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REVIEW ARTICLE

Healthcare price transparency in North America and Europe

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ABSTRACT:

Healthcare price transparency is an effort to inform patient decision-making, but also to decrease prices and their variation across healthcare systems for equivalent medical services. The initiative is meaningful only for medical services that are shoppable—such as imaging examinations—for which patients incur out-of-pocket costs. Therefore, several countries in which patients commonly share a portion of their healthcare costs have been implementing mandates to improve healthcare price transparency. However, the provisional implementation has many issues, especially in the United States, including provider non-compliance and limited accessibility of price transparency tools by the general public. Many of the existing tools are not user-friendly, are difficult to navigate, focus on charges and health plan negotiated rates rather than patients' out-of-pocket costs, and disclose prices on the service level instead of per episode of care. As such, the disclosed amounts are often not reliable. Many price transparency tools also lack valid and measurable quality metrics, which can result in a selection of high-cost care as a proxy for high-value care, as well as an increase in healthcare prices when providers want to imply they offer high-quality care. Nevertheless, the impact of the initiatives on patients' decision-making and healthcare costs remains unclear. While transparency initiatives are patient-centric, efforts should be made to increase patient engagement, provide accurate patient-specific out-of-pocket cost information, compare available treatment and provider alternatives, and couple price information with quality metrics to enable making fully informed decisions.

INTRODUCTION

Healthcare price transparency aims to enhance patients' knowledge of cost of care, and increase their involvement in decision-making regarding their care.¹ Consequently, informed patients may make cost-conscious choices leading to decreased healthcare spending.² Price transparency is also aimed at encouraging high-cost systems to lower prices and reducing variation in prices of equivalent medical services through market competition.^{3–6}

The benefits of price transparency are contingent upon the incentive structure within the healthcare system and the existence of provider and treatment alternatives. The knowledge of healthcare prices may influence treatment choices especially when patients bear at least a portion of the cost. Moreover, price transparency mainly impacts choices

of "shoppable" medical services—those that are offered by multiple providers in a market where patients have the time and capacity to compare price and quality (if available) before making a choice.² Outpatient, non-emergency radiology services are often considered shoppable.²

In countries such as the United States, radiology services are often associated with significant financial burdens for patients, with nearly half of private health insurance policies requiring coinsurance for in-network imaging services and over 90% requiring coinsurance for out-of-network imaging services.⁷ Thus, price transparency in healthcare is a timely and relevant issue in the context of radiology services.

In this review, we provide an overview of the state of healthcare price transparency in select North American

and European countries, and discuss its potential barriers and downstream effects.

Cost, charge, and price terminology

Cost refers to the amount incurred by the provider during healthcare delivery,⁸ and includes direct costs (for resources used in the provision of services) and indirect costs (for resources not directly used for service delivery; *e.g.* utility in a radiology department).⁹

The amount that healthcare providers request as payment is referred to as the charge or list price. A negotiated price is the amount that is contractually agreed upon in advance by the insurer and the provider.⁸ This amount is often split between the insured patient and the insurer based on the plan's benefit design. The amounts that patients are asked to pay out-of-pocket are the most meaningful for patient decision-making and thus the most relevant in healthcare price transparency efforts.⁸ Out-of-pocket costs may consist of deductible, coinsurance, or copayment. Deductible is the amount that insured patients must pay out-of-pocket before their insurance coverage begins to pay for covered services. Co-insurance refers to the proportion of the negotiated price that insured patients pay after their deductible is

met.¹⁰ Co-payment refers to a fixed amount that insured patients are required to pay out-of-pocket for a specific healthcare visit.

States of price transparency in select countries

Table 1 describes the state of insurance coverage and cost-sharing in select North American and European countries,¹¹ for which online information could be found. We discuss the state of price transparency in three countries (United States, Netherlands, and Switzerland) where patients often bear significant portions of their cost of care and prices are determined through negotiation between health insurers and care providers¹²—and therefore, implementing price transparency is of importance—and two countries (Canada and the United Kingdom) where the predominant public coverage of medical services does not require patients to share portions of the cost of their care, so price transparency may not be a concern. By including universal healthcare models and mixed public–private systems, this analysis captures the impact of different regulatory frameworks on promoting price transparency.

United States

In the USA, patients commonly incur an out-of-pocket cost for their medical services. The amount depends on factors, such

Table 1. Patient cost-sharing in North America and select European countries¹¹

	Patient cost-sharing mechanisms	% with public insurance	% with private insurance
United States	Annual deductible, coinsurance, and copayments	34%	67%
Canada	No cost-sharing for publicly insured services	100% publica	67% complementaryb
Denmark	No cost-sharing for publicly insured services	100% publica	42% complementaryb; 30% supplementatyC
England	Very limited cost-sharing for publicly covered services	100% publica	10.5% supplementaryc
France	Coinurance, copayments, and balance billing; no deductibles	100% statutoryd	95% complementaryb
Germany	Deductibles and copayments	88% statutoryd	11% private substitutive coverage; 10.6% complementaryb
Italy	No cost-sharing for primary and inpatient care; copayments for procedures and specialist visits	100% publica	10% complementaryb or supplementaryc
Netherlands	Mandatory deductible; coinsurance, copayments, or direct payments may be required after the deductible is met for selected services.	100% statutoryd	84% complementaryc
Norway	Copayments	100% publica	10% supplementatyC
Sweden	Copayments	100% publica	6% supplementaryc
Switzerland	Annual deductible, coinsurance, and copayments		100% mandatory private

^aPublic: national insurance providing automatic coverage.

^bComplementary private: voluntary coverage for services not covered by public or statutory insurance.

^cSupplementary private: voluntary coverage for quicker access to elective services and greater choice of private providers, mainly employer-based plans.

^dStatutory: mandatory coverage from private non-profit insurers.

as patients' insurance coverage status (insured vs uninsured), type (e.g. public or private), benefit design (deductible, coinsurance, annual out-of-pocket maximum), whether any prior out-of-pocket cost during same fiscal year has been incurred, whether the medical service is obtained from an in-network or out-of-network provider, and the negotiated price between the insurance and the provider. Patients are generally aware of their insurance type. However, they are less knowledgeable about their insurance benefit design, network status of providers involved in their care, or negotiated prices.¹³ Without this information, patients are unable to adequately estimate their out-of-pocket costs. Further, charges and negotiated prices for medical services of comparable quality often vary substantially within geographic areas.⁶ For shoppable radiological services, there are substantial differences in commercial insurance negotiated prices across hospitals¹⁴ and even within the same hospital across health plans operated by same insurance company.¹⁵ Commercial prices of radiology services that involve equipment of high fixed cost—such as CT or MRI—exhibit larger variation compared to those with lower fixed costs—such as mammography.^{14–16}

Since January 2021, the US Department of Health and Human Services Centers for Medicare & Medicaid Services (CMS) has required that all hospitals have their charges, payer-specific negotiated prices, deidentified minimum and maximum negotiated prices, and discounted cash prices for all services publicly available in an online single digital file in a machine-readable format.¹⁷ Hospitals must also display prices for at least 300 commonly provided shoppable services (70 of them pre-specified by CMS) in a consumer-friendly format or use a price estimator tool.¹⁸

As of July 1, 2022, CMS has required all insurers offering individual and group commercial health insurance plans to publish machine-readable files containing negotiated prices for all covered items and services from in-network providers, as well as billed charges and allowed rates from out-of-network providers. Since January 1, 2023, insurers should provide their members an online price estimation and comparison tools for 500 designated services, which will expand to all services in January 1, 2024.¹⁹

Netherlands

The Netherlands have a universal healthcare system underpinned by private insurance and mandatory coverage, in which every resident and tax-paying non-resident is required to purchase health insurance from a private insurer.²⁰ In addition to statutory coverage, 84% of the population purchases voluntary supplementary insurance.²⁰

The main form of patient cost-sharing in Dutch healthcare is a mandatory deductible with additional voluntary deductible for a lower monthly premium. However, copayments, coinsurance, or direct payments may be required even after the deductible is met for some services such as non-formulary medicine.²⁰ For outpatient imaging, there is either a fixed contribution (e.g. copayment) or no fee as long as the patient is referred by a general practitioner and the hospital is within the patient's insurance network.²¹

For many years, negotiated prices between providers and insurers were kept private. In 2016, a major insurer and one medium-sized hospital group published their negotiated prices, specifically for services priced at below the maximum deductible threshold for consumers.¹² This resulted in three additional insurer competitors to release similar information.²² Because these four insurers served 88.3% of the market in 2017, sharing of this information represented a major increase in price transparency. Published prices became available through search engines on insurer websites and external sources that aggregated prices across insurers and providers. The released data showed substantial price variation across hospitals for the same products, and within a hospital for the same product across insurers.¹² Specifically, approximately 27% of contract prices for a hospital product are at least 20% higher or lower than the average contract price in the market.¹² This variation in hospital contract prices is a concern for consumers, especially if prices are below their maximum annual deductible.

The Authority for Consumers and Markets (ACM) has advised health insurers to provide consumers with increased insight into hospital treatment costs for which they are responsible.²³ ACM claims that health insurers are in a better position than hospitals to advise patients about different hospital tariffs. However, measures have yet to be put in place to ensure hospitals do not only compete for better healthcare quality, but also more affordable prices.²³ For patients undergoing elective imaging or receiving imaging at an out-of-network facility, Dutch Health Authority mandates cash prices to be posted on the hospital's website.²⁴

Switzerland

Among European countries, Switzerland spends the highest percentage (12.1%) of its gross domestic product on healthcare.²⁵ Similar to the USA, Switzerland has a decentralized healthcare system where cantons (equivalent to states) are responsible for subsidizing institutions and individual premiums.²⁰ Close to 100% of the population is covered by private health insurance.²⁰ For most insurance plans, households pay high premiums. After meeting a deductible, patients bear a portion of their medical costs through a 10% coinsurance rate until their out-of-pocket spending reaches an annual maximum.

Prices of healthcare services charged to patients and health insurers or payers are supposed to be publicly reported,²⁶ and the federal government is in the process of implementing measures that will force all providers to disclose cost information to all relevant parties.²⁷

Canada

The Canadian healthcare system, known as Medicare, is funded and overseen by the country's provinces and territories. Each province and territory has its own insurance plan, with financial assistance provided by the federal government on a per-capita basis. Due to the decentralized nature of the Canadian healthcare system, it is challenging to obtain a comprehensive understanding of the state of price transparency.

Despite variations in benefits and delivery approaches among the provinces and territories, all Canadian citizens and permanent

residents are entitled to a comprehensive range of hospital and physician services—including diagnostic imaging—free at the point of use. 67% of Canadians also have complementary private insurance to cover services not included in Medicare. Approximately, 90% of advanced imaging is provided in the publicly funded healthcare system. Prices for CT and MR imaging are either negotiated on a regional basis or linked to the provincial fee schedule.²⁸ However, given there is no patient cost-sharing,²⁸ benefits of public disclosure of prices are debatable.

A small percentage of services is offered by privately owned imaging clinics;²⁸ however, usage of private imaging has been increasing in recent years, due to the aging population and prolonged wait times for publicly funded imaging services.²⁸ There is limited publicly available information concerning private imaging facilities and the prices they charge. Diverse policies across provinces have resulted in a complex landscape surrounding private imaging in Canada. For instance, in Ontario, patients may only access private imaging through third-party payers other than the government, such as an employer or private insurance or self-pay. In contrast, private imaging is not available in certain provinces, such as Prince Edward Island, Manitoba, and Newfoundland. However, in the majority of provinces, patients have the option of paying out-of-pocket for private diagnostic imaging if they prefer not to wait for the public system to provide the service.²⁹ In these cases, patients are expected to directly inquire about the cost. While some private imaging clinics have published their prices online, others require a referral or requisition form to provide a more accurate cost estimate.²⁹

United Kingdom

In the UK, creation of the National Health Service (NHS) in 1948 started free universal health coverage—which includes hospital, physician, and mental care—for its “ordinarily residents”.²⁰ NHS also covers advanced imaging (e.g. MRI or CT) but requires a referral from a general practitioner. NHS has pledged to keep the diagnostic waiting times less than 6 weeks, and waiting lists are reviewed and prioritized based on clinical needs in the areas where more than half the patients have been waiting for more than 6 weeks.³⁰ In April 2023, percentage of patients waiting 6 weeks or more were 23.7% for non-obstetric ultrasound, 15.7% for CT, and 22.8% for MRI.³⁰ The COVID-19 pandemic had a significant role in increasing the wait times due to decrease in performance of diagnostic tests during pandemic.^{30,31} National Cost Collection data are a repository of aggregated costs of defined services provided to NHS patients, as well as patient-level costs based on specific interactions patients have.³² The data are used to inform processes such as national tariff prices, and are not designed to be used by patients given that NHS services are free to patients.

Residents have an option to co-enroll in supplementary coverage through private insurance for more rapid access to elective care and imaging, as well as options to choose specialists.³¹ In 2015, 10.5% of the population co-enrolled in voluntary private medical insurance.³³ However, given a marked increase in waiting times for radiology services,^{30,31} it is expected that a larger proportion of patients may opt for private insurance, for whom price

Table 2. Barriers to price transparency

Barrier	Solution
Compliance	Effective penalty for non-compliers
Accessibility and usability of price transparency tools	Involvement of consumers in the design of price transparency tools (stakeholder engagement)
Accuracy of price estimates	Design estimators to accommodate for patients' multiple insurance coverages, multiple providers visit and multiple service use during the same healthcare episode
Missing quality metrics	Adding valid quality metrics that are meaningful to patients to price transparency tools

transparency will have implications. Of services offered by private healthcare providers in the UK, 75% are covered by private health insurance, and 25% are self-pay.³⁴

Following the 2014 investigation from the Competition & Markets Authority, private healthcare providers are required to disclose price information on the Private Healthcare Information Network website.³⁵ Providers currently offer “package” prices that bundle fees together. However, access to both package pricing and prices for individual services might be more beneficial for patients. Additionally, not many imaging centers are compliant with the 2014 requirement, and do not have their price information publicly available. Genesis of start-ups—such as “Scan.com”—that aims to make obtaining healthcare prices easier shows that prices of healthcare services from private providers are often not easily accessible by patients.³⁶

BARRIERS TO PRICE TRANSPARENCY

The impact of price transparency initiatives has often fallen short of expectations due to multiple barriers. While this has been studied more extensively and directly in the USA compared to other countries, many of the circumstances contributing to the limited impact of price transparency legislation are not limited to the USA and can explain shortcomings in other countries (Table 2).

Healthcare system compliance

In the USA, hospital compliance with price transparency mandates has been suboptimal. About a year after the hospital price transparency mandate, which required disclosure of prices of select medical services—including radiology services—less than 50% of hospitals were compliant.^{14,37} The poor compliance resulted in CMS increasing the penalty for non-compliance to a maximum of \$5500 per day for large providers (e.g. hospitals with a bed count of greater than 30).³⁸ In general, hospitals with the following characteristics were more likely to be compliant with the price transparency mandate: strong IT infrastructure, large size, non-urban location, for-profit (as opposed to non-profit) status, affiliation with other hospitals in the same hospital referral region, and higher consumer rating.^{37,39} This suggests that lack of resources may prohibit hospitals from complying with the mandate and compliance is strongly influenced by a patient-centered approach of the hospital and the behaviors of

peer hospitals in the same market.³⁹ On the other hand, hospitals in highly consolidated markets with high revenues were less likely to follow the mandate.⁴⁰

Accessibility and usability of price transparency tools

The majority of price transparency tools are online, which severely limits patients without internet access or without sufficient technical literacy from finding the tool. Even for patients with internet access, finding price information online may be difficult. Many websites require patients to click or scroll through multiple pages of links to access their price listings. In a 2012 study, only 10% of people with price estimator tool access used the tool at least once.⁴¹ In a recent study, only 27.7% were able to find an accurate price estimate for a lumbar MRI examination using four pre-specified hospital price estimator tools, and 9.2% were unable to locate any of the price estimator tools.⁴² This is largely due to the fact many of these websites are not user-friendly, and that many patients do not have sufficient literacy (health, health insurance, and technical) to navigate these websites. Lastly, the nonmenclature of imaging exams is variable which may contribute to patients' inability to find appropriate information.⁴² For example, an imaging exam of one body part is listed in price transparency tools under various labels, such as lumbar spine MRI, spinal canal MRI, or lower back MRI.⁴² Consumer outreach and education, as well as consumer involvement in the design of price transparency tools, are essential to improve awareness, access and utilization of price estimator tools. Policies aimed at improving price transparency should also require that price transparency tools be comparable across providers and fit an established industry standard.

In other countries, such as Netherlands, hospital services are classified into "diagnosis treatment combinations (DTC)", which include all hospital activities and services associated with the patient's demand for care, from the initial consultation to the final check-up. This limits the usability of price transparency, as it is difficult for consumers to know in advance which DTC product they will receive.²²

Accuracy of price transparency estimates

Many of the current transparency efforts target hospital charges and negotiated prices instead of the more relevant out-of-pocket costs.⁴³ Some cost-estimator tools have the ability to estimate patient-specific out-of-pocket costs. However, obtaining an accurate estimate is often difficult for several reasons. Some patients might be covered by more than one insurance plan, and many of the estimator tools account only for patients' primary insurance.⁴⁴ Additionally, healthcare episodes often involve multiple providers who often bill independently of each other, and for a patient to get an estimate of total cost core, they need to look up prices from each provider separately.⁴⁵

Imaging appointments also involve multiple chargeable services such as professional and technical components or additional supplies such as contrast agent. It is difficult for patients to know in advance exactly what services they will be provided and billed for to get an accurate estimate of their service.⁴⁶ A recent

study showed an accuracy of 84% for the price estimator tools.⁴⁷ Designing estimator tools that are comprehensive in accommodating patients' multiple insurance plans, multiple providers, and multiple services during a single healthcare episode is key.

Missing quality metrics

Incorporating quality metrics in price transparency tools allows consumers to get a more comprehensive picture of the value they are getting for their money. Currently, majority of price transparency tools in the United States and other countries lack quality metrics.^{8,26} In a prior study, when patients were provided with data on the cost and quality, they opted for facilities providing high-value, high-quality imaging examinations.⁴⁸ However, when quality information was absent, patients decision was based on their pre-conceived notions that higher cost equates to higher quality. This led patients with higher price sensitivity to select more affordable options, while patients with lower price sensitivity selected more expensive options.⁴⁸ In another study, individuals preferred a higher-cost, higher-quality imaging center over a lower-cost, lower-quality center for severe health conditions (e.g. severe back pain), and were willing to pay extra for additional gains in perceived quality of medical service. However, for mild conditions (e.g. mild back pain) perceived importance of quality and cost were not statistically different.⁴⁹ Adding measurable and valid quality metrics to price transparency tools not only facilitates patient decision-making, but also prevents providers from increasing prices as a proxy for quality. In Switzerland, measures to further increase transparency in health care, particularly in regards to quality of services, were identified as a health policy priority for the 2020–2030 time period. Currently, information about quality is either not collected or is difficult to understand.²⁶

DOWNSTREAM EFFECTS OF PRICE TRANSPARENCY

Impact on shared decision making, care adherence, and healthcare spending

A key reason for impoving healthcare price transparency is to enable patients and providers to incorporate the financial aspect of receiving medical care into patient-provider shared decision-making. However, it is not yet clear whether price transparency indeed improves shared decision-making or inadvertently causes more anxiety and deferral of necessary care.⁴⁴ In one study, active discussions with patients comparing imaging costs of MRI resulted in selection of more affordable outpatient imaging facilities and savings of up to \$925 for a given exam.⁴ Furthermore, price transparency may have a greater impact on more objective, shoppable services like imaging and laboratory tests in contrast to clinician office visits, which are greatly influenced by personal patient-provider relationships. One study showed a 13% decrease in claim payments for MRI and CT scans and a 14% decrease for lab tests after employees from multiple industries were provided with and taught to use price transparency tools.⁵⁰ In contrast, there was only a 1% decrease in claim payments for clinician office visits. Another study supported these findings by showing how direct phone calls to patients with "targeted, personalized, and actionable price information" resulted in a considerable number of patients rebooking their MRI exams at a

different “higher value” facility within a 5-day window between pre-authorization request and imaging exam.⁴ This suggests that access to pricing information empowers patients and is most impactful when patients are actively seeking high-value imaging exams near their date of service.⁵⁰

However, the type of price information patients have access to is also important. After publishing Diagnosis Treatment Combination prices by a major insurer in Netherland, use of price transparency websites increased. However, healthcare spending and likelihood to visit a new provider remained unaffected. Dutch health policy researchers postulate that public release of negotiated prices will likely not help consumers make price conscious hospital choices. Since DTCs represent a bundle of services that patient may or may not use, it makes it difficult to efficiently shop among the available providers. Public dissatisfaction about non-transparent hospital prices may urge hospitals and insurers to simplify the hospital pricing system for consumers especially for prices less than the annual maximum deductible.^{12,22}

In other cross-sectional studies, patient-provider cost discussions were associated with higher care satisfaction and lower out-of-pocket spending, but also higher non-adherence to prescribed treatment regimens.⁵¹⁻⁵⁴ It is not clear whether this non-adherence is a result of out-of-pocket cost discussion, or if those with more vulnerability to cost (e.g. experiencing financial hardship) were more likely to have cost discussions. Another study showed that cost discussions did not impact patient adherence to appropriate and necessary cancer care.⁵⁵ In a survey of 125 patients, obtaining out-of-pocket cost prior to medical services via a price estimator tool resulted in non-adherence in only 1.6% of patients; 71% reported benefiting from the tool in financial planning.⁴⁷

Impact on healthcare prices

It is often suggested that price transparency will increase competition and thus reduce healthcare prices.⁵⁶⁻⁵⁸ The 2005 price transparency initiative in New Hampshire resulted in a 3% reduction in cost of outpatient imaging services that were listed in the HealthCost website 5 years later compared to those services not listed. This translated to an 11% decrease in out-of-pocket costs for the listed imaging services.⁵⁷ Other studies have also shown decreased service prices after introducing price transparency tools.^{4,5,59} In a prior study, price transparency regulations resulted in hospitals reducing charges by approximately 5%;

however, facilities subsequently reduced discounts to maintain profits which did not ultimately result in consumer savings.⁶⁰

To survive in a more competitive market, healthcare providers are expected to economize costs and boost efficiency.⁶¹ Patients’ price shopping could incentivize hospitals to cut prices,⁶² resulting in more affordable care for the poor (*i.e.* improve health equity).⁶³ However, many argue that price transparency will increase consumer awareness about the different products available and their prices, which may increase the aggregate demand for specific providers.⁵⁶ The increased demand may then override the competition effect of transparency,⁶² enabling provider collusion, leading to higher prices,⁴ and thus decreased affordability.⁶³ Moreover, in the absence of quality metrics, if patients perceive that high costs are associated with high quality, healthcare providers are unlikely to decrease their prices.⁶² Therefore, price transparency efforts must be accompanied with information regarding quality to prevent undesirable price escalation.⁶⁴

CONCLUSION

Improving price transparency where patients are responsible for a portion of their cost of care aims to improve patients’ decision-making and financial planning, and decrease prices through increased competition, and thus decrease overall healthcare spending. The impact of price transparency has been most pronounced for shoppable medical services such as outpatient imaging. However, implementation of price transparency faces considerable barriers such as provider non-compliance, issues with accessibility and usability of price transparency tools, accuracy of price estimates, and missing quality metrics. Future efforts should focus on addressing these barriers by making price transparency tools consumer-friendly, easy to navigate, comprehensive, capable of providing accurate patient-specific out-of-pocket cost estimates, and accessible by all. Most importantly, price information should be accompanied with appropriate quality measures to help patients make fully informed decisions.

COMPETING INTERESTS

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REFERENCES

- IBM. What is healthcare price transparency? Available from: <https://www.ibm.com/topics/price-transparency-healthcare> (accessed 1 Feb 2023)
- Gov Info. Executive order 13877—improving price and quality transparency in American healthcare to put patients first. Available from: <https://www.govinfo.gov/content/pkg/>
- DCPD-201900419/pdf/DCPD-201900419.pdf (accessed 3 Feb 2022)
- Glied S. Price transparency—promise and peril. *JAMA* 2021; 325: 1496–97. <https://doi.org/10.1001/jama.2021.4640>
- Wu S, Sylwestrzak G, Shah C, DeVries A. Price transparency for mris increased use of less costly providers and triggered provider competition. *Health Aff (Millwood)* 2014; 33: 1391–98. <https://doi.org/10.1377/hlthaff.2014.0168>
- Sinaiko AD. What is the value of market-wide health care price transparency? *JAMA* 2019; 322: 1449–50. <https://doi.org/10.1001/jama.2019.11578>
- Heller RE, Sadigh G, Rao VM. Current controversies in radiology on cost, reimbursement, and price transparency. *AJR*

- Expert Panel Narrative Review AJR Am J Roentgenol* 2022; **219**: 5–14. <https://doi.org/10.2214/AJR.22.27326>
7. Rosenkrantz AB, Sadigh G, Carlos RC, Silva E, Duszak R. Out-of-pocket costs for advanced imaging across the US private insurance marketplace. *J Am Coll Radiol* 2018; **15**: 607–14. <https://doi.org/10.1016/j.jacr.2017.12.010>
 8. Sadigh G, Carlos RC, Krupinski EA, Meltzer CC, Duszak R. Health care price transparency and communication: Implications for radiologists and patients in an era of expanding shared decision making. *AJR Am J Roentgenol* 2017; **209**: 959–64. <https://doi.org/10.2214/AJR.17.18360>
 9. Gentili A. Cost accounting for the radiologist. *AJR Am J Roentgenol* 2014; **202**: 1058–61. <https://doi.org/10.2214/AJR.13.11549>
 10. Healthcare.gov. Glossary. Available from: <https://www.healthcare.gov/glossary/> (accessed 26 Jun 2023)
 11. The commonwealth fund. Country profiles. international health care system profiles. Available from: <https://www.commonwealthfund.org/international-health-policy-center/countries> (accessed 12 Mar 2023)
 12. Douven R, Burger M, Schut F. Does managed competition constrain hospitals' contract prices? Evidence from the Netherlands. *Health Econ Policy Law* 2020; **15**: 341–54. <https://doi.org/10.1017/S1744133119000215>
 13. Loewenstein G, Friedman JY, McGill B, Ahmad S, Linck S, Sinkula S, et al. Consumers' misunderstanding of health insurance. *J Health Econ* 2013; **32**: 850–62. <https://doi.org/10.1016/j.jhealeco.2013.04.004>
 14. Jiang JX, Makary MA, Bai G. Commercial negotiated prices for CMS-specified shoppable Radiology services in U.S. hospitals. *Radiology* 2022; **302**: 622–24. <https://doi.org/10.1148/radiol.2021211948>
 15. Jiang JX, Forman HP, Gupta S, Bai G. Price variability for common radiology services within U.S. hospitals. *Radiology* 2023; **306**(3). <https://doi.org/10.1148/radiol.221815>
 16. Durand DJ, Narayan AK, Rybicki FJ, Burleson J, Nagy P, McGinty G, et al. The health care value transparency movement and its implications for Radiology. *J Am Coll Radiol* 2015; **12**: 51–58. <https://doi.org/10.1016/j.jacr.2014.08.015>
 17. Centers for Medicare & Medicaid services Website. CY 2020 hospital outpatient prospective payment system (OPPS) policy changes: hospital price transparency requirements (CMS-1717-F2). Published November2019. Available from: www.CMS.Gov/Newsroom/fact-sheets/Cy-2020-hospital-outpatient-prospective-payment-system-OPPS-policy-changes-hospital-price (accessed 3 Feb 2022)
 18. Center for Medicare and Medicaid Services. Transparency in coverage. Available from: <https://www.cms.gov/healthplan-price-transparency> (accessed 8 Jan 2023)
 19. Centers for Medicare and Medicaid Services. Transparency in coverage. Available from: <https://www.cms.gov/healthplan-price-transparency> (accessed 3 Feb 2022)
 20. Tikkanen R, Osborn R, Mossialos E, Djordjevic A, Wharton G. International profiles of health care systems 2020. Available from: https://www.commonwealthfund.org/sites/default/files/2020-12/International_Profiles_of_Health_Care_Systems_Dec2020.pdf (accessed 3 Feb 2022)
 21. Zen OM. Dutch Patients. Available from: <https://www.openmrizen.com/en/patients/dutch-patients/> (accessed 12 Mar 2023)
 22. Husiatyński M, Klein T, Mikkens M. Increasing price transparency in the Dutch health care market does not affect provider choice. 2021. Available from: <file:///Users/gelareh/Downloads/DP15981.pdf> (accessed 25 Jan 2023)
 23. Authority for Consumers and Market. Health insurers to make hospital tariffs more transparent. Available from: <https://www.acm.nl/en/publications/publication/16427/Health-insurers-to-make-hospital-tariffs-more-transparent> (accessed 12 Mar 2023)
 24. Zorgautoriteit N. NZa role and duties. what the dutch healthcare authority (nza) does in brief. Available from: https://puc.overheid.nl/nza/doc/PUC_276485_22/1/ (accessed 12 Mar 2023)
 25. OECD. Oecd health policy overview: health policy in Switzerland. 2017. Available from: <https://www.oecd.org/els/health-systems/Health-Policy-in-Switzerland-July-2017.pdf> (accessed 3 Feb 2023)
 26. KPMG International. Through the looking glass: A practical path to improving healthcare through transparency. Available from: <https://assets.kpmg.com/content/dam/kpmg/campaigns/health-transparency-map/pdf/KPMGTransparencyReport-Switzerland.pdf> (accessed 19 Feb 2023)
 27. Le News. Swiss government approves measures to cut healthcare costs. 2019. Available from: <https://lenews.ch/2019/08/23/swiss-government-approves-new-plan-to-cut-healthcare-costs/> (accessed 23 Feb 2023)
 28. Valand HA, Chu S, Bhala R, Foley R, Hirsch JA, Tu RK. Comparison of advanced imaging resources, Radiology workforce, and payment Methodologies between the United States and Canada. *AJNR Am J Neuroradiol* 2018; **39**: 1785–90. <https://doi.org/10.3174/ajnr.A5755>
 29. Canadian Medical Imaging Inventory. Private Imaging Facilities in Canada: MRI and CT. Available from: https://www.cadth.ca/sites/default/files/attachments/2022-06/CMII-MRI-CT-Final_3.pdf (accessed 3 Jan 2022)
 30. Nuffield Trust. Diagnostic test waiting times. 2023. Available from: <https://www.nuffieldtrust.org.uk/resource/diagnostic-test-waiting-times> (accessed 26 Jul 2023)
 31. NHS. NHS Diagnostic Waiting Times and Activity Data. Available from: <https://www.england.nhs.uk/statistics/statistical-work-areas/diagnostics-waiting-times-and-activity/monthly-diagnostics-waiting-times-and-activity/monthly-diagnostics-data-2023-24/> (accessed 26 Jul 2023)
 32. NHS. National Cost Collection for the NHS. Available from: <https://www.england.nhs.uk/costing-in-the-nhs/national-cost-collection/> (accessed 18 Feb 2022)
 33. LaingBuisson,. Health Cover UK Market Report. 2015. Available from: http://www.laingbuisson.com/wp-content/uploads/2016/06/Health_Cover_12ed_Bro_WEB.pdf (accessed 3 Feb 2022)
 34. Morriss E. Private healthcare prices becoming more transparent but further progress needed, warns PHIN. Pf Media. Available from: <https://www.phin.org.uk/press-releases/private-healthcare-prices-becoming-more-transparent-but-further-progress-needed-warns-phin> (accessed 3 Feb 2022)
 35. The private healthcare information network. Annual report 2016-2017. 2017. Available from: <https://phproduksportalstorage.blob.core.windows.net/website-files/reports/PHIN%20Annual%20Report%202016-17.pdf> (accessed 3 Feb 2023)
 36. Startup Health. The Scan.com platform is bringing pricing transparency and data integration to the world of diagnostic imaging. 2022. Available from: <https://healthtransformer.co/the-scan-com-platform-is-bringing-pricing-transparency-and-data-integration-to-the-world-of-75e0b07f58a> (accessed 19 Jan 2023)
 37. Lin R, Duszak R, Carlos R, Sadigh G. Relationship between hospital compliance with medicare's price transparency rule, proposed cash prices, and consumer ratings for MRI lumbar spine. *J Am Coll Radiol* 2022; **19**: 561–63. <https://doi.org/10.1016/j.jacr.2022.01.005>
 38. Stempniak M. Hospitals dodging imaging price transparency rule could face fines as high as \$2m, CMS says. Radiol bus. 2021. Available from: www.Radiologybusiness.com

- com/topics/policy/hospitals-imaging-price-transparency-rule-fines-CMS
39. Jiang JX, Polksky D, Littlejohn J, Wang Y, Zare H, Bai G. Factors associated with compliance to the hospital price transparency final rule: A national landscape study. *J Gen Intern Med* 2022; **37**: 3577–84. <https://doi.org/10.1007/s11606-021-07237-y>
40. Kona M, Corlette S. Hospital and insurer price transparency rules now in effect but compliance is still far away. *Health Aff.* Available from: <https://www.healthaffairs.org/content/forefront/hospital-and-insurer-price-transparency-rules-now-effect-but-compliance-still-far-away> (accessed Feb 2022)
41. Desai S, Hatfield LA, Hicks AL, Chernew ME, Mehrotra A. Association between availability of a price transparency tool and outpatient spending. *JAMA* 2016; **315**: 1874–81. <https://doi.org/10.1001/jama.2016.4288>
42. Bechel M, Duszak R, Carlos RC, Sadigh G. Usability of hospital price estimators for lumbar spine MRI. *J Am Coll Radiol* 2022; **19**: 1253–59. <https://doi.org/10.1016/j.jacr.2022.07.012>
43. Rao P, Fischer SH, Vaiana ME, Taylor EA. Barriers to price and quality transparency in health care markets. *Rand Health Q* 2022; **9**(3): 1.
44. Sadigh G, Carlos RC. Price transparency in radiology: Challenges and opportunities to improve. *American Journal of Roentgenology* 2021; **217**: 1243–44. <https://doi.org/10.2214/AJR.21.25976>
45. Horný M, Shafer PR, Dusetzina SB. Concordance of disclosed hospital prices with total reimbursements for hospital-based care among commercially insured patients in the US. *JAMA Netw Open* 2021; **4**: e2137390. <https://doi.org/10.1001/jamanetworkopen.2021.37390>
46. Mukherjee M, Horný M. Complex billing for nonemergency outpatient imaging: an obstacle to the success of health care price transparency initiatives. *J Am Coll Radiol* 2023; **20**: 63–70. <https://doi.org/10.1016/j.jacr.2022.11.009>
47. Stults CD, Li J, Frosch DL, Krishnan H, Smith-McCurdy G, Jones VG, et al. Assessment of accuracy and usability of a fee estimator for ambulatory care in an integrated health care delivery network. *JAMA Netw Open* 2019; **2**: e1917445. <https://doi.org/10.1001/jamanetworkopen.2019.17445>
48. Hibbard JH, Greene J, Sofaer S, Firminger K, Hirsh J. An experiment shows that a well-designed report on costs and quality can help consumers choose high-value health care. *Health Aff (Millwood)* 2012; **31**: 560–68. <https://doi.org/10.1377/hlthaff.2011.1168>
49. Manik R, Carlos RC, Duszak R, Sadigh G. Costs versus quality in imaging examination decisions. *J Am Coll Radiol* 2022; **19**: 450–59. <https://doi.org/10.1016/j.jacr.2021.11.015>
50. Whaley C, Schneider Chafen J, Pinkard S, Kellerman G, Bravata D, Kocher R, et al. Association between availability of health service prices and payments for these services. *JAMA* 2014; **312**: 1670–76. <https://doi.org/10.1001/jama.2014.13373>
51. Zafar SY, Chino F, Ubel PA, Rushing C, Samsa G, Altomare I, et al. The utility of cost discussions between patients with cancer and oncologists. *Am J Manag Care* 2015; **21**: 607–15.
52. Kelly RJ, Forde PM, Elnahal SM, Forastiere AA, Rosner GL, Smith TJ. Patients and physicians can discuss costs of cancer treatment in the clinic. *J Oncol Pract* 2015; **11**: 308–12. <https://doi.org/10.1200/JOP.2015.003780>
53. Shih Y-CT, Chien C-R. A review of cost communication in oncology: Patient attitude, provider acceptance, and outcome assessment. *Cancer* 2017; **123**: 928–39. <https://doi.org/10.1002/cncr.30423>
54. Bestvina CM, Zullig LL, Rushing C, Chino F, Samsa GP, Altomare I, et al. Patient-oncologist cost communication, financial distress, and medication adherence. *J Oncol Pract* 2014; **10**: 162–67. <https://doi.org/10.1200/JOP.2014.001406>
55. Hong Y-R, Salloum RG, Yadav S, Smith G, Mainous AG. Patient-provider discussion about cancer treatment costs and out-of-pocket spending: Implications for shared decision making in cancer care. *Value Health* 2020; **23**: 1592–98. <https://doi.org/10.1016/j.jval.2020.08.002>
56. Boone J, Pottersz J. Transparency and prices with imperfect substitutes. *Economics Letters* 2006; **93**: 398–404. <https://doi.org/10.1016/j.econlet.2006.06.003>
57. Brown ZY. Equilibrium effects of health care price information. *Rev Econ Stat* 2019; **101**: 699–712. https://doi.org/10.1162/rest_a_00765
58. Zhang A, Prang K-H, Devlin N, Scott A, Kelaher M. The impact of price transparency on consumers and providers: A scoping review. *Health Policy* 2020; **124**: 819–25. <https://doi.org/10.1016/j.healthpol.2020.06.001>
59. Whaley CM. Provider responses to online price transparency. *J Health Econ* 2019; **66**: 241–59. <https://doi.org/10.1016/j.jhealeco.2019.06.001>
60. Christensen HB, Floyd E, Maffett M. The only prescription is transparency: The effect of charge-price-transparency regulation on healthcare prices. *Management Science* 2020; **66**: 2861–82. <https://doi.org/10.1287/mnsc.2019.3330>
61. Mehrotra A, Hussey PS, Milstein A, Hibbard JH. Consumers' and providers' responses to public cost reports, and how to raise the likelihood of achieving desired results. *Health Affairs* 2012; **31**: 843–51. <https://doi.org/10.1377/hlthaff.2011.1181>
62. Han A, Lee K-H, Park J. The impact of price transparency and competition on hospital costs: a research on all-payer claims databases. *BMC Health Serv Res* 2022; **22**: 1321. <https://doi.org/10.1186/s12913-022-08711-x>
63. Kyle MK, Ridley DB. Would greater transparency and uniformity of health care prices benefit poor patients? *Health Aff (Millwood)* 2007; **26**: 1384–91. <https://doi.org/10.1377/hlthaff.26.5.1384>
64. Muir MA, Alessi SA, King JS. Clarifying costs: Can increased price transparency reduce healthcare spending. *Wm Mary Pol'y Rev* 2012; **4**: 319.