care 149%, Laboratory 229%, High-Tech Radiology 267%).

In the chart, the hospitals are organized in order of their multiplier for surgical day care (the blue circles), and this chart shows that other multipliers (laboratory as represented by orange triangles and high-tech radiology as represented by gray squares) often do not align with the surgical day care price.

Our examination showed that it is difficult for a patient, employer, or referring provider to identify consistently the best value for a particular health care service. For example, a hospital that is a good value for outpatient surgery may not be a good value for radiology (like hospital 7 in the chart above). While some hospitals are very expensive for almost everything, or very low-cost for almost everything, this was the exception. We found that significant differences in payment rates across services existed at most hospitals.

ii. Hospital Outpatient Payment Complexity Extends Beyond Fee Schedules and Billing Categories: Observation Services Case Study.

There are exceptions to the general rule that hospital outpatient services are reimbursed according to a fee schedule. Negotiated approaches to payment for hospital outpatient services that do not fall within the typical fee schedules are complicated and inconsistent across payers. To illustrate how payment rates are calculated for services that fall within these exceptions, we examined the different approaches to reimbursing hospitals for "observation" services. Observation services are short-term treatments and assessments used to determine whether a patient needs to be admitted for inpatient care or can be discharged.

We found significant variation within and across the largest Massachusetts payers in the way this service is reimbursed. One insurer pays for observation services based on time increments but does not have standardized increments. Instead, this payer breaks out time increments for purposes of billing in six different ways across its contracts with different hospitals. Another payer uses a base rate for each hour of observation with a negotiated multiplier. The third payer uses an all-inclusive rate for 24 hours of observation. In addition, each of these rates generally varies by insurance product (e.g., HMO or PPO).

The result of this structural complexity is that it is very difficult (1) to predict which hospitals are competitively priced or are likely to be a good value within any particular payer and (2) to assess value across payers without detailed case-specific information. Due to these different payment approaches, one cannot determine in advance whether certain hospitals are more expensive as compared to others for observation services, since the ultimate price will vary significantly based on the length of treatment and the applicable payment method.

b. Hospital Inpatient Payment Methods Are Somewhat More Standardized Across the Three Largest Payers, But Variation Exists Across the State.

For hospital inpatient services, payments are somewhat more standardized across the three major commercial payers in Massachusetts, but variation exists across the state. As summarized below, Massachusetts payers typically use some combination of four different methods for calculating hospital inpatient payment rates: diagnosis related groups ("DRGs"), case rates, per diems, and percent of charges (also called "payment on account factor").

A DRG is a methodology used to determine payment rates for hospital admissions. Medicare implemented DRG-based payments in 1981, and commercial insurers have slowly adopted this prospective payment method as an alternative to other retrospective methods of payment. Under a DRG methodology, a base rate of payment is prospectively negotiated between each insurer and hospital, and this base rate drives the total payment level for each admission. Upon each hospital discharge, all of the diagnoses, procedures, complications and co-morbidities, and other patient characteristics are coded and grouped using the software each payer uses to assign DRGs, called "groupers." Each assigned DRG is then associated with payer-specific severity weights known as “case weights.” The prospectively negotiated base rate is then multiplied by the case weight associated with the assigned DRG. The number and types of DRGs vary across groupers, and the case weights associated with each grouper can vary as well. Payers may use one or more DRG groupers, such as those developed by CMS for Medicare patients, or they may use other groupers developed for commercial or non-commercial populations. Payers may develop their own proprietary case weight systems or use commercial case weights or case weights derived from Medicare or Medicaid.

Case rates are similar to DRGs as they are negotiated prospectively for certain specific categories of care, such as joint replacements, cardiac services, obstetrics and transplants. Unlike DRGs, case rates are not adjusted for severity and generally are accompanied by negotiated outlier[12] calculations that are not consistent with DRG methods of adjusting for outliers.

Per diem payments are negotiated rates paid retrospectively based on the number of days a patient stayed in the hospital.

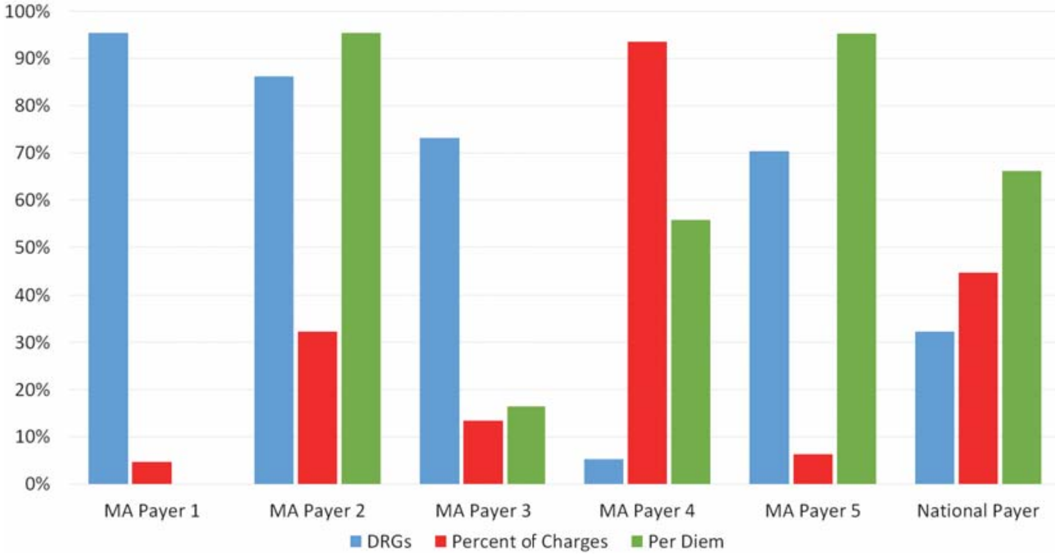
Percent of charges is a payment method in which a hospital is paid a negotiated discount off the hospital’s pricing list (called the hospital’s chargemaster).

i. The Three Largest Massachusetts Payers Use Principally DRGs for Hospital Inpatient Payment; Other Payers Use Per Diems and “Percent of Charges” Arrangements.

As reflected in the chart below, the three largest Massachusetts payers (MA Payer 1, 2, and 3) use principally DRGs (blue bar) for hospital inpatient payment across their Massachusetts hospital contracts. However, many payers use a combination of DRGs, per diems (green bar), and percent of charges (red bar) for payment for different services sometimes at the same hospital. Data from two smaller Massachusetts plans (MA Payer 4 and 5 in the chart below) and a national plan showed that adoption of DRGs was more limited outside of the largest three payers. For instance, one small Massachusetts plan pays over 90% of Massachusetts hospitals, at least in part, on a percent of charges basis. Another small plan uses per diems in over 90% of its Massachusetts hospital contracts. The national payer reported using all three methods across a significant percentage of its Massachusetts hospital contracts. Where different payment methods are used for the same services, it is difficult for a market participant to accurately assess relative value across health plans or even between provider options within a health plan.

12 An outlier is a particularly complex case that may trigger additional payments.

Percent of Payers' Massachusetts Hospital Contracts that Use DRG, Percent of Charges, and Per Diem for Inpatient Payment



Notes:

1. Data reported by payers for contracts in effect in May 2018 with Massachusetts acute care hospitals for commercial business.
2. Data excludes payment methods for behavioral health services.
3. A payer's reported use of these payment methods may add up to over 100% where the payer uses multiple methods to pay some hospitals.
4. Most payers surveyed also reported using case rates to pay for at least some types of hospital inpatient services.

Increased administrative resources are required for hospitals to maintain systems that simultaneously accommodate DRG-based payments, per diem payments, and condition-specific case rates. Each of these inpatient payment methods comes with its own set of payment rules, contractually negotiated specifications, and payment policies and procedures. The complexity of these systems not only leads to increased resource needs to adjudicate multiple systems, but also can lead to difficulty complying with billing specifications, resulting in claims denials, appeals, and additional work and costs associated with this appeal process.

Administrative complexity is also costly for providers where insurers may use the same method of payment but have different ways of administering that particular method of payment. For instance, while many insurers use DRGs for inpatient payments, each has its own contractual specifications and billing requirements. Several Massachusetts insurers use different DRG groupers or different versions of a particular grouper. In addition, each insurer uses its own set of case weights. All of these potential variations in the way DRGs are administered require providers to maintain multiple DRG billing systems and devote incremental resources to complying with variations in billing and contractual requirements. While the three largest Massachusetts payers reported high rates of DRG adoption, they reported using different DRG grouper versions and case weights (some proprietary, some derived from Medicare). These plan-specific grouping, coding, and severity adjustment systems introduce substantial administrative complexity.

ii. Payment Methods for Obstetrics Illustrate the Lack of Standardization Within and Across Payers.

To illustrate inpatient billing and insurance-related complexity, we conducted a case study of the three largest payers' approaches to payment for obstetrics services. In this study we observed multiple approaches to payment for obstetrics including global case rates, per diems, and DRGs. We found that among the three largest insurers in Massachusetts, all three payment methods were used across their networks. That is, a single hospital is sometimes paid on a per diem by one insurer, global case rates for another insurer, and DRGs for another insurer. In addition, we also observed rate variation by product (e.g., HMO or PPO) as well as by product segment (e.g., by the member's primary care provider or employer).

As reflected in the chart below, we observed substantial variation in the billing specifications for global case rates, per diems, and DRGs for obstetrics services. Not only did we see the same obstetrics services paid for in three distinct payment methods, but each of the payment methods lacked standard billing specifications within and across payers. For instance, we observed different categorizations of the services to be included in the global case rates, with some payers offering just two categories of rates (one for vaginal delivery and one for caesarian delivery) and others breaking out four categories based on whether the delivery had complications and whether care for the healthy newborn is included. We also observed variation across provider contracts regarding the specifications of outlier payments and in when an outlier payment is triggered (e.g., Day 5 versus Day 6).

We found the per diem rates used across the plans for obstetrics services to be generally comparable to one another in structure: a negotiated rate multiplied by the number of days of the admission. Rates are generally set with one rate for the first day of the admission and a second rate for subsequent days. However, rates varied by and within products. Some hospitals had more than one HMO rate while others had just one.

We also observed variation in the administration of DRGs for obstetrics services (such as grouper type and version, case weights, and variation across products). DRG rates are more likely to be predictable and comparable across plans if case weights, DRG groupers, and product structure are standardized.

Variation in Obstetrics Payment Methods

	Global Case Rates	Per Diems	DRGs
Standardized Service Categories?	No	N/A	No
Standardized Outlier Definition?	No	N/A	No
Standardized Base Payment Structure?	No	Yes	Yes
Standardized Rates Across Products and Product Segments?	No	No	No

Note:
1. Data is based upon an analysis of the contracts between the three largest Massachusetts payers and the six largest Massachusetts hospital systems.

Our study of obstetrics services is just one example of variation in hospital inpatient payment methods. We found significant variation within and across payers for other hospital inpatient services similar to the variation observed in obstetrics. In particular, we found variation in payment methods for cardiac services, bariatric surgery, transplants, joint replacement, and vascular surgery. We also observed, outside of obstetrics services, that hospital inpatient payment methods may vary based on individualized exceptions or nuances that augment payment structures due to contractual variation in payment specifications. These contractual variations in payment approaches present significant complexity with regard to how a service is defined, how outliers are defined and paid for, and whether services are eligible for additional payments for certain implantable devices or high-cost drugs.

c. Risk Contracts Vary Significantly Across Payers and Providers.

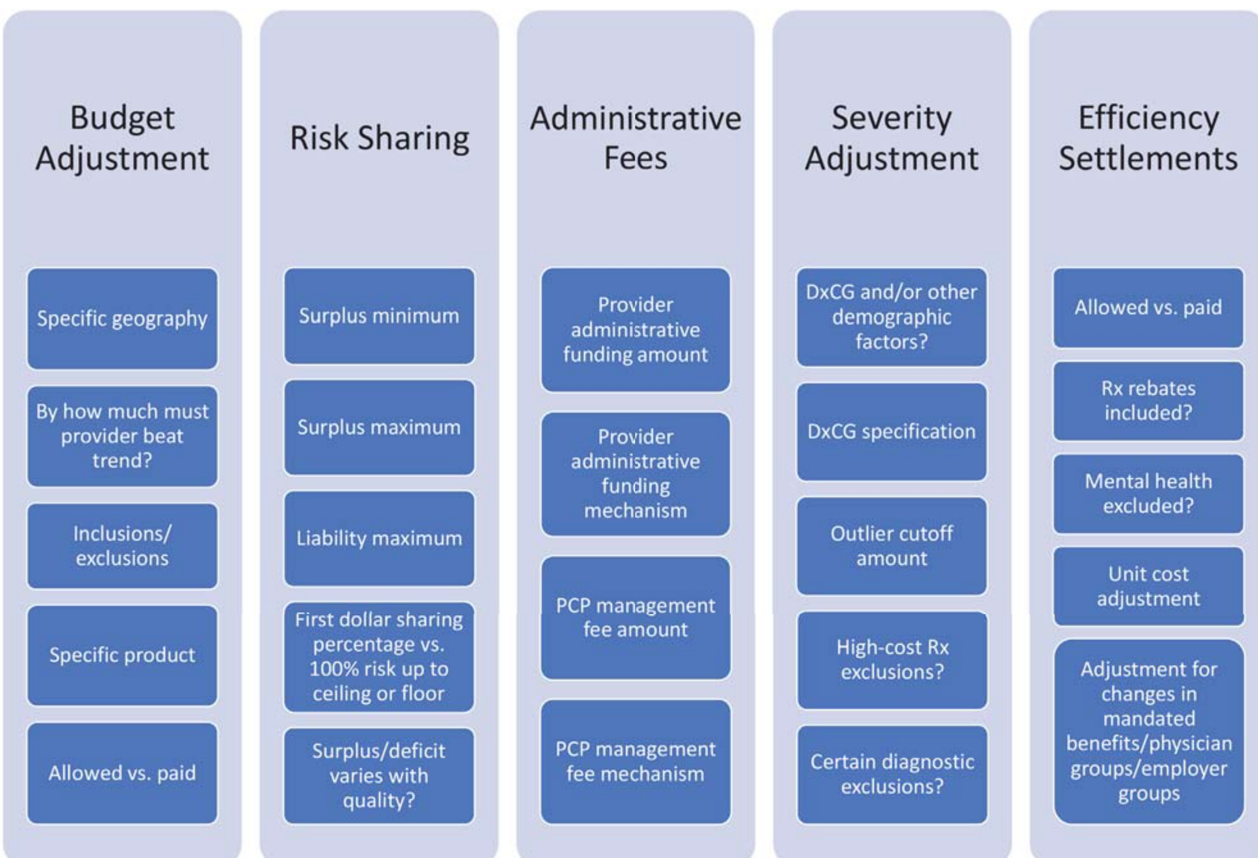
Risk contracts are intended to incent providers to deliver higher-value care. Under a risk arrangement, insurers and providers negotiate a monthly budget for a covered population, and the providers are rewarded at the end of the year if they spend below their negotiated budget or penalized if they spend more than that budget. In addition to this efficiency incentive, most of these arrangements also include certain quality and patient satisfaction bonuses.

Our examination found that risk contracts vary in significant ways, with many contracts significantly capping or limiting efficiency risk exposure and bonus opportunities. We observed certain products and plans that had significant opportunities for rewards and bonuses, while others had very limited opportunity. Our study found, for instance, that the incentive and surplus opportunity in PPO arrangements are often significantly less than in HMO products.

Such variation across plans and products limits providers' incentives to invest in systems and services that could reduce healthcare costs over time because patients move from one plan to another. If patients move from a plan with attractive risk terms and budgets to a different insurer or product that has less attractive risk terms and budgets (or to a fee-for-service product with no provider risk), a provider is less likely to invest in cost-reducing initiatives. Without alignment among insurers on how budgets are set and the level of provider risk and opportunity, when patients migrate between plans, the incentives can shift significantly for providers. To illustrate the migration of members among plans, we looked at member persistency for a large Massachusetts plan and found that year over year approximately 5-15% of members did not stay in the same product, either leaving for a different payer or for a different product within the same payer. This means that over a five-year period, as much as 20-50% of membership can move to another plan or product, significantly altering a provider's attributed population and reward potential.

Furthermore, like the fee-for-service framework these risk arrangements are layered over, alternative payment methods are highly variable with virtually no standard approach to the complex budget and expense calculations, settlement processes, and other administrative and contractual specifications that define these arrangements. Below is a list of the key terms that define a provider's resources and efficiency incentives under risk contracts where we observed variation across contracts.

Key Areas of Variation Across Risk Terms



Notes:

1. Data is based upon an analysis of the contracts and risk settlements between the three largest Massachusetts payers and the six largest Massachusetts hospital systems.
2. This chart does not include terms related to quality.

These terms illustrate areas where risk contracts are not comparable to one another across payers or providers, leading to very different actual risk and incentive exposure for providers who participate in risk contracts. For example, our examination found variation in the liability maximums that govern risk sharing across different risk contracts. The liability maximum is a cap on the provider's losses if the provider spends more than the negotiated budget to care for an attributed population. For one payer, we found physician liability maximums ranging from $5.87 up to $25 per member per month across large Massachusetts provider groups. In previous examinations, we also noted significant differences in the negotiated budgets between providers.[13]

Risk settlements are complicated processes that take up to a year to complete after the end of the contract risk period. Auditing, confirming, and interpreting these risk provisions, adjustments, and appeals requires significant resources from providers and insurers. The complexity of these arrangements means insurers and providers must devote additional resources to negotiating and administering these unique and varied arrangements.

13 *See* AGO 2013 REPORT, *supra* note 2; OFF. OF ATT'Y GEN., EXAMINATION OF HEALTH CARE COST TRENDS AND COST DRIVERS (Sep. 18, 2015), *available at* https://www.mass.gov/files/documents/2018/05/04/cost-containment-5-report.pdf.

II. The Complex and Varied Payment System Has Significant Implications for the Commonwealth's Health Care Cost Containment Goals.

a. Administrative Complexity Adds Substantial Costs to the Health Care System.

Administering a complicated and varied set of health care payment methods is expensive. Although there have not been published studies of this cost in Massachusetts, one important study estimated that administrative costs represented between $107 billion and $389 billion nationally in wasteful spending in 2011.[14] This study concluded that "[r]educing waste is by far the largest, most humane, and smartest opportunity for evolving an affordable health care system,"[15] finding that of the six "wedges" of waste in the U.S. health care system, the largest is administrative complexity—the waste driven by inefficiency in how the health care system is administered.[16]

More recent national studies have similarly documented the continued high cost of administrative complexity in our health care system. A study comparing administrative costs of hospitals in eight nations found that in the United States administrative costs account for 25.3% of hospital expenditures, the highest percent of the eight nations.[17] Administrative costs are a major driver behind the difference in overall health care cost between the US and other countries.[18] In fact, reducing US spending for hospital administration to that of Canada would have saved approximately $158 billion in 2011 dollars.[19] Likewise, another study looking at administrative costs in a multisite, multispecialty medical group found that for every ten physicians, there were almost seven full-time equivalent employees engaged in billing and insurance-related ("BIR") activities.[20] Approximately 62% of administrative costs can be attributed to BIR activities.[21] Not only is the cost attributable to BIR activities high, but it appears to be growing. A national study found that in 2009 costs associated with BIR activities represented 14.4% of total health expenditures, and by 2012 such costs represented 16.8%.[22]

14 Donald M. Berwick & Andrew D. Hackbarth, *Eliminating Waste in US Health Care*, 307(14) JAMA 1513, 1515 (Apr. 2012).
15 *Id.*
16 *Id.*
17 David U. Himmelstein et al., *A Comparison of Hospital Administrative Costs in Eight Nations: US Costs Exceed All Others By Far*, 33:9 HEALTH AFFAIRS 1586, 1589 (Sep. 2014). *See also* David M. Cutler, *Reducing Health Care Costs: Decreasing Administrative Spending*, Testimony for Senate Committee on Health, Education, Labor and Pensions (Jul. 31 2018) (stating that "[t]he typical hospital spends nearly 10 cents out of every dollar collected collecting that dollar; the typical physician's office spends even more").
18 Himmelstein, *supra* note 17, at 1593.
19 *Id.*
20 Julie Ann Sakowski et al., *Peering Into the Black Box: Billing and Insurance Activities in a Medical Group*, 28:4 HEALTH AFFAIRS 544, 547 (May 14, 2009), *available at* https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.28.4.w544.
21 Philip Tseng et al., *Administrative Costs Associated with Physician Billing and Insurance-Related Activities at an Academic Health Care System*, 319(7) JAMA 691, 692 (Feb. 2018).
22 Elsa Pearson, *How much is too much? What does the US actually spend on health care administration?*, The Incidental Economist (Apr. 4, 2018), *available at* https://theincidentaleconomist.com/wordpress/how-much-is-too-much-what-does-the-us-actually-spend-on-health-care-administration/.

There is no evidence that these higher administrative costs translate to higher-value care. While one could imagine a scenario in which more administration would reduce overall costs by eliminating other waste or increasing efficiency, data suggest the opposite. As reported, the eight-nation study found that "total hospital costs were highest in the nations that had the highest hospital administrative costs."[23] This study is consistent with our finding that providers are paid in different, idiosyncratic ways by the different plans with whom they contract. We did not identify evidence that this kind of administrative complexity and its associated costs are bringing value to patients, plan sponsors, or insurers.

b. The Complex Payment System Serves as a Barrier to Actionable Price Transparency.

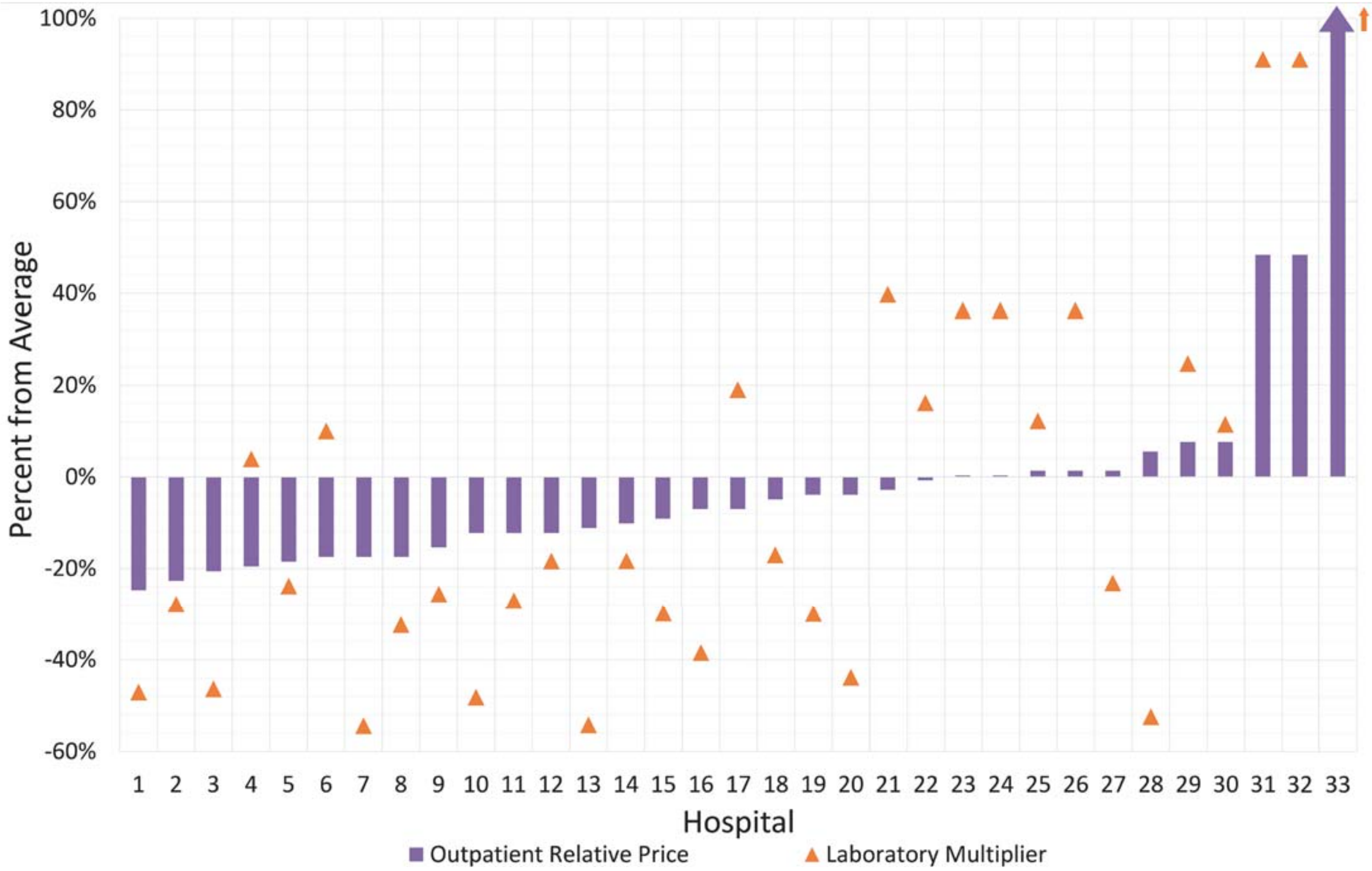
Our findings on the variation and complexity of payment methods also have implications for health care price transparency and market-driven cost containment initiatives. We found a wide range of payment methods in use across Massachusetts payers and providers for determining the rates paid for hospital inpatient and outpatient services. As described above, payment rates for certain services may be determined on a per diem basis for one insurer and a DRG basis for another insurer, with rates that further vary depending on whether the patient has an HMO or PPO product. This individualized approach to payment arrangements makes "apples to apples" price comparisons difficult for market participants like consumers, employers, and providers who want to identify high value health care services and products.

The difficulty of making actionable price comparisons is easiest to model for outpatient services. We found that outpatient fee schedules are generally subdivided into varying service groupings for purposes of negotiating prices. Price negotiations at the service group level result in variation in relative prices for services within the same hospital that raises questions about the appropriateness of using aggregated hospital prices for purposes of comparing outpatient service prices among hospitals.

For example, the existence of intra-hospital price differences by service means that aggregate relativity indices like Relative Price[24] mask the fact that one hospital may be high-priced for some services and lower-priced for others. This adds a hidden level of complexity to discussions of provider relative price and means that aggregate measures—while valuable for analysis of the health care market and overall relativities in price—are not well tailored to capture variation in prices for specific services. The chart below shows the most recent outpatient Relative Price index for one payer mapped against the current laboratory multipliers in effect for the same set of hospitals for the same payer.[25]

23 Himmelstein, *supra* note 17 at 1592.
24 *See* CTR. FOR HEALTH INFO. & ANALYSIS, RELATIVE PRICE PROVIDER PRICE VARIATION IN THE MASS. COMMERCIAL MARKET (Apr. 2018), *available at* http://www.chiamass.gov/assets/docs/r/pubs/18/Relative-Price-Report-2018.pdf.
25 We performed the same analysis for surgical day care and radiology multipliers and found similar results.

Hospital Outpatient Relative Price Compared to Multipliers for Laboratory Services for One Massachusetts Payer



Notes:

1. Includes hospitals that contract through the six largest Massachusetts hospital systems but excludes hospitals that are not paid based on a fee schedule for these services.
2. Outpatient Relative Price is the 2016 payer-specific Relative Price for HMO and POS products as reported by the Center for Health Information and Analysis.
3. The average Outpatient Relative Price in this chart is the unweighted average Outpatient Relative Price for this set of hospitals.
4. The average Laboratory Multiplier in this chart is the payer's unweighted average Laboratory Multiplier for this set of hospitals.
5. Where a contract included negotiated multipliers for ambulatory surgery centers owned by the hospital system, those ambulatory surgery centers are included as one hospital in the chart above.
6. The Laboratory Multiplier and Outpatient Relative Price for hospital 33 exceed 100% above average (Outpatient Relative Price 149% and Laboratory Multiplier 230%).

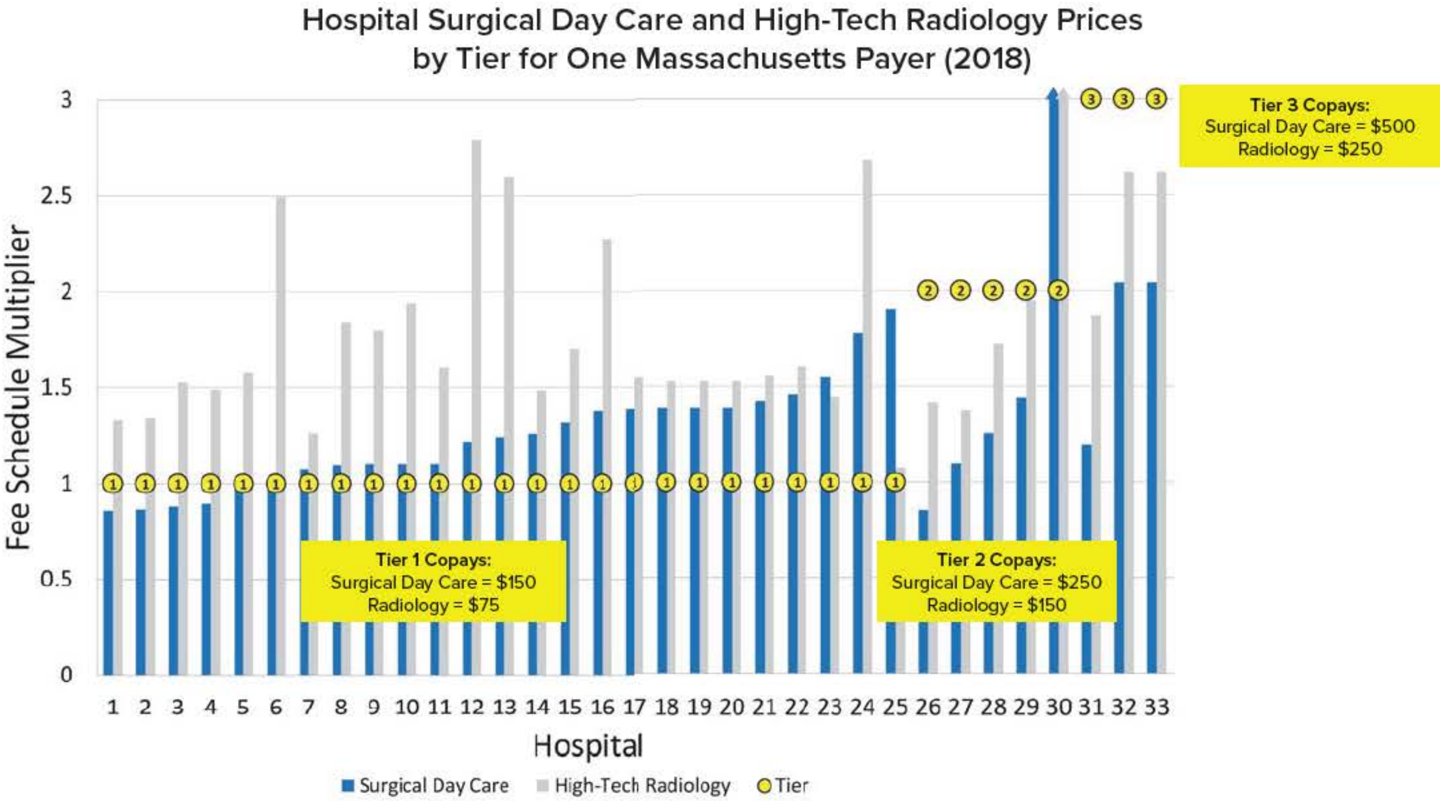
The existence of intra-hospital price variation creates barriers for purchasers seeking to shop for value. Massachusetts law requires payers to maintain online pricing tools that consumers can use to look up price estimates for specific services.[26] Although these online tools should provide consumers with reasonable estimates of the price of services notwithstanding this administrative complexity, reported consumer use of such tools is limited. In FY2016, Massachusetts hospitals reported over 800,000 discharges and over 15,000,000 hospital outpatient visits.

26 Mass. Gen. Laws c. 32A, § 27.

Yet, the largest three Massachusetts payers reported a combined total of only 103,283 hits in 2016 and 93,297 hits in 2017 on their price transparency online tools.[27] Furthermore, such tools are not available to other purchasers, such as employers, who may seek information on comparative costs for particular services when making plan and product selections that will shape the health care options available to their employees.

For most consumers, shopping for health care services is driven by their plan design and out-of-pocket cost exposure. Tiered network products are intended to incentivize consumers to select higher-value providers by offering lower cost sharing when a consumer chooses a provider with a preferred tier classification. However, as the graph below indicates, we found that tier placement is not consistently predictive of actual hospital outpatient pricing, leading consumers to, in some cases, pay higher co-payments when they receive lower-cost services.

27 *See* HEALTH POLICY COMM'N, MASS EXEC. OFFICE FOR ADMIN. & FINANCE, 2014 HEALTH CARE COST TRENDS HEARING, PRE-FILED TESTIMONY [HEREINAFTER HPC PRE-FILED TESTIMONY]: Blue Cross Blue Shield (2017), *available at* http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/public-meetings/annual-cost-trends-hearing/2017/2017-pre-filed-testimony-questions-bcbsma.pdf; HPC PRE-FILED TESTIMONY: Tufts Health Plan (2017), *available at* http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/public-meetings/annual-cost-trends-hearing/2017/2017-pre-filed-testimony-tufts-health-plan.pdf; HPC PRE-FILED TESTIMONY: Harvard Pilgrim Health Care (2017), *available at* http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/public-meetings/annual-cost-trends-hearing/2017/2017-pre-filed-testimony-questions-harvard-pilgrim.pdf; HPC PRE-FILED TESTIMONY: Blue Cross Blue Shield (2018), *available at* https://www.mass.gov/files/documents/2018/09/17/BCBSMA%20-%202018%20Pre-Filed%20Testimony%20Questions%20-%20Payers.pdf; HPC PRE-FILED TESTIMONY: Tufts Health Plan (2018), *available at* https://www.mass.gov/files/documents/2018/09/17/Tufts%20Health%20Plan%20-%202018%20Pre-Filed%20Testimony%20Questions%20-%20Payers.pdf; HPC PRE-FILED TESTIMONY: Harvard Pilgrim Health Care (2018), *available at* https://www.mass.gov/files/documents/2018/09/17/Harvard%20Pilgrim%20-%202018%20Pre-Filed%20Testimony%20Questions%20-%20Payers.pdf. These payers also reported a total of 2,163 consumer price inquiries in person or over the phone in 2016 and 2,989 such inquiries in 2017. *Id.*



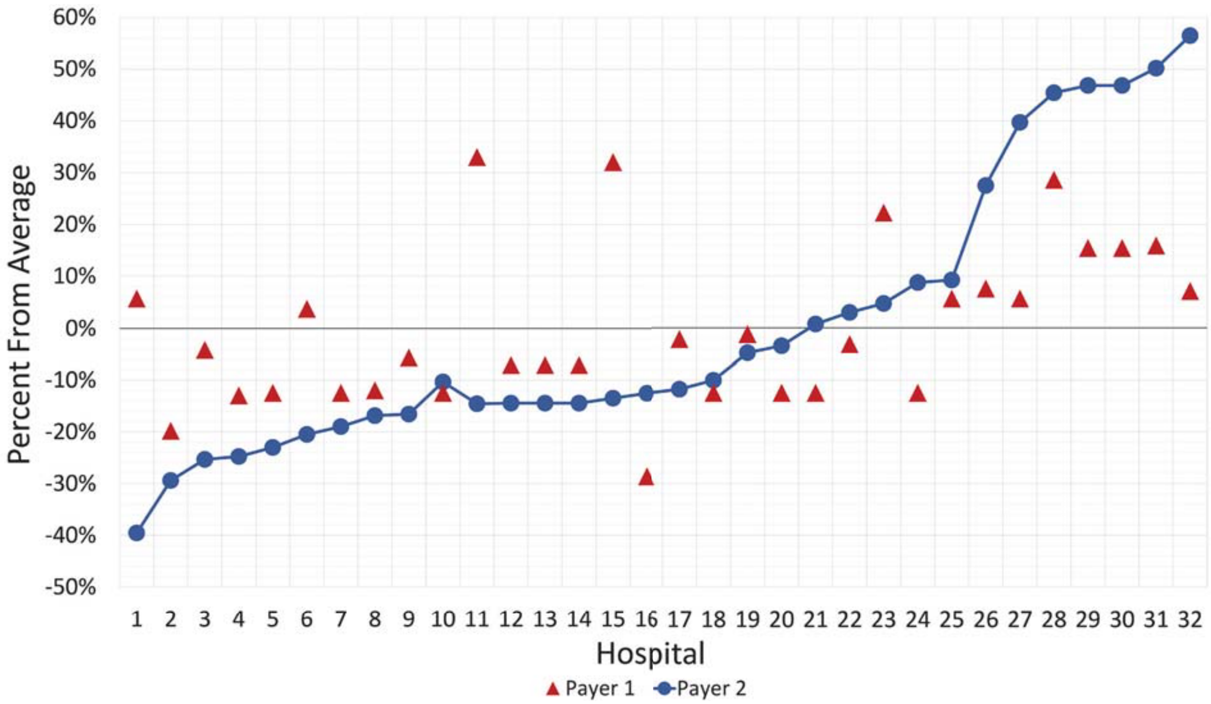
Notes:

1. Includes hospitals that contract through the six largest Massachusetts hospital systems but excludes hospitals that are not paid based on a fee schedule for these services.
2. Where a contract included negotiated multipliers for ambulatory surgery centers owned by the hospital system, those ambulatory surgery centers are included as one hospital in the chart above.
3. The multipliers for hospital 30 exceed three (Surgical Day Care 3.342 and High-Tech Radiology 7.158).

In the graph above, each pair of blue and gray bars represents a hospital's prices for surgical day care and high-tech radiology for one large Massachusetts payer. The hospitals are organized in the graph based on their co-payment tiering level (depicted in yellow) for both surgical day care and radiology services. This chart demonstrates that preferred tiered status with a lower co-pay does not always identify lower-cost options.

Service level price transparency is also necessary for health care providers so that they can make high value referrals for their patients. Providers need to know the relative prices of different services at different sites of care so they can refer patients to high value specialists to contain overall costs, perform on risk contracts, and guide patients—who are increasingly likely to be in a high deductible plan—to affordable options. Hospital outpatient rate variation between payers and across service categories creates barriers for physicians seeking to make efficient referrals. For example, one payer may have negotiated multipliers with a hospital such that it is less expensive for surgical day care but more expensive for radiology, but another payer's negotiation may have yielded the opposite result. The following chart shows multiplier rates for two Massachusetts payers for high-tech radiology, showing that identifying a low-cost referral for a particular service may not be possible without detailed information by payer.

Hospital High-Tech Radiology Prices for Two Massachusetts Payers (2018)



Notes:

1. Includes hospitals that contract through the six largest Massachusetts hospital systems but excludes hospitals that are not paid based on a fee schedule for these services.
2. This chart includes the multipliers used to determine prices for High-Tech Radiology services for two payers. For one payer, the chart includes a negotiated multiplier specific to High-Tech Radiology services. For the other payer, the chart includes a negotiated multiplier for all radiology services (which includes High-Tech Radiology).
3. The averages reflected in this chart are calculated separately for each payer and are based on the payer's unweighted average High-Tech Radiology Multiplier for this set of hospitals.
4. This chart excludes one hospital that is included in the other charts in this report because one of these payers reimburses that hospital on a percent of charges basis for these services.
5. Where a contract included negotiated multipliers for ambulatory surgery centers owned by the hospital system, those ambulatory surgery centers are included as one hospital in the chart above.

This analysis was possible only where comparable outpatient service categories were used by multiple payers for negotiating multipliers to their fee schedules. As discussed in Section 1.A, the largest Massachusetts payers use different service groupings for negotiating outpatient prices, which results in cross-payer price differences that cannot be modeled with a single multiplier. This variation contributes to the challenge for market participants like providers and employers who must assess prices across payers.

III. Recommendations.

This report documents how commercial health care payment rates are determined using complex and varied methods with little consistency across payers, providers, or insurance products. The variation is particularly notable across hospital outpatient services, but we also found variation in how hospital inpatient services are reimbursed. Risk contracts add yet another layer of complexity on top of the intricate and opaque fee-for-service foundation that determines the provider's budget and performance. This complexity and variation create administrative costs and are in tension with the actionable price transparency required to drive market-based solutions.

Based on these findings, we recommend that all stakeholders, including payers, providers, consumer advocates, and policymakers:

1. Study further the administrative costs associated with current approaches to reimbursement that vary significantly between insurers, insurance products, market-segments within insurance products, and providers. These costs remain hidden in part because payers and providers are not required to report or even track how much of their annual operating expenses are used to administer provider reimbursement contracts. A working group with representation from providers, payers, and consumer advocates could determine a consistent way to report on these costs with the goal of developing strategies to reduce them.
2. Reduce complexity and explore increased standardization where appropriate in the methods for determining fee-for-service payments and the key terms that govern risk contracts. Simplifying these complicated provisions would require engagement from providers and payers and may require a legislative catalyst to facilitate changes to historic approaches to payment.
3. Establish real-time, service-level price transparency for employers, consumers, policymakers, and providers. Through the work of the legislature, other agencies, and health care stakeholders, Massachusetts has strong public reporting on overall measures of provider price variation. For example, Relative Price data published through the Center for Health Information and Analysis (CHIA) provides critical insight into aggregate price differences in the market. However, such aggregate metrics are not well tailored to capture variation in prices for specific services or provide real-time information needed for employers or consumers to shop for plans or procedures or for providers to assess the value of a particular referral. While current transparency initiatives such as CHIA's release of 2016 service-specific price data[28] are significant steps in the right direction, a simpler underlying approach to payment would allow for new transparency initiatives that would enable purchasers and providers to compare options for specific services.

The Office of the Attorney General looks forward to continued collaboration with the Legislature, other agencies, health care market participants, and all stakeholders in promoting the affordability and accessibility of health care for all Massachusetts residents.

28 CTR. FOR HEALTH INFO. & ANALYSIS, BULK RELEASE OF PROCEDURE PRICE DATA 2018 (Jul. 20, 2018), *available at* http://www.chiamass.gov/transparency-initiatives.

Acknowledgments

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SEARCH

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* Total price charged for this procedure or

Sponsor

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FAQ

WHAT IS THIS?

We're partnering with you, our communities, to collect prices of common health-care procedures, so we can know what things cost in health care.

HOW DOES IT WORK?

WHY ARE YOU DOING THIS?

WHAT ABOUT QUALITY?

WHAT ABOUT MY PRIVACY?

SO THIS IS CROWDSOURCED INFORMATION -- WHY SHOULD I BELIEVE ANY OF IT?

WHY DO YOU LIST CASH PRICES? ISN'T IT MORE IMPORTANT TO KNOW THE INSURED RATE?

ABOUT US

RESOURCES FOR MEASURING HOSPITAL QUALITY

There are many resources for measuring quality in health care, and many of them come to very different conclusions. Here are some resources.

Hospitalinspections.org, a website run by the Association of Health Care Journalists, collects federal hospital inspection reports.

The federal government lists a number of quality tools on this section of healthcare.gov.

A state-by-state and category-by-category list has been compiled by consumerhealthratings.com. Another resource: The Informed Patient Institute.

Several organizations rank hospitals. They include:

The Leapfrog Group

U.S. News and World Report

PriceCheck community-created guides to health costs with ClearHealthCosts can be found at WLRN public radio in Miami; WUSF public radio in Tampa-St. Petersburg; their partnership, Health News Florida; KQED public radio in San Francisco; KPCC/Southern California public radio in Los Angeles; WHYY public radio in Philadelphia; and MedPage Today, a supplier of news, opinion and continuing medical education to 670,00 providers and a wing of the giant Everyday Health.

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Does It Pay to Know Prices in Health Care?†

By Ethan M.J. Lieber*

Consumers rarely know the price of medical care before they consume it. I use variation in the timing of access to a new source of price information to show how access to and search for price information leads consumers to pay significantly less for care. I provide suggestive evidence that insurance coverage inhibits the use of price information, rationalizing the relatively low rates of search. The results indicate that availability of price information could have large impacts on prices even in the absence of general equilibrium effects. (*JEL* D82, D83, G22, I11, I13)

Health care spending accounts for 18 percent of the United States economy and has grown faster than GDP in 42 of the past 50 years. As a result, containing health care costs has become a primary concern of public policy as well as the private sector. Unlike most markets, consumers know very little about prices in health care. Research in other markets has found that increasing price transparency reduces prices (e.g., Brown and Goolsbee 2002; Goldmanis et al. 2010), but it is not clear the same will be true in health care: health insurance insulates patients from prices, reducing the benefits of switching to a lower priced provider.

In this paper, I estimate whether access to and use of price information affects the prices paid for medical care. I use a unique dataset in which the employees of a large firm gain access to price information provided by Compass Professional Health Services (Compass hereafter). The novel feature of the data is a direct measure of search: Compass tracks the use of its price information and so directly measures search.

I begin by estimating how access to price information affects the prices paid for care. A subset of the employees were given access to price information in a pilot program to determine whether it was worth purchasing for all of the employees. The employees who gained access early did not sign up, volunteer, or select into the pilot program in any way; they were given access early because they worked for the company's corporate offices. I estimate a differences-in-differences model that takes advantage of this variation in access both across groups and over time. The results suggest that access to price information reduces the average price paid by

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† Go to https://doi.org/10.1257/pol.20150124 to visit the article page for additional materials and author disclosure statement or to comment in the online discussion forum.

1.6 percent. The effect is smaller for employees who had less incentive to search and the impact is concentrated among care that is more amenable to search, e.g., non-primary care, less complex care, and nonemergency care.

The identifying assumption is that absent access, the corporate and noncorporate employees would have experienced the same changes in prices over time. I do not find any evidence that those who received access earlier were on different trends than those who received access later. In addition, placebo tests that assign false dates of access do not produce results similar to the actual date of access.

These estimated price reductions can come from many sources. On the demand side, the employees might switch to lower priced providers. They might forego care when they learn that prices are higher than anticipated and obtain care when prices are lower than anticipated. On the supply side, providers might lower prices in response to increased consumer search. In the data, I find evidence that access significantly increases the probability of seeing a new provider. It is not clear that consumer welfare increased because the lower prices might come at the cost of lower quality care. Although the results are only suggestive, I do not find evidence that access to Compass leads consumers to receive lower quality hospital care. On the supply side, it is unlikely that there was a response because the employees in my data are a negligible fraction of any given health care market.

To estimate how search itself affects prices, I pursue an instrumental variables strategy in which I instrument for search with access to price information. In the first stage, access increases search by between 9 percent and 15 percent. The IV strategy estimates that search reduces prices by 10–17 percent. Although large, the estimates are plausible. There is a tremendous amount of price dispersion in health care (Ginsburg 2010). In my data, moving from the ninetieth percentile of the price distribution to the fiftieth percentile reduces the price by 35 percent.

If search reduces prices paid by 10–17 percent, then why are consumers searching so infrequently? A prominent, yet largely untested, explanation is moral hazard in search (Dionne 1981, 1984; Akin and Platt 2014). Health insurance reduces consumers' exposure to price differences and thereby reduces their incentives to search. I provide evidence of moral hazard in search using variation in the marginal price for care on the date the consumer gained access to Compass. Consumers who had met their deductibles by the time they gained access faced a 50 percent lower marginal price for care, but were comparable to those who had not met their deductibles on many other dimensions. Those who had met their deductibles were 90 percent less likely to subsequently search.[1] Based on these estimates, the elasticity of search with respect to the out-of-pocket price is approximately 1.8. This evidence suggests that moral hazard in search could play an important role in health care.

Two important limitations to my findings stem from the fact that they are based upon the employees of a single firm that chose to purchase price information. First, if these consumers are particularly responsive to insurance coverage or prone to using

[1] Because consumers are forward looking, not only the current or spot price of care matters, but the future price of care could matter as well (Keeler, Newhouse, and Phelps 1977; Aron-Dine et al. 2012). How this affects the interpretation of this result is discussed when the result is presented. Throughout the paper, prices paid should be understood as spot prices.

price information, it becomes difficult to generalize my results to the population at large. Second, my results only reflect a short-run, partial equilibrium response and not the general equilibrium effects of insurance on prices (via search). The literature on insurer-provider bargaining finds that being able to steer patients to particular providers impacts network formation (e.g., Ho 2009; Ho and Lee 2013) and lowers prices (e.g., Sorensen 2003; Wu 2009). My estimates do not capture these changes to the bargaining process and so likely understate the impacts of access to price information and search.[2]

This paper is related to two recent studies on price transparency in health care. Whaley et al. (2014) use data from a different price information supplier to compare the prices that searchers and nonsearchers pay. They find that searching is associated with a 13–14 percent lower price for both laboratory tests and advanced imaging procedures. They ameliorate concerns about biases in their estimates by showing that searchers had been receiving slightly higher prices before access to the search tool and that searching for one type of procedure does not help searchers obtain lower prices (relative to nonsearchers) on other types of procedures. My results complement theirs by studying the impact of price information and search for all types of procedures, by taking advantage of plausibly exogenous variation in search, and by directly examining the association between insurance coverage and search. Christensen, Floyd, and Maffett (2014) study whether transparency laws that lead to publicly available price information reduce charge prices for hip replacements. They find that charges for hip replacements fell by 7 percent in states that adopted the laws, while charges for a less shoppable procedure, appendectomies, did not change. My results on prices paid are not directly comparable to theirs because the relationship between charge prices and transaction prices is unclear. However, my suggestive results on moral hazard in search provide a foundation for their findings and suggest one reason for their relatively small impacts: by the end of their sample, only 13 percent of privately insured individuals had high-deductible health plans that would have given them an incentive to search (Claxton, et al. 2014). However, as the fraction of consumers in these plans continues to rise, from 4 percent to 20 percent between 2006 and 2014, it becomes more likely that transparency laws will have larger impacts.

This paper is also related to the broader literature on consumer-directed health care (CDHC). Empirical work in this area has found that health care expenditures fall when consumers are put onto less generous insurance plans (Parente, Feldman, and Christianson 2004; Buntin et al. 2006; Dixon, Green, and Hibbard 2008; Haviland et al. 2011). Because these papers do not have search data, it is difficult to empirically differentiate expenditure reductions due to increased consumer search from those due to reduced care use. My results fill this gap and provide evidence consistent with the premise of CDHC.

The remainder of the paper proceeds as follows. Section I provides background information on pricing in health care and price information firms like Compass.

[2] Cutler and Dafny (2011) point out that making price information public could facilitate collusion between providers and actually lead to higher prices in equilibrium. Evidence for this effect has been seen in the Danish concrete industry (Albæk et al. 1997).

Section II describes the data. Section III presents the empirical strategies and results used to investigate the impacts of access to price information and search on prices paid. Section IV presents the empirical strategy and results for the analysis of moral hazard in search. Section V concludes.

I. Prices and Price Information in Health Care

For those with private health insurance, the price of care is determined by negotiations between insurers and providers. Evidence suggests that these negotiations reduce prices for insurers with greater bargaining power (e.g., Cutler, McClellan, and Newhouse 2000; Sorensen 2003) and relative to the previous cost-based system of provider payments (e.g., Dranove, Shanley, and White 1993). Despite these negotiations, even for narrowly defined procedures, there is a tremendous amount of price dispersion.[3] As seen in Table 1, prices vary considerably for a mammogram, a routine and relatively homogeneous procedure.[4] Within a small geographic market, consumers with insurance from CIGNA can pay between \$202 and \$496 for a mammogram. Those insured by Blue Cross and Blue Shield can pay anywhere from \$251 to \$470. Table 1 of Ginsburg (2010) reports private insurer payment rates to hospitals for eight separate markets, most of them major metropolitan areas. On average, the median payment rate for inpatient care is 47 percent lower than the maximum payment. In the large claims database I use (discussed in Section II), for a given geographic market and narrowly defined procedure, moving someone from the ninetieth percentile of the price distribution down to the median reduces the price by 35 percent on average.

Despite the large amount of dispersion, prices negotiated between insurers and providers are generally not publicly known (Stockwell Farrell et al. 2010; United States Government Accountability Office 2011; Painter and Chernew 2012; Rosenthal, Lu, and Cram 2013). Only very recently have firms and insurers begun to provide consumers access to prices. In 2012, CIGNA unveiled a website available to its insureds that helps them compare providers' prices; WellPoint has had similar resources for its insureds since 2009; and a number of private firms that are not insurers have begun to supply price information as well. In addition to private market efforts to increase transparency, more than 30 states require hospitals to disclose charges for common procedures and post them online (Christensen, Floyd, and Maffett 2014). Although there are concerns that price transparency could foster collusion and actually lead to higher prices (Cutler and Dafny 2011), the trend appears to be toward greater price transparency.

How do consumers search with price information firms? Compass is typically hired by a self-insured firm on behalf of the firm's employees. The client firm's employees are then able to use Compass's services without paying any fees. To

[3] There is a long literature that explores the impact of search frictions on equilibrium prices, price dispersion, and changes in prices over time (e.g., Stigler 1961; Diamond 1971; Burdett and Judd 1983; Hortaçsu and Syverson 2004; Hong and Shum 2006; Tappata 2009). There is also a growing literature in insurance choice and frictions in Medicare Part D (e.g., Abaluck and Gruber 2011; Miller 2014; Ho, Hogan, and Scott Morton 2015; Polyakova 2015).

[4] These are not the widely available charge data, but the actual prices negotiated between the providers and insurers. They are available on New Hampshire's HealthCost website: www.nhhealthcost.org. All providers are within a 20-mile radius of zip code 03101.

Table 1—Price Dispersion for Mammograms

	CIGNA	Harvard Pilgrim	BCBS
Dartmouth Hitchcock South	202	340	328
Elliot Hospital	259	317	310
Derry Imaging Center	263	334	330
St. Joseph Hospital	279	225	358
Southern NH Radiology Consultants, PC	283	275	251
Catholic Medical Center	323	513	438
Concord Hospital	369	882	355
Southern NH Medical Center	369	356	419
Parkland Medical Center	496	477	470

Notes: Prices, in dollars, for a mammogram by provider. Data publicly available at New Hampshire HealthCost website. Prices for patients on a PPO plan with the specified insurer. BCBS is Blue Cross and Blue Shield. All providers are within a 20 mile radius of zip code 03101 (located in the most populous city in New Hampshire).

obtain prices, the employee contacts Compass, indicates what care she needs, and provides information on her geographic location and health insurance. Compass then supplies a list of prices negotiated between insurers and providers.[5]

In conjunction with the increase in transparency, consumers are facing greater health care costs. Between 2004 and 2014, worker contributions for insurance premiums have risen approximately 45–53 percent in real terms, from $278 per month to $402.[6] In addition to higher premiums, consumers are experiencing less generous cost-sharing. Between 2006 and 2014, the share of covered workers in high-deductible health plans rose from 4 percent to 20 percent (Claxton et al. 2014). A number of studies, (e.g., Parente, Feldman, and Christianson 2004; Buntin, 2006; Dixon, Greene, and Hibbard 2008; Haviland et al. 2011), have shown that health care expenditures tend to fall when consumers are switched to high-deductible health plans. Although this is consistent with the hypothesis of consumer-directed health care—that consumers will shop around and find lower priced providers when given incentives to do so—it is not direct evidence of this behavior. Without data on search itself, it is difficult to refute the possibility that consumers are simply purchasing less care as in Brot-Goldberg et al. (2015).

II. Data

The data come from one of Compass's large corporate clients.[7] The client owns and operates restaurants throughout the United States. It offers health benefits to employees who are in senior positions at the restaurants (e.g., manager, head chef) and those who work in the corporate offices. The client self-insures, but contracts with a major insurer to administer the health plans. The data include the date that employees gained access to Compass, a measure of when the employees contacted Compass for price information, the employees' medical claims, and information

[5] This is the allowed amount on the medical claim. This information can be combined with a consumer's nonlinear insurance contract to reflect the consumer's out-of-pocket price.

[6] Reported figures are for family coverage in real 2014 dollars. Single coverage has risen from $59 per month to $90 per month over the same time frame, 2004–2014.

[7] The identity of the client must remain anonymous due to a nondisclosure agreement.

about the insurance plans from which the employees chose. Corporate office employees gained access to Compass on September 27, 2010; noncorporate employees gained access at the start of 2011.

The unique feature of these data is the direct measure of consumer search. Employees may contact Compass via telephone or email, but the great majority of contacts were over the phone; for simplicity, I will refer to all inquiries for price information as calls to Compass or search. Although Compass provides a number of services to its clients, my measure of search only includes calls in which the employee would have been given price information.[8] The data do not include information on exactly which procedure was called about, but do include which employee called, the date of the call, and whether the contact was about price information.

The claims data consist of all the employees' medical claims from 2009 and 2010. The claims include information about the 387,774 distinct procedures: exactly what procedure was performed (using the American Medical Association's CPT billing codes), the employee who used the care (including family members covered by the employee's health insurance policy), the "setting" of the care (hospital inpatient, hospital outpatient, hospital imaging, physician imaging, physician's office, and global imaging facility), the transacted price for that procedure, and the date that the procedure took place. One employee is excluded from the sample because she had two procedures with an average price more than 70 standard deviations above the rest of the sample.[9]

The top panel of Table 2 shows that in the final three months of 2010, 12 percent of the corporate employees searched for price information at least once in that time period. For 2010, the employees chose between the two insurance plans described in Table 3. In both the corporate and noncorporate groups, approximately half of the employees chose the more generous insurance plan. This plan had a deductible of $600 compared to a deductible of $1,250 for the less generous plan. The demographic information presented in the next five rows of Table 2 indicates that corporate office employees were slightly older, had larger families, and lived in slightly higher socioeconomic status zip codes than noncorporate employees.[10]

The bottom panel of Table 2 provides information on employees' care use. The mean price of procedures obtained by corporate employees was $146; for noncorporate employees, the mean price was $142. There is a large amount of dispersion around the mean price as well. For a given market, procedure, and setting, the ninetieth percentile of the price distribution is 35 percent larger on average than the median. Figure 1 shows kernel density estimates of the price distributions

[8] The specific categories included are contacts classified as about prices, prices and quality, scheduling appointments, coordination of care, and care road map. More than 88 percent of calls in these categories were about prices. Excluded contacts were those classified as questions about insurance, prescription reviews, bill summaries, and getting medical records.

[9] Including this employee in the analysis does not qualitatively affect the results. Neither does excluding just the two outlier procedures and using that employee's other medical claims.

[10] Because I observe limited individual demographics, I match employees' five-digit zip codes to the demographic information from the 2010 Census. The Census Bureau reports that the median income in 2010 for households with the head younger than 65 years of age was $56,850, that the fraction of the population 25+ with a bachelor's degree from 2008–2012 was 28.5 percent, and that 78 percent of the population reported being white in 2012. Per insured person, employees spent about $2,664 on health care; this is somewhat less than the national average of $3,583 (Health Care Cost Institute 2012).

TABLE 2—SUMMARY STATISTICS FOR EMPLOYEES

	Corporate	Noncorporate
Panel A. Search and demographic data		
Called for price information in 2010	0.12	—
	(0.33)	—
Chose generous insurance plan	0.50	0.50
	(0.50)	(0.49)
Number of people covered by plan	2.82	2.01
	(1.43)	(1.42)
Age	42.69	38.89
	(8.01)	(8.46)
Median household income	$63,966	$48,225
	(19,651)	(16,407)
Fraction with college or more	0.40	0.27
	(0.16)	(0.14)
Fraction white	0.80	0.78
	(0.14)	(0.17)
Panel B. Medical claims data		
Price	$146	$142
	(1,081)	(1,245)
Per person health spending, pre-access 2010, conditional on positive spending	$3,865	$3,774
	(21,085)	(22,269)
Per person health spending, pre-access 2010	$3,667	$2,194
	(20,555)	(6,340)
Fraction met deductible, pre-access 2010, conditional on positive spending	0.32	0.29
	(0.47)	(0.44)

Notes: Means and standard deviations reported. Called for price information in 2010 indicates fraction of employees who contacted Compass at some point when they had access (in 2010). Top panel for 644 corporate employees and 5,564 noncorporate employees. Bottom panel based on 89,575 corporate procedures and 298,199 noncorporate procedures. "Per person" indicates variable averaged over those covered by employee's insurance plan. Type of care determined using American Medical Association's CPT codes.

for care received between January 1, 2010 and the date the corporate employees gained access to Compass. More precisely, I regress the natural log of the price on market-procedure-setting fixed effects and plot the kernel density estimates of the residuals. As seen in the figure, not only the means, but the entire distributions of prices received by corporate and noncorporate employees are similar. As discussed in Section III, the similarity of prices across the groups plays an important role in the empirical strategy.

In addition to receiving similar prices, corporate and noncorporate employees who obtain a positive amount of care receive similar amounts of care. Table 2 presents health expenditures per person covered by the employee's insurance. Corporate employees who had received care before access consumed $3,865 on average. During that same time period, noncorporate employees who had received care consumed only slightly less, $3,774. Figure 2 shows the distributions of health care expenditures for corporate and noncorporate employees who had received care. The corporate employees spent slightly more than the noncorporate employees. Although the distributions are comparable, noncorporate employees were considerably less likely to have consumed any care. Overall, noncorporate employees spent only 60 percent

TABLE 3—MAIN FEATURES OF INSURANCE PLAN OPTIONS

	High	Low
Deductible	$600	$1,250
Doctor visit	$30 co-pay	$30 co-pay
Hospital visit	20 percent after deductible	20 percent after deductible
Out-of-pocket maximum	$2,000	$5,000

Notes: Structure of PPO insurance plans offered to employees in 2010. High column indicates option with greater coverage. In-network amounts are listed. Out-of-network deductibles and maximums double, coinsurance rate 40 percent instead of 20 percent. $150 co-pay for emergency visits in 2010 only.

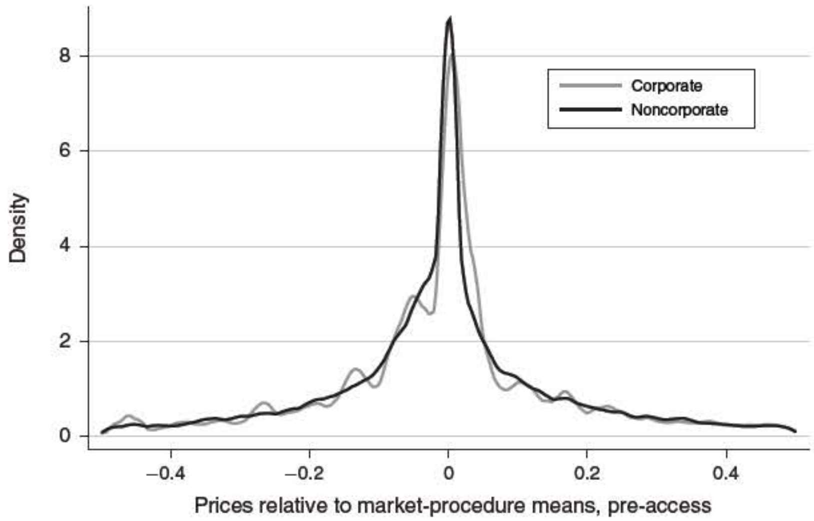

FIGURE 1. DISTRIBUTION OF PRICES BEFORE SEPTEMBER 27, 2010

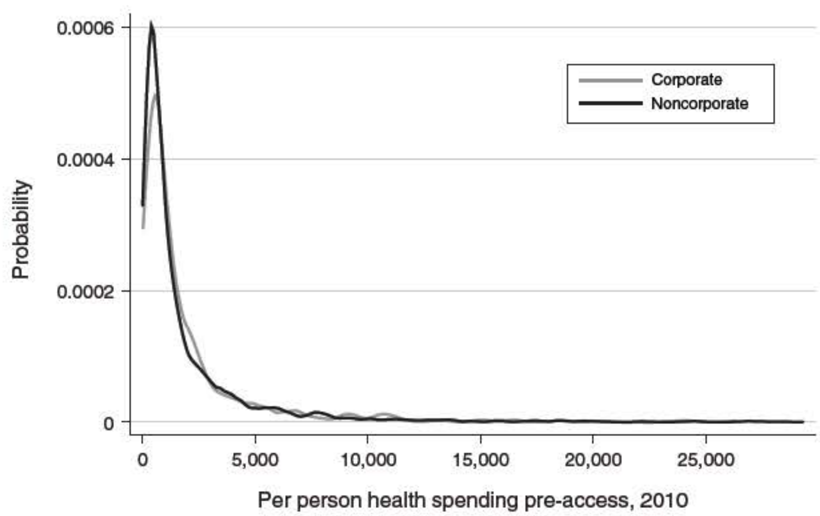

FIGURE 2. DISTRIBUTION OF EXPENDITURES BEFORE SEPTEMBER 27, 2010

of what the average corporate employees spent. This difference raises some concern that all noncorporate employees might not be adequate controls for the behavior of corporate employees and motivates the use of the matching approach taken in parts of the empirical analysis.

III. Access, Search, and Prices Paid for Care

A. *Empirical Strategy*

On September 27, 2010, the corporate office employees gained access to Compass. This was a pilot program to determine whether the company should hire Compass for all of its employees. The employees were not asked to volunteer, they were simply given access if they worked for the corporate offices. In addition, they did not know that they would be receiving access, so there is little scope for their pre-access behavior to have been affected. On January 1, 2011, the noncorporate employees were also given access to Compass.

I take advantage of this difference in timing to estimate how access to price information affects prices paid for care. Using the claims data from 2009 and 2010, I estimate the differences-in-differences specification

$$\ln(price_{ijmt}) = (post_t \times corporate\ employee_i)\,\beta_1 + Z_c\gamma + \lambda_w + \lambda_{jm} + \lambda_i + \varepsilon_{ijmt}. \tag{1}$$

$price_{ijmt}$ is the negotiated price for person i, procedure j, in market m, at time t. The transacted price is used to capture the total price change, not just the employee's out-of-pocket reduction. $post_t \times corporate\ employee_i$ is the differences-in-differences variable; Z_c is an indicator for whether the employee had hit the coinsurance portion of her insurance plan; λ_w are week-by-year fixed effects that remove any trends or seasonality in prices; λ_{jm} are market-by-procedure-by-setting fixed effects (settings are hospital inpatient, hospital outpatient, doctor's office, global imaging facility, or other imaging facility); λ_i are employee fixed effects; and ε is an error term.[11] The main effects for $post_t$ and $corporate\ employee_i$ are not explicitly included in the regression because they are not separately identifiable from the week and employee fixed effects. Compass treats the Core-Based Statistical Area (CBSA) as the market when giving information to its clients and that convention is followed in this analysis.[12] Standard errors are clustered at the market level to account for any correlations in the residuals within a market over time.

The key identifying assumption in equation (1) is that corporate and noncorporate employees would have experienced the same percentage change in prices after September 27, 2010 had neither group been given access to Compass. Even if there

[11] For the full sample, there are 104 week-by-year fixed effects, 5,580 employee fixed effects, and 68,876 market-procedure-setting fixed effects.

[12] Core-Based Statistical Areas are Metro and Micropolitan Statistical Areas defined by the Office of Management and Budget.

are systematic differences in the amount of care used, it is the trend in prices that is critical to the empirical analysis. I run pre-trend tests to show that corporate office employees were not on different price trends prior to access and placebo tests to show that counterfactual dates of access do not produce similar estimates. These tests lend credence to the internal validity of the estimates, but their external validity is less clear. For example, my sample of employees is somewhat more educated than the general population.[13] If education is associated with the returns to having price information, then my estimates will overstate the impacts of price information for the population as a whole.

It is plausible that access leads to lower prices because employees are using the price information, i.e., searching. This suggests estimating

$$\text{(2)} \qquad \ln(price_{ijmt}) = searched_{ijmt}\beta_1 + Z_c\gamma + \lambda_w + \lambda_{jm} + \lambda_i + \varepsilon_{ijmt},$$

where $price_{ijmt}$ is the price that employee i paid for procedure j in market m at time t, $searched_{ijmt}$ indicates whether the employee searched for price information for that procedure, Z_c is an indicator for the employee having met her deductible, λ_w are week fixed effects, λ_{jm} are market-procedure-setting fixed effects, and λ_i are employee fixed effects. However, $search_{ijmt}$ is likely to be correlated with omitted variables that affect the price of care (e.g., previous knowledge of prices). Instead of estimating equation (2) directly, I instrument for whether an employee searched with whether the employee had access to price information. The first stage is given by

$$\text{(3)} \qquad searched_{ijmt} = (post_t \times corporate\ employee_i)\beta_1^1 + Z_c\gamma^1 + \lambda_w^1 + \lambda_{jm}^1 + \lambda_i^1 + \varepsilon_{ijmt}^1.$$

Because I use the 2009 and 2010 claims data in the IV analysis, access to Compass is the differences-in-differences variable used previously: $post_t \times corporate\ employee_i$.

As mentioned before, I observe the date that someone on the employee's health plan searched, not the procedures for which they searched. This creates two ambiguities. First, to estimate the relationship between search and prices, I need to map the dates of search onto procedures for which employees received price information. I use three approaches. First, I assume that any medical care the employee received within 30 days of calling Compass is medical care for which she received price information. Unlike many goods, there is a significant time lag between deciding to purchase certain types of medical care and actually being able to consume it (Coyte et al. 1994; Bell et al. 1998).[14] The 30-day window allows enough time for the employee to have received the care she obtained price information for without being

[13] In its Digest of Education Statistics, The National Center for Education Statistics reports that approximately one-third of Americans between 25 and 64 years old had a bachelor's degree or higher in 2012. However, 40 percent of the corporate employees in my sample (those who are able to search) have a bachelor's degree or more.

[14] Coyte et al. (1994) and Bell et al. (1998) surveyed hospitals and found that the median waiting time for a consultation for a knee replacement was between 2 weeks and 25 days. The mean wait time was 3.2 weeks while the ninetieth percentile of the distribution was 4 weeks (Coyte et al. 1994).

overly inclusive. Second, I use the same 30-day period as before, but assume employees do not forget the price information they have previously obtained. Specifically, if an employee searched for a procedure in the past, I mark any subsequent occurrence of that procedure as having been searched for as well. And lastly, I count any procedure after the first search as something the person received information about. Although this clearly overstates the information available to the employee, it will provide a lower bound on the impact of search on prices.

The second ambiguity is related to who called for price information. When an employee's health plan covers multiple individuals, I cannot observe exactly which person called. Although this may appear problematic, it is not obvious that the person who makes the call will be the same person who receives care (especially in the case of children) and it seems likely that the family will share the information it receives. When using the mappings described above, I assume that a call for price information applies to care received by any person covered by the employee's health plan. To the extent that price information is not shared within the family, I will tend to overcount the amount of care for which individuals have price information. As with the third method of assigning calls to procedures, this will tend to understate the impact of search on prices in the IV analysis.

B. *Results for Access and Prices Paid*

The results from estimating equation (1) are presented in Table 4. If interpreted causally, the baseline estimate implies that gaining access to Compass reduced prices paid by 1.6 percent on average. Although the price data are noisy, the estimate is statistically significant at conventional levels.

Because there is so much variation in health care prices, one might worry that outliers are driving the results. To address this concern, I winsorize the top and bottom 5 percent of observations and estimate equation (1). The results are shown in column 2. The point estimate falls slightly in magnitude to −0.014, but remains highly statistically significant.

Access to price information is unlikely to affect all types of care equally (Bloche 2006; Sinaiko and Rosenthal 2011; Painter and Chernew 2012). Primary care might be less amenable to search because patients have built relationships with their providers. These relationships could make them less price sensitive for this type of care. To assess this possibility, I interact the differences-in-differences variable with an indicator for whether or not the employee received only primary care on the day of the procedure.[15] As seen in column 3, for non-primary care, the estimated impact of access is the same as the baseline. However, the impact of access for primary care is closer to zero and statistically distinguishable from the impact on non-primary care. Combining the coefficients suggests that the impact of access on prices for primary care is a statistically insignificant 0.008.

[15] Specifically, I estimate

$$\ln(price_{ijmt}) = (post_t \times corporate\ employee_i)\beta_1 + (post_t \times corporate\ employee_i \times primary\ only_{it})\beta_2 + primary\ only_{it}\beta_3 + Z_c\gamma + \lambda_w + \lambda_{jm} + \lambda_i + \varepsilon_{ijmt}.$$

The coefficients β_1 and β_2 are presented.

Table 4—Effect of Access to Price Information on Prices Paid

			Separate effects for			
	Baseline (1)	Winsorized (2)	Primary care (3)	Number of procedures (4)	Met deductible (5)	Emergency care (6)
Post × corporate employee	−0.016	−0.014	−0.016	−0.016	−0.019	−0.018
	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Interactions with:						
Primary care			0.024			
			(0.012)			
15+ procedures on day				0.011		
				(0.06)		
Met deductible					0.009	
					(0.004)	
Emergency care						0.011
						(0.019)
Adjusted R^2	0.925	0.947	0.925	0.925	0.925	0.925
Observations	387,774	387,774	387,774	387,774	387,774	387,774

Notes: Dependent variable is ln(price). Regressions include week-year, employee, and market-procedure-setting fixed effects, and indicators for whether employee had fulfilled deductible. Columns 3–6 are baseline specification where the DD estimator interacted with specified indicator. 15+ procedures on day indicates employee had more than 15 procedures on day of the procedure. Emergency care indicates employee received emergency care that day. Standard errors are clustered by market.

Another concern is that patients will not be able to search effectively for complicated care. As the bundle of medical care increases in complexity, the probability of receiving accurate price estimates falls. I proxy for the complexity of care with the number of procedures a person receives in a day. On average, employees receive almost 7 procedures per day, but there is a long right tail with some employees receiving more than 50 procedures in a day. I interact an indicator for receiving 15 or more procedures on a given day with the differences-in-differences estimator and present the results in column 4. Access is associated with a 1.6 percent reduction in prices paid when the employee had fewer than 15 procedures that day, but little measurable impact on days with 15 or more procedures. This result is robust to specifying alternative procedure cutoffs, e.g., 20 procedures on the day.

People who have met the deductible of their insurance contracts could be less likely to search and so less likely to obtain price reductions with access to price information. I interact the differences-in-differences estimator with an indicator for whether or not the employee had met her deductible and estimate this version of equation (1). Column 5 of Table 4 reports the results. Access to price information had larger impacts for employees who had not met their deductibles (1.8 percent reduction) than for employees who had met their deductibles (0.7 percent reduction).

Emergency care does not seem particularly amenable to search because of the urgent nature of the problem. To assess this possibility, I interact the differences-in-differences variable with an indicator for whether or not the person had emergency care on the given day and present the results in the final column of Table 4. For non-emergency care, the point estimate is similar to the baseline result. For emergency care, the estimated impact of access is much smaller in magnitude, but

I lack the statistical power to statistically distinguish the impact of access on emergency and non-emergency-care.

The identifying assumption for the differences-in-differences framework is that the corporate and noncorporate employees would have continued on the same trend had neither group gained access to Compass. Although this is not directly testable, I can test whether the two groups of employees were on the same trends prior to access. If they were not, then it casts serious doubt on the validity of the identifying assumption. First, I interact an indicator for being a corporate employee with a linear trend (in weeks). Second, I test for whether the corporate office employees were on a different linear trend in 2009 or in 2010 before they had access.[16] This is distinct from the first approach because it only uses information from before access to Compass to estimate the differential trends. And lastly, I include week dummies interacted with whether the person was a corporate employee for the 20 weeks preceding access. The results for these tests are presented in Table 5.

Column 2 of Table 5 shows that that the differential linear trend is not statistically distinguishable from zero. Column 3 shows that corporate office employees were not on differential linear trends in either 2009 or the months of 2010 in which they did not have access. Column 4 presents the estimated differences in prices paid by corporate employees in the five weeks preceding access to Compass.[17] There is no clear downward trend that would suggest the differences-in-differences coefficient is simply picking up a spurious correlation.

In addition to the pretrend tests, I have run placebo tests. These tests change the date of corporate access to an alternative date, e.g., February 1, 2009, and then estimate equation (1). In this example, the hypothetical access date sets the differences-in-differences estimator to one for the corporate group for all care received on or after February 1, 2009. Using the first day of each month between February, 2009 and August, 2010 provides 19 placebo access dates. Out of these dates, none produce a statistically significant impact of access.

As we saw in Table 2, corporate employees were more likely to have used care than noncorporate employees. This raises concerns that some of the noncorporate employees might not be good controls in the differences-in-differences specification. Because of this, I implement a matching estimator to compare corporate employees to noncorporate employees who are similar on their observables. For each corporate employee i, I match noncorporate employee j to i if j is in the same CBSA as i and if

$$||X_j - X_i|| < m. \tag{4}$$

In practice, I let X be per person health spending in 2009 and choose m in two ways. First, I let m vary from \$50 to \$150. Second, I let m be between 4 percent and 12 percent of the corporate employee's 2009 per person health spending. I stack the matched samples and estimate equation (1) on the matched data. The

[16] Because the regression specification includes week-year fixed effects, I create a new variable that is the week-year interacted with whether the person is a corporate employee. I create separate variables for 2009 and for the portion of 2010 before corporate employees had access.

[17] The full results for all 20 weeks are presented in online Appendix Table A.1.

Table 5—Access to Price Information and Prices Paid: Pre-trend Tests

	Baseline (1)	Add corporate linear trend (2)	Pre-period linear trends (3)	Pre-period dummies (4)
Post × corporate employee	−0.016	−0.011	−0.023	−0.017
	(0.004)	(0.005)	(0.005)	(0.004)
Linear trend × corporate emp.		−0.0001		
		(0.0001)		
Linear pre-trends × corp. emp.				
2009			−0.0002	
			(0.0002)	
2010			−0.0003	
			(0.0002)	
Weeks preceding access				
1				0.023
				(0.025)
2				−0.005
				(0.013)
3				−0.030
				(0.018)
4				−0.011
				(0.010)
5				0.009
				(0.013)
Adjusted R^2	0.925	0.925	0.925	0.925
Observations	387,774	387,774	387,774	387,774

Notes: Dependent variable is ln(price). Column 2 adds linear trend interacted with corporate employee. Column 3 adds linear trends interacted with corporate employee for specified time periods (and equal to zero outside of those time periods). Column 4 includes indicators for the 20 weeks before corporate access interacted with indicator for corporate employees. All regressions include fixed effects for the week-year, employee, and market-procedure-setting, and indicators for whether the employee had fulfilled the deductible. Standard errors are clustered by market.

market-procedure-setting fixed effects are estimated separately by matched group; i.e., the first corporate employee and her matched noncorporate employees have a different set of market-procedure-setting fixed effects from the second corporate employee and her matched noncorporate employees.[18] I weight the regression to account for the matching of multiple noncorporate employees to a single corporate employee.[19]

The results are presented in Table 6. With a \$50 matching window, the estimate suggests that access to price information reduces prices paid by 1.7 percent.

[18] In principle, all of the covariates could be allowed to vary by the matched group. However in practice, the employee and week fixed effects are not strongly correlated with the differences-in-differences variable after the procedure-market-setting-matched group fixed effects have been removed, and so have little impact on the estimated impact of access. For computational ease and statistical efficiency, I do not include these additional interactions in the estimation.

[19] The noncorporate observations matched to a given corporate employee are weighted so that they sum to one. Intuitively, this creates an "average" noncorporate employee against whom the corporate employee is being compared. More specifically, if corporate employee i is matched to three different noncorporate employees, each of those noncorporate employees' observations will be given a weight of one-third. The corporate employee's observations will all receive a weight of one.

TABLE 6—ACCESS TO PRICE INFORMATION AND PRICES PAID: MATCHING ESTIMATOR

	$m = \$50$ (1)	$m = \$100$ (2)	$m = \$150$ (3)
Panel A. Matches within m dollars			
Post × corporate employee	−0.017	−0.019	−0.017
	(0.008)	(0.006)	(0.007)
Observations	282,375	411,704	538,198
	$m = 4$ percent	$m = 8$ percent	$m = 12$ percent
Panel B. Matches within m percent			
Post × corporate employee	−0.017	−0.014	−0.014
	(0.005)	(0.006)	(0.006)
Observations	198,903	306,073	413,804

Notes: Dependent variable is ln(price). Corporate employees matched to noncorporate employees by market and 2009 per person health care spending. Panel A finds matches based on dollar amounts, panel B on percentages. Matching regressions include week-year, employee, and market-procedure-setting-matched group fixed effects, and indicators for whether the employee had fulfilled the deductible. Standard errors are clustered by market.

Columns 2 and 3 widen the range in which matches are found, but produce very similar point estimates. As seen in columns 4–6, matching on percentages produces qualitatively similar results. Overall, these results are consistent with those found in the unmatched differences-in-differences approach and provide additional evidence that access reduced prices paid.

C. *Sources of Estimated Price Reductions*

Receiving access to price information might affect prices in health care in a number of ways. On the demand side, it might lead employees to search for price information and switch to lower priced providers. In addition, it might lead employees to search and adjust their use of care. For instance, an employee might call to learn the price for a procedure, find out it is much more expensive than anticipated, and choose to not receive that care; alternatively, the employee might learn the price is much lower than anticipated and choose to receive the care. In this example, prices paid could fall because of an adjustment on the extensive margin even without employees switching providers. On the supply side, access to price information could increase insurers' bargaining power and allow them to negotiate lower prices than before. In my data, it is not likely that there are supply side responses to the employees' access to price information because the employees are spread throughout the United States and are effectively a zero measure set of health care consumers in any given market. As such, their insurer's bargaining power is not likely to have changed.

First, I test whether access to price information increases the probability that an employee switches providers. A subset of the American Medical Association's CPT billing codes indicate whether the patient was a new or established patient. This distinction is made on the codes that physicians use to bill for the time they spend with a patient. For example, CPT code 99213 is used for an "Office or other outpatient visit for the evaluation and management of an *established* patient," while CPT code 99201 is for new patients: "Office or other outpatient visit for the evaluation and management of a *new* patient" (emphasis added).[20] There are ten such CPT codes that effectively indicate whether or not the patient was seeing a new doctor.

For this subset of procedures, I estimate

$$(5) \qquad new\ physician_{ijmt} = (post_t \times corporate\ employee_i)\beta_1 + Z_c\gamma + \lambda_{j'} + \lambda_w + \varepsilon_{ijmt}.$$

$new\ physician_{ijmt}$ indicates whether procedure j was provided by a physician who is new to employee i in market m at time t. Z_c contains indicators for the setting of the care, whether the employee had met her deductible, and demographics; and λ_w are week-year fixed effects. Because the indicator for seeing a new physician is based entirely on the CPT code for the procedure, including the procedure-market-setting fixed effects would perfectly predict whether the visit was to a new physician or not. However, for each CPT code for a new patient, there is a corresponding CPT code for an established patient. I group corresponding codes together and include a set of these modified procedure fixed effects, $\lambda_{j'}$, to partially control for the types of care employees are receiving. Employee fixed effects were removed due to the concern that employees who go to the doctor multiple times in a given year could be unrepresentative of the employees more generally. However, in practice, I show that specifications with and without employee fixed effects produce very similar results.

Estimates are presented in Table 7. The first column suggests that access to Compass increases the probability of seeing a new physician by 2.4 percentage points.[21] Because only 17 percent of the visits are to new doctors, this is a 14 percent increase in the probability of seeing a new doctor. This baseline specification uses variation both across employees and within an employee over time. If the corporate office employees who went to the doctor after they had access to price information happened to live in markets where patients often switch physicians, then the results could be spurious. When market fixed effects are included, the point estimate changes very little and still implies a very large response to access to price information.

In column 3, employee fixed effects are included. This removes the possibility that the particular employees who went to the doctor after gaining access to Compass were inherently more likely to see a new physician. Once the employee fixed effects are included, the identification comes from an employee who had multiple physician visits in a single year; at least one member of that employee's family saw a doctor prior to access while another (or the same) member of that employee's family saw a doctor after access to Compass. The point estimate increases slightly in magnitude. Overall, these estimates suggest that having access to price information affects which providers employees went to and provides supporting evidence for the price reductions found previously.

[20] This information was obtained from the American Medical Association's website, https://ocm.ama-assn.org/OCM/CPTRelativeValueSearchResults.do?locality=3&keyword=99213.

[21] Estimating the regressions as probits produces results that are extremely similar to those presented.

TABLE 7—IMPACT OF ACCESS ON SEEING A NEW DOCTOR

	Baseline (1)	Market fixed effects (2)	Employee fixed effects (3)
Post × corporate employee	0.024	0.022	0.031
	(0.007)	(0.007)	(0.010)
CBSA fixed effects		X	
Employee fixed effects			X
Mean dependent variable	0.169	0.169	0.169
Adjusted R^2	0.026	0.031	0.120
Observations	63,704	63,704	63,704

Notes: Dependent variable is whether patient is seeing a new doctor. Data only include procedures differentiating between new and established patients. All columns include indicators for modified procedure code (described in text), type of setting where procedure performed, demographics, and week fixed effects. Standard errors are clustered by market.

If employees are switching providers, then it becomes particularly important to consider how access to Compass has affected the quality of care the employees receive. If the price reductions come at the cost of lower quality care, then it is not clear that welfare will increase in the long run.[22] I merge Medicare's Hospital Compare quality measures onto these data to test whether access to price information affected the quality of hospital care the employees received. Specifically, I average each hospital's process of care measure for heart attacks, heart failure, pneumonia, and surgical patients to create a single quality index.[23] Once again using the variation in access to Compass, I estimate equation (1), where the average of the quality measures is the dependent variable.

As seen in the first column of Table 8, gaining access to price information does not appear to be strongly linked to the quality of care received. If the point estimate were correct, then it would suggest that gaining access to information actually increases the quality of care received, though only by 1/13 of a standard deviation. Column 2 shows that the results do not change when I take the natural log of the dependent variable. We might think that employees just choose a hospital and not the amount of care they receive once at that hospital. In that case, there should only be one observation per employee-hospital. I use this restriction in column 3 and find similar results. Because the measures of quality are noisy at best (Doyle, Jr. et al. 2015) and might not be measures relevant to the actual type of care received, these results on quality are merely suggestive. However, they do suggest that reduced prices are not coming at the expense of quality of care.

It is difficult to directly address the extent to which changes in the quantity of care affect the prices employees paid for care. In the short run, the transaction prices

[22] Dranove and Satterthwaite (1992) show that if consumers only observe noisy signals of price and quality, an increase in the precision of price information can actually reduce consumer welfare in the long run. This result relies on a reduction in quality by producers that is large enough to offset the gains from lower prices.

[23] Physician specific measures of quality are not publicly available. I used the process of care measures that indicate the fraction of the time the hospital follows treatment guidelines for patients who present with the specified conditions. These measures have been shown to be correlated with actual outcomes by Peterson et al. (2006) and Fierer (2007) among others. The sample does not contain a sufficient number of observations to use the disease-specific measures of hospital quality.

TABLE 8—IMPACT OF ACCESS ON QUALITY OF HOSPITAL CARE

	Baseline (1)	ln(quality) (2)	One observation per visit (3)
Post × corporate employee	0.200	0.002	0.101
	(0.174)	(0.002)	(0.324)
Mean of dependent variable	97.072		96.964
SD of dependent variable	2.358		2.488
Adjusted R^2	0.854	0.834	0.875
Observations	23,123	23,123	8,415

Notes: Dependent variable is quality measure. All regressions include indicators for type of procedure, whether employee had fulfilled deductible yet, and fixed effects for the week-year fixed, employee, and market procedure. Column 3 only uses one observation per hospital visit. Standard errors are clustered by market.

negotiated between the insurer and the providers will not have changed. But when employees search and learn additional information, people who expected prices to be higher than they actually are might now choose to go to the doctor while people who expected prices to be low might now choose to not go to the doctor. Although I do not observe the employee's prior beliefs about prices, I do see that at least 90 percent of searches are followed by use of care.[24] This suggests that for no more than 10 percent of searches did the employee expect a much lower price and subsequently decide to forego care. However, because there is so much dispersion in prices, even small changes on the extensive margin could play an important role in explaining the observed price reductions.

Access to price information leads to lower transacted prices at least in part because consumers search. Because the impact of searching on prices is likely to vary across individuals, the IV regression will provide a LATE parameter that only applies to a subset of the population. As such, it is useful to get a better sense of who searches. Online Appendix Table B.1 provides summary statistics on corporate employees who searched in 2010 and corporate employees who did not search in 2010. Relative to each procedure's mean price in their market, searchers were not obtaining substantively different prices from nonsearchers and were quite similar on a number of demographic dimensions. However, searchers had consumed somewhat more care per covered person and were less likely to have chosen the more generous insurance plan. Thus, the IV estimate reflects impacts for people who were not getting unusually high prices, but were tending to use more care.

The IV estimates are given in Table 9 and the first stage estimates are shown in online Appendix A. Each column presents the estimated impact of search on prices for one of the mappings of calls to procedures described previously. As seen in column 1, when any procedure obtained within 30 days of calling is treated as one the employee received price information about, search is estimated to reduce the price by 17 percent. Although this is a very large price reduction, it is a reasonable

[24] This relies on assigning calls to particular procedures as in the IV analysis. The 90 percent estimate is for the most conservative of the mappings of calls to procedures.

Table 9—Impact of Search on Prices Paid

	One month (1)	One month or previous call (2)	Everything after first call (3)
Searched	−0.167	−0.137	−0.101
	(0.044)	(0.035)	(0.026)
F-stat, first stage	37.12	40.59	44.51
Observations	387,774	387,774	387,774

Notes: Instrumental variables results. Dependent variable is ln(price). First column is within 30 days; second column also counts procedures previously called about (according to 30-day measure); third column counts all procedures after an employee's first call. All regressions include fixed effects for the week-year, employee, and market-procedure-setting, and indicators for whether the employee had fulfilled the deductible. Standard errors are clustered by market.

one—searching achieves roughly half of the price reduction due to moving from the ninetieth percentile of the distribution down to the median.

In columns 2 and 3, results are presented for the other two methods of assigning search to procedures. Although the estimated impact decreases slightly in magnitude, it remains quite large and statistically distinguishable from zero. In each case, the first stage is strong and provides little concern about small sample bias (Stock and Yogo 2002). If the use of price transparency tools can reduce the prices paid by 10–17 percent, then why are the employees not calling for most of their care? One potentially important reason explored below is moral hazard in search.

IV. Moral Hazard in Search

Generally, price dispersion gives consumers an incentive to search. Although there is considerable price dispersion in health care, health insurance insulates consumers from price differences and so could lead to less search. Dionne (1981) first discussed how this type of moral hazard is distinct from other forms of moral hazard (e.g., Pauly 1968; Ehrlich and Becker 1972). It was further studied theoretically (Dionne 1984; Akin and Platt 2014), but has received very little empirical attention because data on search are rare.

A. *Empirical Strategy*

I use variation based on differences in employees' marginal price for care on September 27, 2010—the date the corporate office employees first gained access to Compass's price information. As seen in Table 3, in 2010, the employees had standard, nonlinear, preferred provider organization (PPO) insurance plans that included annual deductibles, cost-sharing provisions (coinsurance rates and co-pays), and out-of-pocket maximums to cap employees' total expenditure risk.[25] Because employees had consumed different amounts of care before they gained access

[25] The plans were administered by a single health insurer and had a single network of providers. The employees were also able to choose an HMO or EPO plan, but none did so.

to Compass, they were in different cost-sharing regions of their insurance plans. Approximately 31 percent of the corporate employees had met their deductibles by the date they gained access to Compass. On average, an employee's marginal price of care fell by 50 percent when her deductible was met.

The data are at the employee-by-week unit of observation. They begin in September of 2010 when corporate employees gained access to Compass and extend through the first 13 weeks of 2011. Initially, I only use data from 2010. The sample is restricted to corporate employees who received insurance through the company in 2010 and 2011. Although the exact procedure the employee seeks price information for is not observed, the date she called for prices is. I estimate probits of the form

$$(6) \qquad \Pr(called_{it} = 1) = \Phi(met\ deductible\ by\ access_i \delta_1 + \lambda_t + X_{it}\gamma_1),$$

where $called_{it}$ indicates whether employee i called Compass for price information in week t; Φ is the normal cumulative density function; $met\ deductible\ by\ access_i$ indicates whether the employee had met her deductible by the date she gained access to Compass's price information; λ_t is a set of week fixed effects that removes any week-to-week variation in the propensity to search; and X_{it} is a set of control variables that includes a cubic in cumulative spending on medical care for the employee up to date $t-1$ and demographic information based on the employee's five-digit zip code: per capita income, gender, education levels, unemployment level, log of the population, and race. Standard errors are clustered by employee.

Interpreting the results from this empirical strategy requires care. It is not clear that the marginal price changes discontinuously when employees meet their deductibles. For example, consider two employees near the deductible threshold who are both going to go see the doctor for a simple procedure. In practice, the employee who is \$1 below the threshold does not face a significantly higher marginal price than the employee who is \$1 past the threshold because both employees will be beyond the threshold once they receive care. More generally, some employees who are below the threshold may behave as though they face a low marginal price for care. This will lead equation (6) to understate the impact of insurance coverage on search.

Table 10 presents summary statistics for employees who had and those who had not met their deductibles by access in 2010. Importantly, there appears to be little difference across the groups in their 2009 health care spending, age, income, and other demographics. There does appear to be a slight difference in family size; those who had met their deductibles by access were from somewhat larger families. Although the two groups are comparable, I supplement the empirical strategy with the same matching approach used earlier. In this case, employees who had not met their deductibles are matched to similar employees who had met their deductibles. I again match exactly on the geographic market and use ranges of 2009 spending to determine matches. I stack matched groups and estimate

$$(7) \qquad called_{igt} = met\ deductible\ by\ access_i \delta_1 + \lambda_{tg} + X_{it}\gamma_{1g} + \eta_{igt}$$

Table 10—Summary Statistics for Corporate Employees

	Met deductible by access	Not met deductible by access	p-value of difference
Median per person health spending, 2009	$1,177	$1,070	0.14
Number covered per employee	3.3	2.6	0.03
Age	42	43	0.51
Per capita income	$64,006	$63,090	0.61
Fraction with college or more	0.39	0.40	0.53
Fraction white	0.81	0.78	0.11
Observations	175	390	

Notes: Unit of observation is the corporate employee. Statistics based on 565 corporate employees insured through company in 2010 and 2011. Met deductible by access is determined using 2010 data. Median health spending per covered individual reported for 2009.

Table 11—Deductible Status and Subsequent Use of Price Information

	Baseline (1)	Age, family, and zip code demos (2)	5th-order demand controls (3)	Demand controls bins (4)	Demand control pre-access (5)
Met deductible	−0.015	−0.016	−0.015	−0.012	−0.016
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Week f.e.	X	X	X	X	
Demand controls	X	X	X	X	X
Age and family size		X	X	X	X
Five-digit zip demographics		X	X	X	X
Mean of dependent variable	0.016	0.016	0.016	0.016	0.016
Pseudo R^2	0.050	0.084	0.087	0.106	0.078
Observations	7,345	7,345	7,345	7,345	7,345

Notes: Dependent variable is whether employee sought price information in a given week in 2010. Only periods in which employees had access to Compass are included. Met deductible indicates employee had met deductible on her insurance plan by the week she gained access to Compass. Week fixed effects included. Demand controls is a cubic in cumulative medical spending up to the previous week. Age and family size includes age, age-squared, and number of people in employee's family covered by the insurance contract. Demographics from the employee's five-digit zip code are described in the paper. Demand controls bins break previous spending into $200 bins and include dummies for each bin. Demand control pre-access uses cumulative medical spending by the employee in 2010 up to the date she gains access to Compass. A third-order polynomial in that measure is included. Standard errors are clustered by employee.

for each employee i in matched group g in week t. X_{it} is a third-order polynomial in previous medical spending. Note that the week fixed effects, λ_{tg}, vary for each matched group. In addition, the impact of past medical spending is allowed to vary by matched group.[26] Standard errors are clustered by employee.

B. *Results*

Column 1 of Table 11 reports the estimated marginal effects where only the demand controls and week fixed effects have been included. The results show that

[26] In practice, only the first order term of the polynomial varies with matched group. When the second or third order terms are also allowed to vary by matched group, collinearities prevent the model from being estimated with any reliability.

employees who had met the deductible were 1.5 percentage points less likely to search for price information in a given week. Relative to the average calling rate, this is a 90 percent difference. On average, meeting the deductible reduced the out-of-pocket price by 50 percent. Combining the estimates implies that the elasticity of the probability of search with respect to the fraction of the price consumers have to pay is approximately 1.8.

In the second column, controls for employee characteristics and demographics from the employee's five-digit zip code are included. The point estimate changes very little. Because the demand for medical care is likely related to both search and whether the person had met her deductible by the date of access, the remaining three columns of Table 11 include more flexible controls for previous medical spending to assess the sensitivity of the estimated marginal effect. Column 3 presents the results when a fifth-order polynomial of past spending is included. Column 4 breaks previous spending into $200 bins and includes those bins. In these specifications, there is potential for search to feed back into the demand controls because search in the first week of access could have an impact on the demand controls in the later weeks of 2010. Column 5 shuts down this concern by using a third-order polynomial of cumulative medical spending up to the date of access to Compass. This measure of demand for care does not vary over time for an individual and is completely determined before the employees had access to Compass. The estimated impacts change very little across all of these specifications.

As an additional robustness test, I restrict the sample to those who are within $200 of the deductible threshold. To the extent that employees are forward-looking in their health care consumption, the difference in search behavior between those just above and below the threshold will be attenuated. The results are presented in online Appendix C. The estimated marginal effects are consistent with those found in Table 11, but are estimated with very little precision.

The matching approach produces very similar results. These estimates are presented in Table 12. When employees are matched on geography and a narrow range ($50) of 2009 health care spending, the estimates suggest that having met the deductible lowers the probability of searching by 1.7 percentage points. As the matching window for 2009 medical spending increases, the point estimates remain stable. Matching on a percentage of the corporate employee's 2009 per person health spending produces similar results and continues to suggest that having met the deductible by access leads to a lower probability of searching.

It is possible that some omitted, employee-specific variable that has nothing to do with the marginal price for care leads to the observed correlation. For example, employees who care much more about quality than price could be less likely to search for price information and more likely to have met their deductibles. If this were true, if employee's decisions about search were unaffected by the marginal price for care, then the search patterns observed in 2010 should be observed in 2011 even after deductibles had been reset. To test this alternative hypothesis, I estimate equation (6) using data from 2011 and report the marginal effects in Table 13.

As seen in column 1, employees who had met their deductibles by access in 2010 were no less likely to search in 2011 than employees who had not met their deductibles in 2010. In each specification, the point estimate is very small,

TABLE 12—DEDUCTIBLE STATUS AND USE OF PRICE INFORMATION: MATCHING ESTIMATOR

	$m = \$50$ (1)	$m = \$100$ (2)	$m = \$150$ (3)
Panel A. Matches within m dollars			
Met deductible by access	−0.017	−0.015	−0.016
	(0.008)	(0.008)	(0.007)
Observations	18,746	35,685	50,999
	$m = 4$ percent	$m = 8$ percent	$m = 12$ percent
Panel B. Matches within m percent			
Met deductible by access	−0.013	−0.014	−0.015
	(0.007)	(0.007)	(0.007)
Observations	6,396	9,750	12,649

Notes: Dependent variable is whether employee searched that week. Employees matched by market and 2009 per person health care spending. Panel A matches on dollar interval, panel B on percentage interval. Matching regressions include controls for previous medical spending and week fixed effects. Standard errors are clustered by employee.

TABLE 13—DEDUCTIBLE STATUS AND USE OF PRICE INFORMATION IN THE NEXT YEAR

	Base (1)	Individual demos (2)	Zip code demos (3)
Met deductible	0.002	0.002	0.004
	(0.007)	(0.006)	(0.006)
Week f.e.	X	X	X
Demand controls	X	X	X
Age and family size		X	X
Five-digit zip demographics			X
Mean of dependent variable	0.020	0.020	0.020
Pseudo R^2	0.001	0.012	0.015
Observations	7,281	7,281	7,281

Notes: Dependent variable is whether employee sought price information in a given week in 2011. Only weeks in which employees had access to Compass are included. Met deductible indicates that the employee had met the deductible on her insurance plan by the week she gained access to Compass. Deductibles were reset on January 1, 2011. Demand controls are a cubic in the cumulative cost of her care up to the previous week. Age and family size includes variables for age, age-squared, and the number of people in the employee's family covered by the insurance contract. The demographics from the employee's five-digit zip code are described in the paper. Standard errors are clustered by employee.

positive, and nowhere near statistically significant.[27] These same results can be seen in Figure 3. Starting in January 2011, there does not appear to be a systematic relationship between an employee's 2010 deductible status and her 2011 search. This suggests it was not some time-invariant, person-specific factor that was driving the 2010 results.

[27] The number of observations does not exactly match that from the analysis in 2010 because 16 employees left their jobs in week 10 of the new year.

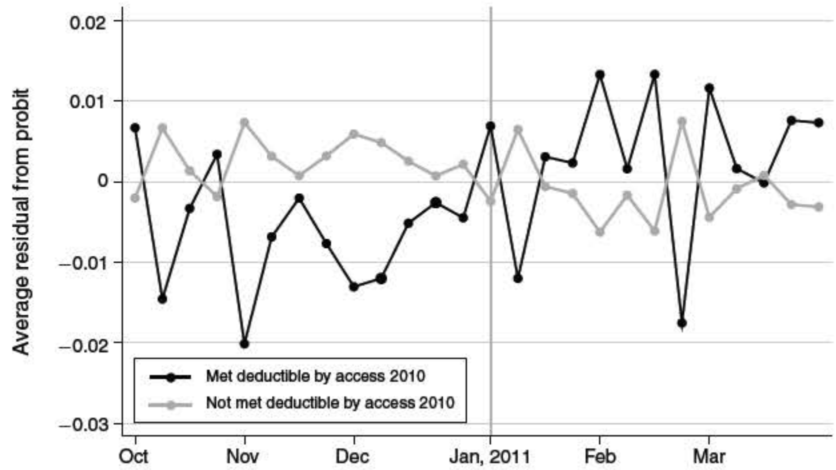

FIGURE 3. DEDUCTIBLE STATUS AT ACCESS AND SEARCH

V. Conclusion

There are huge information gaps in the market for health care, but these are shrinking as governments, insurers, and private companies begin to provide price information. I use a unique dataset with a direct measure of search to show that access to price information reduces the prices paid for care by 1.6 percent on average. The reduction is concentrated in types of care that are easier to plan for in advance and for employees who have greater incentives to search. Once employees gain access to price information, they become much more likely to visit a provider they had not seen previously. Despite this, their quality of care does not appear to fall dramatically. I find that search itself reduces the price paid by 10–17 percent, but that a relatively small amount of search occurs. I provide evidence that more generous insurance coverage leads to less search: employees who faced a lower marginal price of care on the date they gained access to Compass searched less during the remainder of the year. The results suggest that search is quite responsive to insurance coverage; the estimated elasticity of search with respect to out-of-pocket price is 1.8. Taken together, access to price information could have large impacts in the market for health care, but considering consumers' incentives to search is of primary importance.

There are important limitations to the findings. Because they are based upon the employees at a single firm that chose to hire Compass, there are concerns about external validity. The mechanism through which access to information and search can affect prices is also limited in my empirical work. In particular, I am not able to observe any general equilibrium changes to prices from impacts on insurer-provider bargaining, increased competition between providers, or other supply side reactions to the availability of price information and the incentives to use it. And lastly, it is not clear that reduced expenditures translate directly into consumer welfare gains because lower prices might come at the cost of lower quality.

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Original Investigation

Association Between Availability of Health Service Prices and Payments for These Services

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IMPORTANCE Recent governmental and private initiatives have sought to reduce health care costs by making health care prices more transparent.

OBJECTIVE To determine whether the use of an employer-sponsored private price transparency platform was associated with lower claims payments for 3 common medical services.

DESIGN Payments for clinical services provided were compared between patients who searched a pricing website before using the service with patients who had not researched prior to receiving this service. Multivariable generalized linear model regressions with propensity score adjustment controlled for demographic, geographic, and procedure differences. To test for selection bias, payments for individuals who used the platform to search for services (searchers) were compared with those who did not use the platform to search for services (nonsearchers) in the period before the platform was available. The exposure was the use of the price transparency platform to search for laboratory tests, advanced imaging services, or clinician office visits before receiving care for that service.

SETTING AND PARTICIPANTS Medical claims from 2010-2013 of 502 949 patients who were insured in the United States by 18 employers who provided a price transparency platform to their employees.

MAIN OUTCOMES AND MEASURES The primary outcome was total claims payments (the sum of employer and employee spending for each claim) for laboratory tests, advanced imaging services, and clinician office visits.

RESULTS Following access to the platform, 5.9% of 2 988 663 laboratory test claims, 6 9% of 76 768 advanced imaging claims, and 26.8% of 2 653 227 clinician office visit claims were associated with a prior search on the price transparency platform. Before having access to the price transparency platform, searchers had higher claims payments than nonsearchers for laboratory tests (4.11%; 95% CI, 1.87%-6.41%), higher payments for advanced imaging services (5.57%; 95% CI, 1.83%-9.44%), and no difference in payments for clinician office visits (0.26%; 95% CI; 0.53%-0.005%). Following access to the price transparency platform, relative claim payments for searchers were lower for searchers than nonsearchers by 13.93% (95% CI, 10.28%-17.43%) for laboratory tests, 13.15% (95% CI, 9.49%-16.66%) for advanced imaging, and 1.02% (95% CI, 0.57%-1.47%) for clinician office visits. The absolute payment differences were $3.45 (95% CI, $1.78-$5.12) for laboratory tests, $124.74 (95% CI, $83.06-$166.42) for advanced imaging services, and $1.18 (95% CI, $0.66-$1.70) for clinician office visits.

CONCLUSIONS AND RELEVANCE Use of price transparency information was associated with lower total claims payments for common medical services. The magnitude of the difference was largest for advanced imaging services and smallest for clinical office visits. Patient access to pricing information before obtaining clinical services may result in lower overall payments made for clinical care.

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Prices of medical services for commercially insured patients vary widely,[1-3] yet there is little correlation between price and the quality of care.[4] From an economic perspective, health care pricing is unique because many insurance contracts preclude disclosing negotiated rates,[7] resulting in patients making health care choices on factors other than cost.[5,6] Recent changes in the health care insurance market have resulted in commercially insured patients bearing a greater proportion of their health care costs.[8] In 2013, 48% of US residents had employer-sponsored health insurance. Of those, 20% were enrolled in a high-deductible health plan, up from 4% in 2006.[9] As patients have an increasing responsibility to pay for their care, they will likely demand access to prices charged for that care.

Previous studies of high-deductible health plans found that deductibles did not result in lower payments for care.[10] These studies were conducted when patients did not have access to health care pricing information and did not have the ability to select clinical services based on cost. To address this limitation, in addition to initiating cost sharing, employers seeking to reduce health care spending should provide their employees with accurate cost and quality information to help the patients make well-informed decisions about their care.[11-14]

Several state-administered initiatives have increased price transparency by reporting hospital charges or average reimbursement rates. In recent years, price transparency initiatives have emerged in the private sector and enhanced state efforts by providing personalized price information to patients.[15] Pricing information made available to patients reflects actual out-of-pocket costs for each individual patient by accounting for billed charge discounts, health benefit design, and deductibles.

Although it is widely perceived that greater transparency of pricing information should reduce health care costs, to our knowledge, no prior studies have shown this using private price transparency platforms. We examined the association between the availability of health service prices to patients and the total claims payments (the total amount paid by patient and insurer) for these services. We hypothesized that providing personalized price information would allow patients to identify and choose less expensive providers resulting in lower payments for medical services.

Methods

Population

The study population consisted of employees, their spouses, and their dependents from 18 large, self-insured employers who had access to a price transparency platform, Castlight Health, for varying amounts of time between 2010 and 2013. These employers, which represented such industries as retail, biotechnology, and manufacturing, offered a variety of insurance plans, including high-deductible, limited network, and preferred provider organization plans. Patients not residing in a metropolitan statistical area were excluded.

The University of California, Berkeley, Committee for Protection of Human Subjects did not require informed consent.

Transparency Technology

Eligible employees and their adult family members could access the platform online (both Internet and mobile) or by calling on the telephone. When registered individuals searched for a procedure, they were shown personalized out-of-pocket costs, which were based on the particular individual's insurance design, network, and deductible status. For the services examined in this study, prices shown on the website were based on individual *CPT* (*Current Procedural Terminology*) codes; for more complex services (eg, joint replacement surgery), prices were shown at the episode level. For clinician office visits, patients could also see satisfaction ratings and other nonprice information (eg, where the physician went to medical school), but these dimensions were not examined in this study because such information was not consistently available for all services or for all clinicians. Example results of pricing information available to patients are shown in eAppendix Figures A1 through A3 in the Supplement.

Data

We examined searches for laboratory tests, advanced imaging services (magnetic resonance imaging [MRI] and computed tomographic [CT] scans), and clinician office visits. These services were selected for 2 reasons: First, they are among the most frequently obtained outpatient services. Second, because these are usually elective services, patients may choose health care service facilities and locations based on price in advance of obtaining these services. We excluded all inpatient and emergency department claims because patients have limited ability to shop for providers of these services.

For each of these 3 services, we examined the relationship between searching the price transparency website and medical claims. Each of the 18 employers provided claims data for up to 2 years before they provided the platform (preperiod), and then for all subsequent periods. The data from the preperiod were used to examine potential baseline differences between searchers and nonsearchers.

Search Definitions

To link searches to claims, we first identified searches for laboratory tests, advanced imaging services, or clinician office visits conducted before obtaining that service. We defined laboratory test searches as searches for a laboratory procedure (eg, lipid panel or obstetric panel) or as containing the word string *lab*. We defined imaging searches as searches containing *MRI*, *CT*, *magnetic resonance imaging*, or *computed tomography*. We defined clinician office visit searches as searches for any type of clinician office visit (eg, primary care clinician or endocrinologist). Because family members may use a common account or search for another family member, we attributed any search to all household members.

For each service category, we defined *searchers* as those with at least 1 service-specific claim following a search. Those who did not search for a given service before receiving a claim for that service were defined as *nonsearchers*. Our primary treatment group consisted of patients with a service-specific claim made within 14 days after a search. We chose the 14-day period to approximate the time between searching for a service and realistically receiving an appointment. We also examined alternative search periods as robustness tests (eAppendix Section G Table G1 in the Supplement).

Statistical Approach

Medical claims at the procedure-code level were our primary unit of analysis. We classified the search status of each claim by the relation of the claim's date to the patient's search history. Because our outcome of interest was total health care spending, we used each claim's total payment amount (ie, the sum of the patient and employer payments) as the dependent variable. We first examined unadjusted payment differences between searchers and nonsearchers. Next, we used multivariable generalized linear model regressions with a log link and gamma distribution to isolate the association of searching vs other observed differences between searchers and nonsearchers.[16] The generalized linear model regressions were weighted using inverse-probability weights obtained from a propensity score model. Weights were determined using probit regression to predict the probability of being a searcher based on demographic variables: age, sex, year, and employer. The generalized linear model regression coefficients were converted into dollar values by computing the average marginal effect of the predicted values.

We controlled for demographic characteristics, time, geography, and employer interaction with insurance carrier. Specifically, year and month, metropolitan statistical area, and employer interaction with insurance carrier were considered to be fixed effects. To control for differences in procedure type, we included *CPT*-code as fixed effects in regression models. We also included each claim's patient cost-sharing. For office visits, we controlled for clinician specialty.

Selection Bias

Although the statistical model controls for a variety of confounding factors, searchers might differ from nonsearchers in various ways so that unobservable differences between them might still bias the results. For example, those who chose to search for a service may have already known price information through other channels and may have searched simply to confirm existing knowledge. After having access to the platform, such individuals would likely have had lower payments than nonsearchers. New price information would not have been the cause of any payment differences.

To test for unobservable differences, we used the data from before the platform had opened and conducted multivariable placebo regressions that examined differences in payments between those who would become searchers and those who never searched. We hypothesized that selection bias would obviate our results if these regressions showed that searchers had lower payments than nonsearchers before the transparency platform was available.

We also assessed for selection bias by performing a falsification test using multivariable regressions to compare payments received by searchers for services unrelated to the search with payments for nonsearchers. For example, we compared imaging services fees paid on behalf of nonsearchers with those paid on behalf of individuals who had searched for laboratory test fees. This test only included laboratory tests and advanced imaging services. We hypothesized that any difference in payments for unrelated services between searchers and nonsearchers would reflect selection bias.

Robustness

We conducted 3 additional tests for robustness. First, we categorized claims into 2 cost-sharing categories: no cost sharing (<5% of the cost paid by the patient) and full or partial cost sharing. We then used multivariable regressions to compare payments between the searchers and nonsearchers. We hypothesized that payment differences between searchers and nonsearchers would be higher for claims with full cost sharing due to a higher financial incentive to shop for care.

Next, we used multivariable regressions to examine differences in claims payments for 2 treatment groups: those with a relevant medical claim from 15 to 30 days after a search and those with a claim from more than 30 days after a search. For this test, we expected to find smaller differences between searchers and nonsearchers because the amount of time between the search and the claim had increased.

The heterogeneous effects of clinician office visits for new vs established patients were assessed using multivariable regression. We expected to find smaller payment differences between searchers and nonsearchers for established visits because patients might be less likely to change their established clinicians. Continuity of care, patient experience, and other nonprice attributes might play a larger role in how patients choose a clinician with whom he/she had planned to establish a continuing relationship.

Additional robustness and sensitivity tests are described in the eAppendix in the Supplement. These tests include testing sensitivity of results to alternate search window definitions, restricting the analysis sample to patients who used the price transparency platform in both the before and after periods, excluding high users from the analysis, using alternate controls for plan networks, and alternate controls for clinician satisfaction ratings.

All analyses were conducted using STATA version 13.0 (StataCorp). Robust standard errors were clustered at the zip code level. All significance testing was 2-sided with a significance threshold of $P < .05$.

Results

Descriptive Characteristics

A total of 502 949 individuals representing 253 757 households were included in this study. After each employer provided access to the platform, 304 247 individuals from 195 401 households received laboratory services, 37 384 individuals from 34 245 households underwent advanced imaging, and 446 290 individuals from 236 942 households visited a clinician (eAppendix Section B Figure B1 in the Supplement).

A total of 7485 households searched for a laboratory test, 2184 for an advanced imaging service, and 51 481 for a clinician office visit. After access to the platform, 5.9% of laboratory claims matched a laboratory search, 6.9% of advanced

Table 1. Demographics, Health Conditions, and Health Care Use of Searchers and Nonsearchers Prior to Access to the Search Platform

	Nonsearcher Patients (n=386 223)[a]	Searcher Patients (n=116 726)[b]	*P* Value[c]
Age, y, No. (%)			
0-24	138 480 (35.9)	40 566 (34.8)	
25-49	175 809 (45.5)	48 150 (41.3)	
50-64	64 465 (16.7)	26 317 (22.6)	
≥65	7469 (1.9)	1693 (1.5)	
Men, No. (%)	191 017 (49.5)	55 140 (47.2)	<.001
Household income of zip code, median (IQR), $	75 233 (52 940-95 299)	73 149 (53 038-90 240)	<.001
Medical conditions in year prior to access, No. (%)			
Pregnancy	6220 (1.6)	1798 (1.5)	.09
Diabetes			
without complications	7986 (2.1)	2904 (2.5)	.08
with complications	819 (0.2)	291 (0.2)	.50
COPD	5423 (1.4)	1733 (1.5)	.45
Congestive heart failure	749 (0.2)	202 (0.2)	.71
Medical spending and use in year prior to access			
Total medical spending in year prior to access, $[d]	559 (0-2108)	495 (0-1911)	.01
Service in year prior to access, median (IQR), No.			
Laboratory tests	5.0 (2.0-9.0)	5.0 (3.0-10.0)	>.99
Advanced imaging	1.0 (1.0-3.0)	1.0 (1.0-2.0)	>.99
Clinician office visits	3.0 (2.0-6.0)	3.0 (2.0-6.0)	>.99
Cost-sharing during postperiod, median (IQR), %			
Laboratory	0.2 (0.00-1.00)	0.2 (0.00-1.00)	.59
Advanced imaging	0.2 (0.10-1.00)	0.2 (0.2-1.00)	>.99
Clinician office visit	0.2 (0.10-1.00)	0.2 (0.05-1.00)	.95
Claims during postperiod, total No.			
Laboratory	2 813 300	175 363	
Imaging	71 455	5313	
Clinician office visit	1 941 650	711 577	

Abbreviations: COPD, chronic obstructive pulmonary disease; IQR, interquartile range.

[a] Nonsearchers are those who never use the platform to search for a service.

[b] Searchers are those who used the platform to search for any of the 3 services of interest.

[c] *P* value from standard errors clustered at zip code.

[d] Total medical spending does not include dental or prescription drug spending.

imaging claims matched an advanced imaging search, and 26.8% of clinician office visit claims matched a clinician office visit search. Table C2 in the eAppendix Section 3 of the Supplement presents the proportion of searchers who did not have a claim for the searched service or who had a claim for that service within 14 days, from 15 through 30 days, and 30 or more days after a search.

Both groups had similar age, sex, zip code median household income, and medical condition status. Both groups had qualitatively similar medical spending levels and use of laboratory, advanced imaging, and clinician office visit services as the nonsearchers had the year before the program started (**Table 1**).

The study population covered much of the United States, including a mixture of urban and rural geographic areas from every state and 75% of metropolitan statistical areas (Figure 5 in the Supplement). Median claim payments in the period after access were $14 for laboratory tests (interquartile range [IQR], $8-$26), $728 for advanced imaging services (IQR, $473-$1164), and $112 for clinician office visits (IQR, $75-$138; eAppendix Figure D1 in the Supplement).

Regression Results

The **Figure** compares the total claims payments with both groups following access to the transparency price platform. Those who searched 14 days before receiving care had lower claim payments than those who did not. Adjusted payments were 13.93% (95% CI, 10.28%-17.43%) lower for laboratory tests, 13.15% (95% CI, 9.49%-16.66%) lower for advanced imaging, and 1.02% (95% CI, 0.57%-1.47%) lower for clinician office visits. The relative differences translate into lower absolute dollar payments of $3.45 (95% CI, $1.78-$5.12) for laboratory tests, $124.74 (95% CI, $83.06-$166.42) for advanced imaging, and $1.18 (95% CI, $0.66-$1.70) for clinician office visits (**Table 2**).

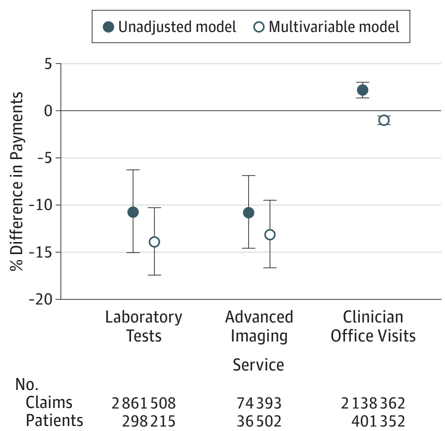
Claims for searchers had lower relative payments than those of nonsearchers: 0.78% (95% CI, 0.25%-1.23%) lower clinician office visits for established patients and 2.40% (95% CI, 1.66%-3.13%) lower for new patient office visits. The absolute payment differences were $0.86 (95% CI, $0.28-$1.43) for established patient and $3.29 (95% CI, $2.31-$4.27) for new patient clinician visits (eAppendix Table F1 in the Supplement).

Tests for Selection Bias

In the period before either group had access to the price transparency platform, payments for searchers were 4.11% higher (95% CI, 1.87%-6.41%) for laboratory tests and 5.57% higher (95% CI, 1.83%-9.44%) for advanced imaging but were 0.26% (95% CI, 0.53%-0.005%) lower for clinician office visits than for nonsearchers.

Similarly, in the falsification test, in which we compared payments obtained by searchers for services unrelated to the search with payments received by nonsearchers, we found that searchers had 3.33% (95% CI, −4.62% to 11.96%) higher relative payments for unrelated services than did nonsearchers. However, this result was not statistically significant (P = .42).

Figure. Difference in Payments Between Searchers and Nonsearchers



Each data marker represents the difference in payments between searchers, those who searched for a service within 14 days before receiving a service, and nonsearchers, those who did not search for that service. For regression coefficients, error bars indicate 95% confidence intervals. Multivariable regressions controlled for patient cost sharing, demographics (age and sex), year, month, *Current Procedural Terminology* (*CPT*) code, Metropolitan Statistical Area, and employer interacted with insurance carrier. For multivariable regressions, 95% confidence intervals were derived from standard errors clustered at the zip code. The absolute dollar decrease for the adjusted models are $3.45 (95% CI, $1.78-$5.12) for laboratory tests, $124.74 (95% CI, $83.06-$166.42) for advanced imaging, and $1.18 (95% CI, $0.66–$1.70) for clinician office visits.

Robustness Results

For all 3 services, payments were lower for searchers than for nonsearchers, regardless of cost sharing. For laboratory tests and advanced imaging services, the difference was larger for claims that required patient cost sharing than for claims that did not. For searchers with cost-sharing laboratory claims, the relative payments were 16.36% (95% CI, 12.46%-20.08%) lower than they were for nonsearchers; however, for claims without cost sharing, the difference was 14.13% (95% CI, 9.11%-18.88%). For advanced imaging, searchers had 14.97% lower relative payments (95% CI, 11.47%-18.34%) for cost-sharing claims and 13.63% lower relative payments (95% CI, 2.77%-23.27%) for claims without cost sharing than did nonsearchers. Cost-sharing claims for clinician office visits for searchers was 0.76% lower (95% CI, 0.27%-1.24%) and were 2.26% (95% CI, 1.41%-3.10%) lower for clinician office visits claims without cost sharing than for nonsearchers (**Table 3**).

For all 3 service periods (within 14 days, between 15 and 30 days, and >30 days), the difference in payments was largest for claims received within 14 days of a search. In addition, the payment differences for services obtained within 14 days were statistically different from services obtained more than 30 days after a search (Table 2).

Additional analyses presenting the robustness of the main results, including alternative search periods, alternative sample populations, additional insurance design controls, and clinician quality are presented in the Supplement. The results from these tests were similar to the main results.

Discussion

When eligible patients searched using the price transparency platform prior to getting a service, searching was associated with lower payments for clinical services—namely, advanced imaging and laboratory tests—and for claims with cost sharing. Savings for imaging services were in the hundred-dollar

Table 2. Price Differences Between Searchers and Nonsearchers by Days Between Search and Claim[a]

	No. of Observations: Claims	No. of Observations: Patients	Relative Difference, % (95% CI)	Absolute Difference, $ (95% CI)
Search Within 14 Days Before Claim				
Laboratory tests	2 861 508	298 215	13.93 (10.28-17.43)[b]	3.45 (1.78-5.12)[b]
Advanced imaging	74 393	36 502	13.15 (9.49-16.66)[b]	124.70 (83.06-166.40)[b]
Clinician office visits	2 138 362	33 173	1.02 (0.57-1.47)[b]	1.18 (0.66-1.70)[b]
Search From 15 to 30 Days Before Claim				
Laboratory tests	2 855 222	297 402	10.74 (6.08-15.17)[b]	2.51 (1.35-3.67)[b]
Advanced imaging	68 838	33 875	11.52 (5.047-17.55)[b]	120.80 (43.22-198.40)[b]
Clinician office visits	2 122 273	396 437	0.746 (0.25-1.24)[b]	0.86 (0.28-1.43)[b]
Search >30 Days Before Claim				
Laboratory tests	2 969 806	303 580	4.86 (2.57-7.12)[b]	1.13 (0.41-1.85)[b]
Advanced imaging	36 481	74 627	3.03 (1.09-6.97)	29.86 (11.15-70.86)
Clinician office visits	441 960	2 561 380	0.638 (0.35-0.92)[b]	0.72 (0.40-1.04)[b]

[a] Results from multivariable regressions controlling for demographics (age and sex), year, month, employer interacted with insurance carrier, *Current Procedural Code*, and metropolitan statistical area. This table examines differences in prices between searchers and nonsearchers for search periods in addition to the 0 through 14-day period: 15- through 30-day following a search, and more than 30 days following a search. The P values report differences between the coefficients. The reference group for each regression represents claims not proceeded by a search. The 95% confidence intervals were derived from robust standard errors clustered at the zip code.

[b] $P < .001$.

Table 3. Price Differences Between Searchers and Nonsearchers by Patient Cost Sharing[a]

	Search Within 14 Days of Claim							
	Cost Sharing				No Cost Sharing			
	No. of Observations		Relative Difference (95% CI), %	Absolute Difference (95% CI), $	No. of Observations		Relative Difference (95% CI), %	Absolute Difference (95% CI), $
	Claims	Patient			Claims	Patients		
Laboratory tests	3 382 865	343 342	16.36 (12.46-20.08)[b]	4.05 (3.02-5.08)[b]	1 192 746	205 803	14.13 (9.11-18.88)[b]	3.58 (1.22-5.94)[b]
Advanced imaging	85 243	42 256	14.97 (11.47-18.34)[b]	139.00 (95.84-182.10)[b]	7512	14 896	13.63 (2.772-23.27)[c]	155.30 (18.47-292.10)[c]
Clinician office visits	3 001 581	500 038	0.76 (0.27-1.24)[b]	0.84 (0.30-1.37)[b]	515 223	236 452	2.26 (1.41-3.10)[b]	3.00 (1.86-4.15)[b]

[a] Results from multivariable regressions controlled for demographics (age and sex), year, month, employer interaction with insurance carrier, *Current Procedural Terminology* code, and metropolitan statistical area. Claims for each service are stratified by cost-sharing level (full or partial cost sharing vs none) to examine the association between searching with 14 days of receiving a service and cost sharing. *No cost sharing* is defined as claims for which the patient pays less than 5% of the total allowed amount. The *P* values report differences between the coefficients. The reference group for each regression represents claims not proceeded by a search. The 95% confidence intervals are from robust standard errors clustered at the zip code.

[b] $P < .001$

[c] $P < .01$.

range and average savings for laboratory tests were a few dollars per test. This naturally raises the question: Why did patients change behavior for seemingly modest savings per service? It may be that less expensive physicians and health care services facilities were also higher quality or were more convenient; therefore, those who searched based on nonprice attributes visited lower-cost providers. Or it may be that forward-looking patients thought that savings per laboratory test would accumulate over time. Some patients, especially those with chronic conditions, need periodic laboratory tests or other medical services. It may be that the savings were sufficient to change behavior or that unexpectedly high prices induced behavior change, even in cases for which consumers were responsible for only a fraction of the total price as out-of-pocket costs. However, we do not have data on patient motivations to know the relative importance of each of the above or other explanations for our findings.

We also demonstrated that payments for claims, even without cost sharing, were lower for those who searched than for those who did not. This result may be in part due to inertia because clinician choices when employees must pay a deductible might persist even after they have reached the deductible and have little or no cost sharing. In addition if less expensive clinicians have higher-quality service or are more convenient, then those who search based on nonprice attributes may also happen to seek care from lower-cost clinicians. We found a smaller reduction in payments as the time between searching for a service and receiving that service increased, suggesting that price information is most effective when obtained near the date of medical service.

This study has several limitations. First, given that searching is not randomly assigned, unobserved factors distinguishing people who searched before getting a service and people who did not search may explain some of the difference in payments. However, in the preperiod, those who would later become searchers had higher laboratory test and advanced imaging payments than those who would not become searchers, suggesting that they were not necessarily more frugal before they had access to the price transparency platform. Similarly, the confidence in our conclusion that searching on the transparency platform was associated with pursuing lower-cost services was reinforced by the negative-falsification test showing that the costs for services not associated with searches were no different between groups. Nevertheless, it is possible that nonsearchers may differ from searchers in unobservable ways such as experience navigating the health care system. In addition, potential bias from contemporaneous events cannot be considered related to either reduced payments or increased use of the price transparency platform. These biases would cause overestimation of the payment reductions found in this study.

Second, whether the results found in this study would generalize to those who chose not to search is unclear. Evaluating why patients did not use the price transparency platform and what types of interventions might increase use is important. It is also important to investigate why patients who searched did not go on to receive the services for which they searched.

Third, the study was not designed to determine whether patients are making better decisions; rather, we only examined whether patients who actively search are choosing lower-cost clinicians. The study did not examine quality of care, convenience, or other nonprice attributes. For example, factors such as physician characteristics, including patient satisfaction, medical education, years of experience, and board certification may influence decision making but were not examined in this study. (Appendix K in the Supplement discusses patient satisfaction with their physicians.)

It is possible that these tools might also affect use of care. For example, knowing that some prices are very high, some patients may forego care. Conversely, cost savings from price shopping might enable patients to increase use, which may lead to improved adherence to recommended treatments but also to overuse of services. For this reason, our study cannot determine whether the price transparency technology reduces overall health care spending. Future research should extend this analysis to services beyond the 3 used in this study. It should also examine how use is affected to better understand the broader effect of price transparency on health care spending and population health.

The Affordable Care Act (ACA) recognizes price transparency's potential and requires hospitals to publish charges for common services. Insurance plans offered through the exchanges are required to communicate price information to enrollees.[17] Although the ACA focuses on increasing price transparency, tailoring price information to the privately insured market remains a challenge.

Conclusions

Use of price transparency information was associated with lower total claims payments for common medical services. The magnitude of the difference was largest for advanced imaging services and smallest for clinician office visits.

ARTICLE INFORMATION

Author Contributions: Mr Whaley had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: All authors.
Acquisition, analysis, or interpretation of data: Whaley, Schneider Chafen, Pinkard, Bravata, Sood.
Drafting of the manuscript: Whaley, Schneider Chafen, Pinkard, Kellerman, Bravata, Sood.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Whaley, Schneider Chafen, Pinkard, Sood.
Obtained funding: Sood.
Administrative, technical, or material support: All authors.
Study supervision: Sood.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Mr Whaley, Drs Schneider Chafen, Kellerman, and Bravata, and Ms Pinkard reported that they are employees of Castlight Health. Dr Sood reported that he is a paid advisor for Castlight Health. Dr Kocher reported that he is on the board of directors of Castlight Health.

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Additional Information: Deidentified data will be made available to researchers in a HIPPA-compliant manner upon request for the purposes of replication.

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VIEWPOINT

Variation in Prices for Common Medical Tests and Procedures

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Editor's Note page 13

Say you are shopping for a new computer or a new car and you want the best price. Within a matter of minutes on Google, you would have a pretty good idea of the price range for the item you want. But in health care? Forget it. As a journalist specializing in health care, I have written frequently about the frustration and anxiety that patients face in dealing with bewildering bills. In addition, insurers negotiate contracts with physicians and hospitals, and those prices are sealed tight.

In an effort to create transparency, I was part of a team at KQED, KPCC, and ClearHealthCosts.com that launched an innovative project, PriceCheck, to crowdsource health costs.[1]

Since June 2014, hundreds of people have submitted their charges for common medical tests and procedures, and the amount they paid. We entered all the information into a free, searchable database. KQED and KPPC conducted on-air announcements to encourage members of our public radio audiences to share their price data for 4 specific procedures: screening mammograms, lower-back magnetic resonance imaging (MRI), intrauterine devices (IUDs), and diabetes test strips. Because there was no database where consumers could easily look up costs, we created one. These are not "chargemaster" prices from physician or hospital billing systems because virtually no one pays those. These are not "average" prices either. You do not use "average price" to shop for a car or a computer—you want the real price. Instead, we asked members of our public media audience in California to share, anonymously, what they and their insurers actually paid.

How PriceCheck Works

For the project, we created an online tool to make it easy for people to share prices. Our tool was designed to obtain consistent, apples-to-apples prices every time; that is, when someone starts typing in a procedure name, a drop-down box appears, seeded in advance with *Current Procedural Terminology* (*CPT*) or Healthcare Common Procedure Coding System (HCPCS) codes and specific procedure names to choose from.

First, people enter the "charged" price. Next, people who do not have insurance and pay out of pocket enter the self-pay price. People with insurance can submit both what the insurer paid and their copay amount, if any. All shared costs are automatically fed into the database, which we prepopulated with cash prices for 30 to 35 "shoppable" medical tests and procedures; these prices were collected by ClearHealthCosts.com, a for-profit company founded by journalists whose goal is to facilitate health care marketplace transparency by making the prices of medical services publicly available.[2]

We launched and held our breath. Would people share prices? The short answer is yes. We have received hundreds of shares. Thousands of people searched the database.

Physicians' First Question: What About Quality?

We also received substantial feedback and questions from physicians and other health care professionals. Their first question: Where does quality fit in?

In other sectors of the economy, people often equate higher cost with higher quality, but in health care it is widely accepted that there is no correlation between the two. Our belief was that people want quality at a fair price and that shining a bright light on health costs would help drive discussions about quality. But we also found physicians who were fascinated by our project and wanted to share their own cash prices.

What We Learned

We started with mammograms because this test is performed 38 million times a year in the United States.[3] Since screening mammography is a test that can be scheduled, women could, in theory, shop for the best price. Screening mammograms are covered as a preventive health benefit under the Affordable Care Act and should be available to patients with no copay. We wanted to find out not only if patients were receiving screening mammograms with no copay but also the variation in the amounts insurers paid for the procedure.

Some women reported that they were charged copays when they should not have been. And there was variation across the board. In the Los Angeles and San Francisco Bay Area regions, we found that commercial insurers paid from $128 to $694 for screening mammograms (Table).

We next asked people to submit prices for lower back MRI. There was variation in prices paid by commercial insurers, government insurers, and cash prices. For *CPT* code 72148, we found that commercial insurers paid from $467 to $1567 (Table). But we found even greater variation when also reviewing additional types of payers not listed in the Table. Here, variation ranged from $255 to a self-pay price of $6221 at an academic medical center. The $255 price was for a patient covered by Medicare; the federal program's payment was just a fraction of the facility's charge of $2450. We found that another person who went to the same facility was charged $603 for the same procedure with the same *CPT* code. The reason was that the latter patient had commercial insurance: this patient stated that the entire amount was paid out of pocket, since "I had not yet met my deductible."

For IUDs, we found that insurers paid from $440 to $1230 for the devices and their implantation. For diabe-

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Table. Lowest and Highest Prices Paid by Commercial Insurers for 3 Common Medical Tests and Procedures in the San Francisco and Los Angeles Metropolitan Areas in California, June-October 2014

Procedure	Commercial Insurer-Paid Price, $[a]	
	Lowest	Highest
Screening mammogram		
CPT code 77057 or HCPCS code G0202	128	694
Lower-back MRI		
CPT code 72148 (without contrast)	467	1567
CPT code 72158 (with and without contrast)	624	2925
IUD (insertion and device)	440	1230

Abbreviations: *CPT*, *Current Procedural Terminology*; HCPCS, Health Care Common Procedure Coding System; IUD, intrauterine devices; MRI, magnetic resonance imaging.

[a] Data are from the PriceCheck project.[1]

tes test strips we received fewer responses; some people, however, commented in blog posts or on Facebook that self-pay prices for a box of 50 strips ranged from $9 to $88. People shared with us their frustrations:

- "High deductible so paid the whole thing and then found out I could have had it done for *HALF* the price only blocks away. My first foray into individual insurance.... Need to shop around assuming I can even get a price quote."[5]
- "I was told the procedure was $1850. I have a $7500 deductible. So I talked to (an employee) who said if I paid upfront and agreed not to report the procedure to Blue Cross, that it would be $580."[5]
- "I'm sure every woman who's had a mammogram had the exact same experience as I did. It was a friendly technician, but I don't think that's worth maybe $600 extra dollars."[6]

An important caveat is that these data are crowdsourced and may contain errors. Yet people should be able to able to understand their medical bills and explanation of benefits statements. Some people who shared their prices provided contact information; we reached some of them to discuss their bills more fully.

Why Now?

Health insurance premiums have skyrocketed in the last decade, and with them, health insurance plans with high deductibles have become more common. More patients are cost conscious.

Our project has had impacts beyond patients and physicians. PriceCheck data were cited in a letter that was made public when contract negotiations between Anthem Blue Cross and Stanford Health Care broke down. The letter was sent from the president of Anthem to the president of Stanford Health Care: "According to KQED's PriceCheck tool, a lower back MRI (72158 MRI-Lower back/lumbar spine w/ and w/o contrast) cost $5647 at Stanford, which is nearly eight times what an imaging center in nearby San Jose charges at $724."[4] Anthem could have looked up these prices in its own database, but the insurer's contracts with physicians and hospitals prevented it from making the prices public.

The Road Ahead

Not surprisingly, creating the database has not been easy. Our audience was occasionally frustrated that PriceCheck did not work as well as Google or Amazon. But our community mostly vented its frustration on the byzantine world of health care costs and their inability to get a bill that made sense (or find an accurate price in advance).

The window is cracked open on health cost transparency. We have been here before—with car sales, with airline tickets. Now, technology in combination with transparency can do the same for health care.

And yes, we have been asked whether people should "shop" for medical treatment in the same way they shop for a new car. If there were a correlation between cost and quality, this might be a reasonable question. Instead, in American health care, money is spent on unnecessary or unproven treatments much too often, and there's widespread variation in price. People are waking up to these facts.

The money conversation makes the practice of medicine very complicated: the "gotcha" bill and the medication that is not covered challenge the physician-patient relationship. It is time to take off the blindfold and embrace transparency in pricing for medical care and services.

ARTICLE INFORMATION

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Physician–patient communication regarding patients' healthcare costs in the US: A systematic review of the literature

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Abstract

Background/objectives: The increasing cost of healthcare is a major issue for US policymakers and patients and their families. To date, little research has focused on physician–patient communication about healthcare costs. This systematic review identifies themes present in that literature and synthesizes findings.
Methods: PubMed, CINAHL, PsycINFO, and Communication and Mass Media Complete were searched to identify articles regarding physician–patient communication about healthcare costs. The search yielded 24 articles based on inclusion criteria.
Results: Empirical findings showed that most physicians and patients were open to discussion about costs; however, few actual conversations were reported across research studies. Most of the research on physician–patient communication about healthcare costs explored issues of non-adherence and identified relevant communication barriers. Research on physician–patient communication about healthcare costs currently lacks evidence-based strategies for increasing and improving these discussions.
Conclusions: Physicians and patients judge communication about healthcare costs to be important and to have the potential to influence health and financial outcomes; however, discussions between physicians and patients on the topic are rare.

Keywords: Communication barriers, Healthcare costs, Out-of-pocket costs, Patient non-adherence

Healthcare costs are a major concern for many patients in the US In 2012, out-of-pocket spending for healthcare grew by 4.1% to $320.2 billion as compared to 2011.[1] Further, researchers have found that the majority of bankruptcies in the US are medical-related.[2] In 2010, national healthcare expenditures were $2.6 trillion, which represented 17.9% of the gross domestic product.[1] The rate of increase in the national health expenditures has slowed in the past decade from 9.5% in 2002 to 3.9% in 2010; however, these figures still outpace inflation.[1] Although some experts suggest that the Affordable Care Act is helping to control inflation in healthcare costs,[3] many healthcare cost-related challenges for patients remain (e.g., ability to pay out-of-pocket costs, such as high insurance premiums and deductibles). Patients concerned about healthcare costs often are faced with a need to discuss the issue of healthcare costs with their physicians.

Physician–patient communication has been investigated for decades by researchers from numerous disciplines including health communication, sociology, medicine, public health, and nursing, among others.[4] A focal area of physician–patient communication research that is growing in practical significance is communication about the costs of healthcare.[5–7] Today physician–patient communication about out-of-pocket costs is becoming a more important issue as many patients face uncertainty regarding the magnitude of their medical expenses and their ability to pay. Research on physician–patient communication about the costs of healthcare has ranged from investigating general out-of-pocket costs,[5–7] to examining patient attitudes toward oncology costs,[8] and Medicare out-of-pocket expenses.[9] Research conducted on physician–patient communication about out-of-pocket expenses has important implications regarding adherence to medical directives and increasing patient knowledge about and ability to manage

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medical expenses. Despite the importance of this research area, we were unable to locate a systematic review of literature.

The purpose of this systematic review was to examine research on physician–patient communication about healthcare costs in order to identify the major findings and themes, and to discuss related implications and research gaps. The following research questions were posed:

RQ1: To what extent do physicians and patients perceive that communication about healthcare costs has occurred in physician–patient encounters?

RQ2: What are the primary themes in the literature regarding physician–patient communication about healthcare costs?

RQ3: What are the gaps in research regarding physician–patient communication about healthcare costs?

Methods

A literature search was conducted using four databases, PubMed, CINAHL, PsycINFO, and Communication and Mass Media Complete, which were chosen based on their inclusion of social behavioral research on physician–patient communication. Uniform searches using the same terms and logic were conducted for each of the databases. These searches included the use of the term *physician–patient communication* with one of the following terms: *costs*, *payment*, and *insurance*. No restrictions or limitations in the initial searches were made on publication type, publication date, or language, so that the most comprehensive list of literature was returned.

All of the citations generated by the searches were imported into an EndNote® file. Duplicates were identified and removed, which resulted in a list of 1618 unique references. A first round of review, using inclusion criteria that were applied to the individual citations (i.e., citation titles were closely examined for relevancy based on inclusion criteria), resulted in 95 references. The inclusion criteria were: (1) article reporting original research and/or commentary; (2) a focus on communication between physicians and patients; and (3) a focus on payment, costs, and/or insurance. Articles that could not be retrieved because they were either unavailable in full-text at the authors' university or could not be located beyond their initial citations and abstracts in the database ($n = 3$) were excluded, resulting in 92 references. Although no date restrictions were applied, all identified literature was published between 1996 and 2013.

After the first review that identified 92 references, abstracts for all 92 references were examined further using the inclusion criteria. This final analysis of the 92 abstracts yielded 22 articles that met the requirements for inclusion in this review. From the 22 articles' respective bibliographies two additional citations[10,11] were identified that were not found in the initial search. Therefore, a total of 24 unique articles regarding physician–patient communication about costs were included in this systematic review. The 24 articles varied in methodology, objective, and style; however, each addressed the issue of physician–patient communication about costs. Original research articles (e.g., quantitative and qualitative studies), literature reviews (non-systematic), and essays/commentaries were all included in the review because of the limited number of articles of *any type* focusing on physician–patient communication about costs.

The relevant articles ($n = 24$) were analyzed using data extraction techniques.[12] According to Wright,[12] data extraction documentation can be useful in writing a systematic review as it allows for the systematic gathering of all pertinent data to analyze in the review. From each article, the authors extracted the following key data points: objective, study design, participant population, and results/key ideas or recommendations. Thematic analysis of the articles along with the data extraction documents identified specific themes and gaps in the literature.

Results

Table 1 describes key findings from the 16 original research articles included in the review. Quantitative methods (e.g., surveys and content analyses) were the most frequent methodology employed in the original research articles ($n = 14$; 58.3%). Most ($n = 13$, 54.2%) of the studies conducted surveys of physicians and/or patients. Other studies ($n = 3$, 12.5%) conducted content analysis of transcripts of audio recordings to record frequencies of physician–patient communication about costs. One study used a mixed-methods design (i.e., quantitative and qualitative analysis techniques) with focus groups and a survey,[14] and another study used ethnography and discourse analysis.[16] Table 1 also identifies the populations studied in the original research articles. General patient populations ($n = 7$) and general physician populations ($n = 7$) were examined most often. However, a variety of the studies examined specific populations, such as Veteran's Administration patients with diabetes[11] and Medicare beneficiaries.[9] The majority of

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Table 1 Descriptions of original research studies.

Author(s)	Methods	Objectives	Population	Key findings
Alexander *et al.*[5]	Cross-sectional survey	Investigate physician and patient communication about out-of-pocket costs	484 patients; 133 general internists	Sixty-three percent of patients want to talk with their physician about out-of-pocket costs and 79% physicians felt these conversations were important. However, only 35% of physicians and 15% of patients reported having these conversations
Alexander *et al.*[6]	Cross-sectional national random mail-in survey	Investigate why physicians do not discuss out-of-pocket costs with patients	519 general internists and cardiologists	Physicians reported a variety of barriers to communication about out-of-pocket costs, including: lack of habit, insufficient time, and concern over patient discomfort
Alexander *et al.*[7]	Cross-sectional survey	Investigate barriers to physician–patient communication about out-of-pocket costs	484 patients; 133 general internists	Patients and physicians cited the following barriers to communication about out-of-pocket costs: discomfort, insufficient time, patient belief that their physician did not have a viable solution, and concerns about the impact of discussions on quality of care
Beard *et al.*[13]	Content analysis of audio recordings from medical visits and surveys	Examine the frequencies of conversations about medication costs and predictors of such discussions between RA patients and rheumatologists	8 rheumatologists; 193 RA patients	Thirty-four percent of the visits included discussion about medication costs; 48% of those discussions were initiated by patients
Bullock *et al.*[8]	Cross-sectional survey	Explore oncology patients' attitudes toward discussing costs	256 oncology patients	Of the patients surveyed, 68% reported wanting to know about costs before treatment started and 59% of patients wanted to discuss these costs with their physicians. However, patients active in chemotherapy were less likely to want to discuss costs versus other patients; the authors theorized this was because patients did not want financial concerns to affect their care
Danis *et al.*[14]	Focus groups, interviews, and surveys	Examine patient perceptions of physician–patient discussions about costs	211 insured individuals	Patients want to discuss out-of-pocket costs with their physicians; however, they do not want to discuss insurance costs. Older patients and patients who are more ill are more likely than healthier and younger patients to want to discuss costs with physicians
Lapane *et al.*[15]	Cross-sectional survey	Examine medication-related communication between physicians and patients and resolve why both parties report differing amounts of such conversations	96 healthcare providers; 1100 patients	Providers reported proportionately more frequent discussions about medications than did patients. Eighty-three percent of patients did not tell physicians if they chose not to fill a prescription because of cost

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Table 1 *Continued*

Author(s)	Methods	Objectives	Population	Key findings
Mirivel[16]	Ethnographically informed discourse analysis	Explore the communication between plastic surgeons and their prospective clients	2 plastic surgeons; 17 patients for plastic surgery	Plastic surgeons did not discuss the costs of their procedures with patients. This raises ethical questions concerning who is responsible for initial discussion of costs for elective surgery
Patel *et al.*[17]	Cross-sectional survey	Examine how often physicians discuss cost when prescribing new asthma medication to children	252 pediatricians and family physicians	Thirty-five percent of physicians reported that they were concerned about cost when prescribing new asthma medication; 50% of physicians reported that they did not discuss cost with parents. Further, parents with private insurance were less likely to discuss cost with physicians than patients on public programs (e.g., Medicare) or who did not have insurance
Piette *et al.*[10]	Cross-sectional survey	Examine physician–patient communication about cost concerns and non-adherence for patients with chronic illnesses	660 older adults with chronic illnesses	One third of chronically ill patients who underuse prescription medications do not discuss medication cost issues with their physicians. Physicians need to address cost concerns with patients in the medical visit
Piette *et al.*[11]	Cross-sectional survey	Determine how physician trust moderates medication non-adherence because of cost	993 VA patients with diabetes	When patients experience high out-of-pocket costs and low trust in physicians, they are more likely to not adhere to physician prescriptions (i.e., forgo medications)
Schmittdiel *et al.*[9]	Cross-sectional survey	Examine Medicare Part D beneficiaries with diabetes' communication with physician about costs	1458 Medicare Part D beneficiaries with diabetes	Forty-four percent of patients discussed costs with their physicians; 75% of patients felt that having these conversations was important. Minority, female, and older patients had significantly fewer past discussions with physicians than did white, male, and younger patients
Shrank *et al.*[18]	Cross-sectional survey	Examine communication about out-of-pocket costs and its affect on enrollment in incentive-based pharmacy benefit plans.	1707 patients; 111 physicians	Sixty-two percent of patients with prescription drug coverage knew of pharmacy benefit plans; 54% of these patients were not aware of their out-of-pocket costs at the time of their physician visit. Physician characteristics (i.e., age, gender, ethnicity, and country of medical education) did not affect the likelihood of conversations; patient characteristics, such as ethnicity and education level did affect likelihood of conversations

Continued

Tab e 1 *Continued*

Author(s)	Methods	Objectives	Population	Key findings
Tarn *et al.*[19]	Content analysis of audio recordings	Determine the amount of physician–patient discussions about dietary supplements	1479 patients; 102 clinicians	Discussions about dietary supplements included content about out-of-pocket costs 4.2% of the time, which is an important issue because dietary supplements can lead to patients 'incur[ring] unnecessary costs' (p. 287)
Tarn *et al.*[20]	Content analysis of audio recordings	Determine the frequency of physician–patient communication about costs related to a new prescription	185 patients	Patients discussed cost or insurance issues regarding new medications for 2% of prescriptions
Tseng *et al.*[21]	Cross-sectional survey	Determine if elderly patients want to communicate with their physicians about managing drug costs	1116 seniors enrolled in a Medicare Managed Care Plan	Most patients wanted physicians to discuss medication costs (81%), but only 17% reported having providers ask about affordability; 62% had asked their providers for help with out-of-pocket drug costs

the patient populations studied averaged over the age of 50.

Table 2 describes the eight essays (e.g., commentaries, editorials, and reviews) included in the review. The essays ($n = 8$) included an editorial,[23] a news article,[27] a symposium,[22] a commentary,[29] proposed strategies,[24,26] a conceptual framework,[28] and a review of literature on physician–patient communication about oncology costs.[25]

Perceptions of physician–patient communication about costs (RQ1)

Eight of the articles reported that physicians and patients often are open and willing to discuss costs, however, most of the time these conversations do not take place.[5,8,9,14,21,22,23,29] Patients reported a lower frequency of communication regarding costs than did physicians.[5] In content analysis studies, where physician–patient interactions were recorded and frequencies of conversation related to costs were coded, results showed that only 2,[20] 4.2,[19] and 34%[13] of medical encounters actually included discussions of costs. Despite these observations of low frequencies of communication between physicians and patients about healthcare costs, both physicians and patients indicate that having these conversations is important.[5,21]

Alexander *et al.*'s[5] study explored physician and patient perspectives about communication regarding out-of-pocket costs. Their study is unique and particularly informative because it collected data from both patients and physicians regarding their perceptions of communication about out-of-pocket healthcare costs. Reporting on both perspectives shows differences in the experiences of the two parties. In this study, 63% of patients reported *wanting* to discuss out-of-pocket costs with their physicians; 79% of physicians *wanted* to do the same. However, 85% of patients said that they *never had* such conversations with physicians, while 65% of physicians reported that they had *never had* these conversations with patients. Further, 90% of physicians reported 'that they should consider patients' out-of-pocket costs in their clinical decisions' (p. 955). Inconsistencies between physician and patient self-reports could be due to physicians recalling conversations with patients who were not included in the survey. However, this research shows that communication regarding healthcare costs does not happen as often as either patients or physicians believe that it should, although the parties' perceptions of frequency of occurrence may differ.

Table 2 Descriptions of essays, literature reviews, and commentaries.

Author(s)	Article type	Objectives	Key ideas/recommendations
Donley and Danis[22]	Symposium	Discuss ethical issues of communicating with patients about costs of end-of-life care	Physicians and patients should discuss costs early in the treatment and financial considerations should be incorporated into treatment plans
Federman[23]	Editorial	Examine the importance of physician–patient communication about the cost of healthcare	Physician–patient communication about costs is important, as physician knowledge about cost-related problems in healthcare can better equip physicians to help patients
Hardee *et al.*[24]	Proposed strategies	Offer strategies to physicians for discussing costs with patients	Empathic communication and resource materials about costs can help physicians and patients have discussions about healthcare costs
Hofstatter *et al.*[25]	Literature review	Understand patient-physician communication about cost in oncology care	Patients' oncology decisions seem to be influenced by the cost of care; however, the literature has not explored why physicians and patients are not discussing oncology costs more often
McFarlane *et al.*[26]	Proposed strategies	Repurpose the SPIKES (setting, perception, invitation, knowledge, empathy, and summarize/strategize) protocol for delivering bad medical news to work for delivering bad financial news about healthcare costs	Revised protocol for SPIKES to address issues of healthcare cost, where all steps are the same, except for the last step (summarize/strategize), as during this step the issue of cost needs to be a focal point
Nicholas[27]	News	Identify the barriers between physicians and patients in talking about the costs associated with cancer treatment	Barriers to physician–patient communication about costs of cancer treatment include: time constraints, the reimbursement system, inherent difficulty of these conversations, desire for the best patient care, and health insurance causing patients not to discuss the subject (patients may discuss costs with financial representatives from the healthcare organization or insurance company, but this does not generally include the physician)
Piette *et al.*[28]	Conceptual framework	Present a conceptual framework to understand patient responses to medication costs	Patients generally adhere to medication prescriptions; however, several contextual factors contribute to non-adherence. The conceptual framework offered to explain the probability of patient non-adherence due to costs includes: patient characteristics, medication type, clinician factors, and the health system
Wilkes and Schriger[29]	Commentary	Argues that not discussing costs with patients is a limitation in the improvement of health care	Discussing costs with patients is beneficial. Shared decision-making in the medical encounter is important, but should be practiced with caution, because expensive treatments may be needed for life-threatening conditions

Primary themes in the literature (RQ2)

Two primary themes emerged in the literature regarding physician–patient communication about healthcare costs. The first theme emphasized that physician–patient communication about healthcare costs is important because of cost-related non-adherence to treatment regimens. The second theme identified was numerous barriers to physician–patient communication.

Cost-related non-adherence

Non-adherence, which refers to patients failing to accurately or completely follow recommended medical advice, was a dominant concern discussed in 15 of 24 articles. It was also a commonly cited rationale for examining and practicing physician–patient communication about healthcare costs.[5–7,9–11,13–15,17,19,21,22,28,29] These 15 articles emphasized the importance of physician–patient communication about healthcare costs because high out-of-pocket costs may cause patients to forgo treatment (e.g., taking prescribed medications and physical therapy) in order to save money. This literature explained that physician–patient communication about healthcare costs may help patients by offering affordable options (e.g., generic medications versus name brands).

Out-of-pocket costs for those managing chronic illness (e.g., diabetes and rheumatoid arthritis) are of great concern to both patients and physicians.[10,11,13] Piette *et al.*[11] explain that the relationship between personal costs and non-adherence is complex and not well understood. They propose that when physicians address adherence and costs with their patients, patients are more likely to choose to adhere and physicians can aid in creating lower cost options for the patients. Although discussing costs with patients generally is believed to be beneficial in terms of reducing non-adherence, some authors caution that such discussions could have adverse effects. In their essay, Wilkes and Schriger[29] explain that many benefits are associated with physicians discussing costs with patients, but argue that such discussion also can cause non-adherence in some circumstances (e.g., the physician discloses the cost of treatment and the patient decides not to adhere as a result). They specifically advise physicians to be careful to avoid discussing costs in life-threatening situations when patients may not adhere to potentially life-saving treatments because of cost concerns.

Barriers to physician–patient communication about healthcare costs

More than half of the literature reviewed[5–8,10,11,15,17,18,21,22,27,29] ($n = 13$) discussed barriers to physician–patient communication about healthcare costs (see Table 3). The most common barriers reported were: patient discomfort, insufficient time, and physicians' feelings that discussing costs would not help the patient's financial concerns. As a theme in the literature, barriers to physician–patient communication about healthcare costs is important, as it identifies that specific reasons both patients and physicians do not to have conversations about healthcare costs. Further, these barriers to communication are problematic, as both patients and physicians believe that discussing healthcare expenses is valuable. Alexander *et al.*[7] explain, 'Interventions to promote communication between patients and physicians about out-of-pocket costs should focus on barriers perceived by both parties, including patient and physician discomfort, the perceived absence of viable solutions, and insufficient time' (p. 858). When researchers fully understand factors that prevent

Table 3 Barriers to physician patient communication about costs.

Authors	Barriers to communication
Alexander *et al.*[5]	Patient discomfort; insufficient time; physician lack of knowledge/ability to present solutions
Alexander *et al.*[6]	Patient discomfort; insufficient time; physician lack of knowledge/ability to present solutions; patient lack of knowledge
Alexander *et al.*[7]	Insufficient time; physician lack of knowledge/ability to present solutions; patient lack of knowledge; patient fear of lower quality of care
Bullock *et al.*[8]	Patient discomfort
Piette *et al.*[10]	Patient discomfort; insufficient time; physician lack of knowledge/ability to present solutions; topic not being brought up; lack of patient trust in the physician
Piette *et al.*[11]	Lack of patient trust in the physician
Donley and Danis[22]	Lack of resources to train physicians
Lapane *et al.*[15]	Use of computers in examination
Nicholas[27]	Patient discomfort; insufficient time; physician lack of knowledge/ability to present solutions
Patel *et al.*[17]	Physicians' concerns about patient finances
Shrank *et al.*[18]	Cultural, linguistic, or cognitive factors (e.g., language use; health literacy)
Tseng *et al.*[21]	Patient discomfort
Wilkes and Shriger[29]	Lack of resources to train physicians

communication about healthcare costs from occurring, they will be better situated to design evidence-based strategies to overcome these barriers and to increase communication efficacy.

Gaps in the literature (RQ3)

Currently, the literature on physician–patient communication about healthcare costs is underdeveloped. Our literature search identified only 24 articles focusing on the topic. In general, literature on physician–patient communication is quite large and diverse. Physician–patient literature has examined specific communication variables, such as empathy and support,[30] and how these variables are moderators to health outcomes, such as medical adherence.[4] Zolneirek and DiMatteo's[31] meta-analysis of physician–patient literature found that 'communication skill of physician' (p. 830) had a significant and positive correlation with patient adherence. In the context of this review, it is possible that medical and financial outcomes, such as adherence, could be moderated by the discussion of healthcare costs. More research needs to examine physician–patient communication about healthcare costs and how physician communication can help to increase medical adherence.

Physicians and patients clearly need concrete strategies to increase and improve communication about healthcare costs. The current literature contains few examples of evidence-based strategies for physicians and patients to use in order to facilitate communication about healthcare costs. This represents a major gap in extant research. The literature reviewed offered only a few communication strategies for physicians and patients to use in conversations about healthcare costs.[22,24,26] One such strategy was for physicians to use empathic communication when discussing healthcare costs with patients.[24] Another strategy was for physicians to adapt a six-step protocol for delivering bad medical news to patients to deliver bad financial news to patient (e.g., high costs of oncology care).[26] For the most part, however, these strategies were developed for specific healthcare contexts (i.e., oncology[26] and end-of-life care[22]), which are characterized by immediate and high healthcare costs versus other more commonly reoccurring medical needs (e.g., costs due to treatment of chronic conditions).

The literature on physician–patient communication about costs mostly has explored the issue from a medical perspective (i.e., published in medical journals and written by physicians) and has often not incorporated conceptual understandings of communication. This constitutes a gap; research on physician–patient communication about costs largely has ignored communication perspectives, which may be helpful in determining how health-related interactions can be made most effective. For example, communication research shows that *collaborative* decision-making in the medical encounter, where physicians and patients work together to understand the health-related issue at hand, discuss options, and share decision-making, is effective with regard to health and medical outcomes.[32]

A second potentially useful application of a communication approach to research the issue of physician–patient communication about healthcare costs is a focus on communication competency. Research has indicated that physician communication competence is an important factor in effective physician–patient communication.[33,34] Hence, using communication competency measures to evaluate physician communication about healthcare costs could be a beneficial tool for identifying communication barriers and improving physician and patient communication competencies in this context.

Discussion and conclusions

The present findings from this systematic review indicate that, despite the agreed upon importance of physician–patient communication about healthcare costs, little such communication actually occurs. Therefore, patients often are left to deal with the realities of their out-of-pocket healthcare costs without their physicians' knowledge. This is problematic as it can lead to non-adherence and other health-related issues (e.g., stress of paying for medical expenses). The populations represented in the literature are mostly older adults with chronic and/or life-threatening conditions. Populations like these tend to face great pressure from out-of-pocket costs and may have a particularly high need for physician–patient communication about costs and may benefit more from such conversations than other populations.

Literature reviewed also considered the ethical responsibility of physicians to discuss costs with patients. As Federman[23] argues, 'As the burdens of health care [*sic*] costs increase, physicians have a greater responsibility to direct patients to sources of assistance with health care [*sic*] costs when help is needed, and to select affordable therapies whenever possible.' (p. 1723). Examples of articles in this review that directly addressed the ethical issue of physician responsibility to discuss healthcare costs with patients, include Mirivel,[16] who examined cost-related communication in cosmetic surgery, and Donley and Danis,[22] who discussed end-of-life care costs. Sloan and Knowles,[35] in their research on improving communication between cancer patients and their healthcare providers, indicated that providers have an ethical responsibility to provide more financial resources to cancer patients. Some contexts (e.g., cosmetic surgery, cancer and end-of-life care) have unique personal and financial dilemmas compared to more common contexts (e.g., treating chronic conditions). More generally, physicians experience problems discussing healthcare costs with their patients, because of the barriers to communication, such as being unaware of the costs and/or lacking resources and training to communicate about healthcare expenses.[5–7,10,22,27] This occurs despite the fact that both patients and physicians believe these conversations are an important part of medical encounters and potentially influence health outcomes.

The issue of healthcare costs is multi-faceted, as physicians want to select the best treatment option(s) for patients; however, the best medical option may not be financially viable for the patient. Furthermore, when a medical treatment is financially straining for a patient and/or his or her family, the burden may cause great psychological and/or relational stress in the patient's life. Therefore, as the literature in this review demonstrates, communicating about healthcare costs during the medical encounter is a beneficial way for both physicians and patients to decide on the best treatment, with the understanding that healthcare costs are an important consideration.

In the healthcare context, communication about costs has important implications, as evidenced by the reviewed literature. Generally speaking, the consensus among scholars on this topic was that physician–patient communication about out-of-pocket costs has potential beneficial outcomes for both patients and physicians, but occurs rarely. Thus, researchers need consider the barriers evidenced and provide practical evidence-based solutions to overcome these barriers and thereby facilitate open communication that can be enacted in medical encounters with regard to already tight resources in healthcare.

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How Primary Care Physicians Integrate Price Information into Clinical Decision-Making

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BACKGROUND: Little is known about how primary care physicians (PCPs) in routine outpatient practice use paid price information (i.e., the amount that insurers finally pay providers) in daily clinical practice.
OBJECTIVE: To describe the experiences of PCPs who have had paid price information on tests and procedures for at least 1 year.
DESIGN: Cross-sectional study using semi-structured interviews and the constant comparative method of qualitative analysis.
PARTICIPANTS: Forty-six PCPs within an accountable care organization.
INTERVENTION: Via the ordering screen of their electronic health record, PCPs were presented with the median paid price for commonly ordered tests and procedures (e.g., blood tests, x-rays, CTs, MRIs).
APPROACH: We asked PCPs for (a) their "gut reaction" to having paid price information, (b) the situations in which they used price information in clinical decision-making separate from or jointly with patients, (c) their thoughts on who bore the chief responsibility for discussing price information with patients, and (d) suggestions for improving physician-targeted price information interventions.
KEY RESULTS: Among "gut reactions" that ranged from positive to negative, all PCPs were more interested in having patient-specific price information than paid prices from the practice perspective. PCPs described that when patients' out-of-pocket spending concerns were revealed, price information helped them engage patients in conversations about how to alter treatment plans to make them more affordable. PCPs stated that having price information only slightly altered their test-ordering patterns and that they avoided mentioning prices when advising patients against unnecessary testing. Most PCPs asserted that physicians bear the chief responsibility for discussing prices with patients because of their clinical knowledge and relationships with patients. They wished for help from patients, practices, health plans, and society in order to support price transparency in healthcare.
CONCLUSIONS: Physician-targeted price transparency efforts may provide PCPs with the information they need to respond to patients' concerns regarding out-of-pocket affordability rather than that needed to change test-ordering habits.

KEY WORDS: primary care; technology assessment; health services research.
Abbreviations: OOP, Out of pocket; PCP, Primary care physician

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INTRODUCTION

Physician-targeted price transparency efforts—initiatives that focus on making doctors aware of the price of healthcare services—are considered to be a promising strategy for reducing wasteful spending in healthcare.[1–3] Physicians are typically unaware of the prices of the tests and procedures they order,[4–6] so making price information available may motivate physicians to reconsider the value of the services they provide or recommend and to reduce the amount of inappropriate tests or procedures they order.[7]

Our understanding of physicians' views and use of price transparency efforts, however, has been surmised from studies of transparency initiatives conducted one to two decades ago.[8–20] Notably, the prior era of studies involved interventions that gave physicians charge information (i.e., "list" prices) rather than paid prices (i.e., the amount that health plans finally pay providers) or the out-of-pocket costs that patients might bear. These studies also shared price information retrospectively after the clinical interaction between physician and patient had occurred rather than at the point of care.[8–20] Past studies also involved interventions with physicians-in-training in inpatient settings for several weeks rather than fully-trained physicians in outpatient settings for several months or years.[7–20]

Our more recent randomized controlled trials of price transparency among fully trained outpatient generalists and specialists practicing within an accountable care organization have found that physician-targeted price transparency may not change, lower, or even raise physician test-ordering rates.[3] Together, these findings suggest that physicians may incorporate price information into daily care or test-ordering patterns in a more complex manner than prior studies have highlighted.[3,21–30] Qualitative study of when and how price transparency discussions enter into physicians' clinical decision-making processes, therefore, is important for considering whether and how price transparency might be an effective waste reduction strategy. Insights are also relevant for improving physician conversations with patients who are increasingly faced with higher levels of cost-sharing and bringing affordability concerns to their physicians' attention.[31,32]

Fully trained primary care physicians (PCPs) with experience having and using paid price information at the point of care are uniquely able to shed light on how physician-targeted price transparency efforts work in contemporary outpatient medical settings. PCPs can provide their views regarding the price information they have received, the type of clinical scenarios in which they do and do not find price information useful, and the role that physicians versus other actors within the healthcare system should play in price transparency.

In this qualitative study, we describe the experiences of PCPs who were given paid price information for a minimum of 1 year. Among price-informed PCPs, we describe their (a) "gut reaction" to having paid price information, (b) the clinical scenarios in which they used price information in clinical decision-making or patient conversations, (c) the degree to which they felt physicians should be involved in having conversations about price with patients, and (d) suggestions for improving physician-targeted price information interventions.

METHODS

Study Design. We conducted a cross-sectional qualitative study using semi-structured interviews. We received Boston Children's Hospital institutional review board approval for this study and obtained oral consent from all interview participants.

Study Setting. Our study was conducted within Atrius Health (Atrius), a large multispecialty medical group consisting of over 35 practice locations in eastern and central Massachusetts. At the time of our study, Atrius' over 517 adult PCPs delivered care to nearly 400,000 unique patients annually. About 90 % of patients were from white racial/ethnic backgrounds; 79 % were commercially insured. Approximately half of the contracts in which Atrius was engaged were risk-bearing, which equated to half of their patients, and their leadership reported a high level of focus on their capitated business.

Price Education Initiatives. Atrius began providing its physicians with paid prices for commonly ordered laboratory tests in 2011 and for imaging studies and procedures in January 2014 (screenshots in online Appendix).[3] The goal of Atrius' initiative was to provide physicians with paid price information without adjunctive clinical decision support or patient education materials. The intent of the intervention was stated in the paper and email communications that Atrius used to introduce this program to physicians. For each price-revealed test, Atrius calculated single median paid prices from all the risk-bearing commercial, Medicaid, and Medicare contracts that Atrius had in the year prior to the initiative.

Interviewee Recruitment. Between August and December 2014, we conducted 30–45-min in-person interviews with MD and DO-licensed internists and family practitioners functioning as PCPs. We recruited PCPs from 18 eligible adult primary care sites within Atrius. Given the variability in patient populations (e.g., 7–40 % on Medicare or Medicaid) and primary care practice group size (e.g., 3–22 PCPs), we sought to interview a representative sample, with a goal of 2–3 PCPs per site. We recruited PCPs first via email and then through Atrius' internal paper-based and electronic messaging systems. All interviewees had been employed by Atrius for at least 1–2 years and had been given paid price information for a minimum of 1 year for commonly ordered lab tests and a minimum of 8 months for commonly ordered imaging studies and procedures.

Interview Protocol and Analysis (details in online Appendix). Our semi-structured interview protocol was based on a conceptual model that accounted for the fact that (a) inquiring after PCPs' experiences with price information could be a sensitive process,[33] (b) clinical decision-making is a complex process,[34,35] and (c) asking PCPs about price information involves assessing how price information may affect how physicians balance potentially conflicting roles as patient advocates,[33] representatives of evidence-based medicine,[36,37] key members of practices,[38] and stewards of societal resources.[39–42]

We began by verifying the degree to which PCPs were aware of the price information they were given. We then asked PCPs for (a) their "gut reaction" to having paid price information, (b) the situations in which they used price information in clinical decision-making separate from or jointly with patients, (c) their thoughts on who bore chief responsibility for discussing price information with patients, and using probes, (d) their suggestions for improving physician-targeted price information interventions, along with the frequency with which PCPs were having conversations involving price and the degree to which PCPs felt professionally obligated to place primacy on patients' interests, medical professionalism, their practice or organization, and society at large. We audio-recorded and transcribed the interviews for all except two participants, who preferred having a notetaker. Two interviewers (ATC, KHS) conducted all interviews.

We analyzed semi-structured interview transcripts using grounded theory and the constant comparative method of qualitative analysis to identify themes in responses;[43] we created a codebook for our analytical approach, which involved cycling between three phases of open and closed coding. During the closed-coding phase, we checked inter-rater agreement among our coders (κ = 0.73) prior to adjudication through discussion. Two study team members double-coded all interviews, and two others served as independent adjudicators if consensus could not be reached. We examined whether findings seemed to differ based on PCP demographics (e.g., age, gender, training) or clinical role (with or without administrative duties). We used Dedoose and Excel software to support our analysis.

RESULTS

Our site response rate was 83 % (15 of 18), and our PCP response rate was 85 % (46 of 54). Slightly more than half (*N* = 27, 59 %) of the interviewed PCPs were female, 96 % (44 of 46) of PCPs practiced internal medicine and 4 % (2 of 46) were family practitioners, and PCPs had completed residency an average 22 years ago (SD 10, range 3–43 years) (Table 1). Most PCPs (*N* = 39, 85 %) reported being engaged in direct patient care at least 2.5 days per week (range 0.5–5 days), and one-third (*N* = 16, 35 %) reported having administrative responsibilities (e.g., unit chief) in addition to providing patient care directly. Seven key themes emerged from the interviews (Table 2).

PCP "Gut Reactions" to Price Information Ranged from Positive to Negative. All PCPs recalled seeing price information. When asked about their "gut reactions" to having paid price information for use during clinical care, over half of PCPs (*N* = 26, 56 %) responded that they viewed having such information positively, about one-third (*N* = 14, 30 %) viewed the availability of this information more neutrally, and the remainder (*N* = 6, 13 %) had a negative reaction. Examples of statements that were considered positive, neutral, and negative include the following: "clinicians were asking for the [price] information", "[the price information] was no surprise," and "I felt the [price information] was a waste of time," respectively.

Table 1 Primary Care Physician (PCPs) Demographic Information

Characteristic	Number (percentage)
Female	27 (59 %)
Specialty	
Internal medicine	44 (96 %)
Family practice	2 (4 %)
Years in practice	
3 9	5 (11 %)
10 19	16 (35 %)
20 29	14 (30 %)
30 39	8 (17 %)
40 43	3 (7 %)
Days/week in direct patient care	
Unknown	1 (2 %)
0.5 1.4	4 (9 %)
1.5 2.4	2 (4 %)
2.5 3.4	14 (30 %)
3.5 4.4	10 (22 %)
4.5 5	15 (33 %)
Has administrative duties	16 (35 %)

PCPs with All Ranges of "Gut Reactions" Were Interested in Having Patient-Specific Price Information. One-third of PCPs (*N* = 16, 35 %) spontaneously voiced an interest in having price information that was specific to their patients' out-of-pocket (OOP) spending burden. While this sentiment was voiced by those with both positive and negative gut reactions, a greater proportion of those with negative than with positive gut reactions expressed this interest in patient-specific OOP price information (83 %, *N* = 5, versus 25 %, *N* = 4, respectively). PCPs with negative gut reactions expressed, "[paid] prices are meaningless…it is not the right price [for this patient]," whereas those with positive gut reactions commented, "I would like to see [the price information] tailored to the patient that I'm seeing."

Having Price Information Only Slightly Altered PCPs' Test-Ordering Heuristics. Most PCPs (*N* = 27, 59 %) rebuffed the idea that having price information changed their test-ordering habits, citing that they were already parsimonious (e.g., "I'm very minimalistic when I'm ordering") or that the main driver of their test-ordering behavior was evidence-based medicine rather than price (e.g., "I tend to be kind of evidence-based. I don't order a bunch of stuff that I'm not supposed to order"). However, over a quarter of PCPs (*N* = 13, 28 %) reported small changes in their ordering habits (e.g., "[when] all [patients] need is a creatinine and a potassium [then] that's…more cost effective [than a basic metabolic panel]").

When Patients' Affordability Concerns Were Revealed, Price Information Helped PCPs Engage Patients in Conversations About How to Alter Treatment Plans. The vast majority of PCPs (*N* = 43, 93 %) described having recently or increasingly discussed price information with patients (e.g., "I've had more of these conversations with patients over the years as copay[s] have gone up and as now deductibles are going up"), and two-thirds of PCPs (*N* = 31, 67 %) also stated that they found price information useful for patient conversations.

Half of PCPs (*N* = 22, 48 %) described using price information simply in a price-informed conversation. At times they described providing patients with ballpark estimates (e.g., "Patients don't know [prices] at all. So it is just helpful to be able to say, 'It's going to be under $100'"). Other times, PCPs described the identification of alternate treatment approaches like watchful waiting, a substitute test, or a medication trial. One PCP described,

Table 2 Primary Care Physician (PCP) Views on and Experience with Price Information

Themes identified	Representative quote(s)
1. PCP "gut reactions" to price information ranged from positive to negative.	"I'm all for [price transparency]… I think we have no clue as physicians what things cost." *Female PCP in practice for 37 years, sees patients 4.8 days per week plus has administrative duties* "I don't know what [price transparency] is supposed to do other than make you feel bad." *Female PCP in practice for 20 years and sees patients 5 days per week*
2. PCPs with all ranges of "gut reactions" were interested in having patient specific price information.	"I think it would be very beneficial if I know that if [the price] is specifically for this patient for this kind of insurance and what will be the out of pocket [spending] for this particular patient." *Male PCP in practice for 25 years and sees patients 4 days per week* "More patient specific data would actually probably have a pretty significant impact on what we wind up doing." *Male PCP in practice for 19 years, sees patients 3.5 days per week plus has administrative duties*
3. Having price information only slightly altered test ordering heuristics.	"An ultrasound is cheaper than a CT scan, so if I would get enough information by that, I would then order the ultrasound." *Female PCP in practice for 31 years, sees patients 2.5 days per week* "For some of the X ray stuff, I kind of try to keep in the back of my mind like, 'This is pretty costly. Is it going to change anything?'" *Female PCP in practice for 23 years, sees patients 4.4 days per week*
4. When patients' affordability concerns were revealed, price information helped PCPs engage patients in conversations about how to alter treatment plans.	"[Patients will] say, 'You know, but I haven't met my deductible. This test is going to cost so much, or how much do you think it will cost? Can we wait on this?' And then we discuss pros and cons." *Female PCP in practice for 31 years and sees patients 2.5 days per week* "We'll look at the [information] together and [I'll] say, 'I'm worried you have a pituitary adenoma. The MRI is going to cost you $3,000, but we can get a non contrast head CT scan for $500 and it will probably give you the same information.'" *Male PCP in practice for 23 years and sees patients 4 days per week*
5. PCPs avoided mentioning price information when advising patients against unnecessary testing.	"Some people, when you tell them the cost of something…they feel like you are trying to limit care for them because of the cost. So I do try to be careful about using [price information]." *Female PCP in practice for 18 years and sees patients 4 days per week* "I really try not to [use price information when advising patients against unnecessary testing] because most patients will rear back in disgust if you bring it up as a clinician. I do frequently bring up evidence based medicine as an explanation for why I am or am not doing something." *Male PCP in practice for 17 years, sees patients 3 days per week plus has administrative duties*
6. PCPs felt that physicians bore chief responsibility for discussing prices with patients because of their clinical knowledge and relationships with patients.	"All of those [clinical] subtleties, I don't think anyone else [other than physicians] would really be able to discuss with the patient." *Female PCP in practice for 13 years and sees patients 3.8 days per week* "You've got to have the clinical information in there. The patient needs to know what does that mean and they need to be reassured that if they don't do something, they're not doing something bad for themselves." *Female PCP in practice for 23 years, sees patients 4.8 days per week plus has administrative duties*
7. PCPs wished for help from patients, practices, health plans, and society in order to support price transparency in healthcare.	*Patients.* "[Patients] should know what their insurance covers…they're the ones who selected their insurance with the copays, deductibles, other out of pocket expenses." *Male in practice for 13 years and sees patients 3.8 days per week* "[Patients say], 'I don't care about how much this [test] costs because my insurance company pays for it.' And [I] say, 'Yes. You do care…because your premium would go up.'" *Female in practice for 18 years and sees patients 4 days per week* *Practices.* "It would be great if there was a little office of how to help you with the cost of your medical care right here [in the office]." *Female PCP in practice for 37 years, sees patients 4.8 days per week plus has administrative duties* "Maybe when we send out [patient] letters saying, 'You need your routine physical, and we believe that you need the following: a mammogram, a colonoscopy, a lipid panel; and this is what it's going to cost you.'" *Female PCP in practice for 14 years and sees patients 5 days per week* *Health Plans.* "The insurance companies don't get involved enough in being transparent about what their insurance covers, what their rules are. Nowadays I feel like they turf it to us." *Male PCP in practice for 3 years and sees patients 5 days per week* *Society.* "I could envision a more transparent society where on the website you could be curious about the cost of your care. People could just click on 'How much does an MRI cost' and how much does this cost and how much does that cost." *Male PCP in practice for 19 years, sees patients 1.5 days per week plus has administrative duties*

"Some patients are choosing probably not to have something that I might have been interested in or that isn't maybe totally necessary…We'll decide, what out of these possibilities, do we think we really need to get? What are you willing to pay for?" About one-third of PCPs ($N=16$, 35 %) described ways in which they would use patient out-of-pocket price information if they had it (e.g., "If I knew exactly how much it would cost a person to do a test like that would be very useful, to both [me and my patient]").

PCPs Avoided Mentioning Price Information When Advising Patients Against Unnecessary Testing. Most PCPs ($N=28$, 61 %) considered cost stewardship an important part of their role as physicians (e.g., "[I feel] responsible… to society for keeping costs down") and conveyed a high level of frustration when faced with patients who demanded tests that were not clinically indicated (e.g., "The patient wants it ordered or will freak out if you don't order").

In situations in which PCPs felt that adhering to patient requests were in conflict with medical evidence and cost stewardship, PCPs expressed fear of eroding patient rapport and described avoiding rather than incorporating price information. For example, one PCP explained, "I wouldn't necessarily bring [price] up because patients feel that they're not getting the best care…they might think that all I'm doing is trying to save money, which is not the case." PCPs also related that they wanted to emphasize the clinical indications for testing (e.g., "It's more helpful to put it in contexts of medical necessity").

PCPs Felt That Physicians Bore Chief Responsibility for Discussing Prices with Patients Because of Their Clinical Knowledge and Relationships with Patients. A majority of PCPs ($N = 37$, 80 %) stated that physicians bore the chief responsibility for discussing prices with patients, or affirmed that there "wasn't any way for physicians not to be involved in conversations about price." Some PCPs were emphatic about physicians playing an active role (e.g., "We're the ones doing the ordering, and we're the ones making the compromises when the finances are a problem or trying to figure out the alternatives or arguing with the insurance companies when they turn stuff down…[it] is our ethical responsibility"). Other PCPs were reluctant (e.g., "I don't love having the [price] discussion…I do have to own some of that, and while it may be uncomfortable, it may also help [patients] in their decision-making").

Irrespective of the degree to which PCPs embraced their role in helping patients make price-informed decisions, they described their responsibility stemming from their clinical knowledge base (e.g., "[We] are the only ones with the expert knowledge of what is and isn't appropriate") and their relationship with patients (e.g., "There is no one else because we're the ones giving the care and ordering").

PCPs Wished for Help from Patients, Practices, Health Plans, and Society in Order to Support Price Transparency in Healthcare. One-third of PCPs ($N = 18$, 39 %) wanted patients to be better educated consumers (e.g., "In an ideal world, people should know what their insurance covers and what it doesn't cover before they go into something"). One-quarter ($N = 13$, 28 %) also thought that other members of their practice's clinical team or administrative staff could help introduce the idea of considering cost and could provide educational material to patients (e.g., "It would be great if there was a little office of how to help you with the cost of your medical care right here"). One-half ($N = 23$, 50 %) strongly stated that health plans could better align with PCPs' efforts (e.g., "[physicians] have these difficult conversations with patients…to try to reduce the duplication. Then, to have patients be able to call [insurance companies] up and be told 'All you need to do is have your doctor do a referral,'…[it] is very frustrating for a lot of clinicians"). Finally, about one-third of PCPs ($N = 14$, 30 %) stated that society had a stronger role to play in promoting price transparency (e.g., "In this country it has always been 'more is better' and 'spend, spend, spend,' and 'somebody else is paying for it.' Well, somebody else really isn't paying for it, and we're all paying for it. I think it's a real education for the consumer").

We observed no differences in views based on PCP demographics (age, gender, training) or clinical role (with or without administrative duties).

DISCUSSION

PCPs with extended experience with price information describe price information to be more useful for responding to patients' affordability concerns than for changing test-ordering habits that do not involve patients per se. This finding is novel among price transparency studies to date and perhaps reflects that prior studies were conducted in hospital settings where patients are not expected to play as active a role in their own care treatment decisions as in primary care.[33]

Although PCPs express a substantial amount of fear and hesitancy when considering whether to incorporate price information into clinical conversations, they still articulate being dedicated to the idea that physicians should play a central role in helping patients make price-informed clinical decisions. PCPs offer some practical solutions to overcome some of their own tentativeness, but most solutions involve broader stakeholder involvement (e.g., non-physician practice members could help gauge patient interest in price-informed clinical guidance, health plans could make patients' OOP spending obligations more accessible), so further study of stakeholder views are needed.

Our findings may be more generalizable than they initially seem. Although we interviewed PCPs at a large multispecialty group taking on risk-bearing contracts in MA and listed in the first wave of the Centers for Medicare and Medicaid Services Health Care Innovation Awards,[44,45] these types of organizations are proliferating across the U.S. Observations among our PCPs may be similar to what may emerge from physicians in analogous situations across the nation.[1,44–47] Certainly, our findings will also remain relevant if patients continue to face cost-sharing burdens in both fee-for-service and risk-bearing settings. More work will need to be done in order to understand how price transparency efforts may work in settings where patients are non-white or not commercially insured—settings in which patient out-of-pocket spending concerns are likely to be greater than those in our study population.[48] Social desirability bias is typically a concern for qualitative studies, but it is difficult to tell what direction that bias may have taken in this study—PCPs may have underreported their response to price information because they may have wanted to avoid the appearance that they were influenced by price information, or they may have overstated the degree to which they took price information into account because they wanted to appear value-oriented.

Those interested in developing the next generation of physician-targeted price transparency efforts will benefit from recognizing that organizations face incentives from insurers and also create information environments for PCPs, and that PCPs may prefer to use price information to support patient-centered decisions rather than as a strategy for eliminating waste from healthcare, either for their organization or for the system at large.[49] Developers will also undoubtedly benefit from the increasing availability and sophistication of consumer-oriented websites and smartphone "apps" that are moving toward providing patients with timely and accurate price information, including out-of-pocket spending obligations.[1] To meet this interest, however, it may be necessary to provide physicians with additional information or training on how to be good price-informed guides to patients. Stakeholders interested in reducing waste in healthcare may want to consider the adjunctive training or clinical decision supports that may need to be combined with price transparency to achieve a waste reduction effect.

In summary, at least from the eyes of the price-experienced physicians we interviewed, the future of physician-targeted price transparency interventions in medicine likely lies more in the ability of such interventions to facilitate conversations between physicians and their patients about patients' out-of-pocket spending burden than in changing physicians' ordering patterns.

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CERTIFICATE OF SERVICE

I hereby certify that on August 17, 2020, I electronically filed the foregoing with the Clerk of the Court by using the appellate CM/ECF system. Participants in the case are registered CM/ECF users, and service will be accomplished by the appellate CM/ECF system.

s/ *Courtney L. Dixon*
COURTNEY L. DIXON