When Is Paying Cash Cheaper Than Billing Insurance for Scheduled Imaging?

Raveesh Seth[1], **Mehar Seth**[1] **& Akshaj Gupta**[2]

Received October 14, 2026
Accepted November 16, 2026
Electronic access November 30, 2026

Background: U.S. hospitals now post cash prices beside insurer-negotiated rates. For an insured patient, whether paying cash is cheaper depends on the deductible (the amount paid each year before the plan shares costs), other care that year, the out-of-pocket maximum (the yearly cap on patient payments) and whether cash payments count toward these limits. How often cash is the better choice is unknown.
Methods: We combined a PRISMA-guided review (39 studies) with a decision model that processes the plan year in order and compares the patient's annual cost of paying cash with billing the plan, using published prices for brain MRI, head CT and diagnostic mammography, commercial claims spending and observed plan designs (2025 dollars).
Results: At national medians, cash exceeded negotiated rates for brain MRI ($2,540 vs. $1,990) and head CT ($1,142 vs. $896). Comparing a 25th-percentile cash price with the median negotiated rate, cash was cheaper for 30% (MRI), 48% (CT) and 53% (mammogram) of commercially insured people. With prices paired at the same hospital, the MRI share fell to 7–19%. Across plan designs it ranged from 17% to 78%. Full deductible credit raised the 30% MRI share to 47%; cash cost more for 51% and the same for 2%.
Conclusions: Cash helps insured patients mainly when the deductible is unmet and little other care follows; choosing a lower-priced facility usually matters more. Price tools should show the cash price, the plan price and whether cash counts toward the deductible; deductible-credit laws need testing with real claims.

Keywords: price transparency; cash price; deductible; high-deductible health plan; imaging; decision model

Introduction

Background

As of January 2021, hospitals in the United States are required to publish their standard charges, including discounted cash prices and the rates they have negotiated with each health insurer[1]. However, the posted data are not always complete or usable. The U.S. Government Accountability Office found that the Centers for Medicare & Medicaid Services could not confirm that hospital pricing data were complete and accurate[2]. Furthermore, mixed-methods research has found that consumers have difficulty using the posted files[3]. Starting in 2026, hospitals must also report the amounts actually allowed by payers[4]. This research uses pricing information that was posted before that requirement took effect.

At the same time, the share of costs that patients pay directly is increasing. In 2025, the average annual deductible for single coverage was $1,886 among workers whose plan had a general deductible[5]. A deductible is the amount a patient pays each year before the plan begins to share costs; after it is met, the patient usually pays coinsurance, a percentage of each bill, until reaching the out-of-pocket maximum, the most the patient can be required to pay in a year.

Problem Statement and Research Gap

Patients who have insurance but face a high deductible might think that paying a posted cash price will be the least expensive option; however, this depends on three conditions. First, the relevant comparison is between the cash price and the amount the patient would owe through the insurance plan, not the price listed by the hospital. Second, a cash payment made outside the insurance plan does not count toward the deductible or the out-of-pocket maximum unless the plan or a state law requires it; for example, Texas introduced such a requirement only in 2023[6], so a cheaper test now can raise costs later in the year. Third, many people misunderstand cost sharing: in national surveys, only 14% of insured adults correctly answered four basic questions about deductibles, copayments, coinsurance and out-of-pocket maximums[7], and copayments exceeded the drug's price on 23% of pharmacy claims[8].

Research on hospital price postings has found that the cash

[1] *Marvin Ridge High School, Waxhaw, North Carolina, USA*
[2] *Vasant Valley School, New Delhi, India*

© The National High School Journal of Science 2026

price is lower than the median negotiated rate at roughly half of hospitals[9–11]. One study estimated the savings from paying cash as a share of the insurer's price in one region[12]. Studies of price transparency tools and benefit designs measure changes in prices paid and spending[13–15]. None of these studies, and none that our review identified, estimates the patient's own annual out-of-pocket cost of paying cash versus billing the plan, which depends on when the test occurs, the care that follows and whether the plan credits the cash payment. This paper provides that estimate by building a decision rule from published prices and plan rules and applying it to commercial spending data.

Purpose and Objectives

This paper asks whether paying cash costs less than billing insurance for an insured patient who needs scheduled imaging. Our first objective was to review, using a documented search, the evidence comparing hospital cash prices with negotiated rates and the evidence on how patients and physicians respond to price information. Our second objective was to build a decision model that compares the annual cost of each payment option, in the order care occurs, using only published inputs. Our third objective was to estimate the share of commercially insured people for whom paying cash would be cheaper, and to test how that share changes with plan design, with the pairing of cash and negotiated prices, and with deductible credit. Our fourth objective was to translate these results into guidance for price comparison tools, physicians and policy.

Scope

We focus on scheduled imaging, because these services are ordered in advance and both cash and negotiated prices are posted for each imaging code[9,16]. We exclude emergency and inpatient care. The paper concerns the patient's choice between two ways of paying for the same service; separate charges such as hospital facility fees and radiologist professional fees are discussed only where they affect what a posted price includes. This work builds on our earlier review of price transparency platforms[17].

Methods

Study Design

The research has two parts: a literature review reported according to PRISMA 2020[18] and a deterministic decision model. A deterministic model is a set of formulas that, for fixed inputs (a price, a deductible, a coinsurance rate and the patient's other medical spending), calculates exactly what the patient would pay under each option; it does not use individual patient records. We applied these formulas across the published distribution of annual spending to estimate how many people would benefit from paying cash. Every input comes from a published source (Table 1).

Literature Search and Selection

On November 3, 2026, we searched PubMed for English-language articles published between January 1, 2010, and October 31, 2026. Search 1 targeted cash prices: ("cash price*" OR "self-pay price*" OR "discounted cash" OR "cash-pay" OR "cash pay") AND (negotiated OR "price transparency" OR insur*), all in title or abstract. Search 2 targeted responses to price information: ("price transparency" OR "price information" OR "price shopping" OR "reference pricing" OR "price comparison") AND (imaging OR radiology OR MRI OR laboratory OR shoppable). Because economics journals are poorly indexed in PubMed, we also searched the reference lists of included studies and of our earlier review[17].

Studies were eligible if they were U.S. empirical studies that reported hospital or facility cash prices for imaging or compared cash prices with commercial negotiated prices (topic A); measured how patients or clinicians respond to price information, price-based incentives or cost sharing for imaging or laboratory services (topic B); or assessed whether posted imaging prices reflect the full cost of care (topic C). We excluded commentaries, editorials, letters and reviews; studies of price variation or regulatory compliance without one of these outcomes; studies of emergency or inpatient care, retail drugs or non-imaging self-pay services; studies conducted outside the U.S.; and simulations of potential savings. The first reviewer screened titles and abstracts and assessed eligibility against these criteria with the assistance of an AI tool, and the decision and its reason were logged for every record. The second reviewer checked every screening and eligibility decision against the same criteria and agreed with all of them. Because this check was not blinded to the first reviewer's decisions, we do not report an agreement statistic.

From each included study, we extracted the setting, years, data source, design and main quantitative finding. We rated risk of bias by study design: low for randomized trials and quasi-experimental studies with a comparison group using multi-site data; moderate for observational studies using national or multi-employer data; and high for single-site studies, telephone audits and hypothetical-choice surveys. Policy documents (statutes, regulations and agency guidance) were obtained directly from the issuing government body and were used only to describe the rules, not as evidence of effects.

Decision Model

Let D denote the deductible, c the coinsurance rate after the deductible, and M the out-of-pocket maximum. The patient needs a test with negotiated price P_n and cash price C. The model processes the plan year in order: other in-network

© The National High School Journal of Science 2026

spending before the test (S_1), the test itself, and other spending after it (S_2), with $S = S_1 + S_2$. At every step, the remaining deductible and the remaining room under the out-of-pocket maximum are tracked and never allowed to fall below zero. A claim of size x, when d of the deductible remains and m of the out-of-pocket room remains, costs the patient $\min\{m, \min(x, d) + c \times (x - \min(x, d))\}$.

When the plan is billed, the test is processed as one more claim. When the patient pays cash without credit, the patient pays C and the plan's balances are unchanged. When the patient pays cash with credit, the patient pays C and the plan reduces the remaining deductible by min(C, d) and adds min(C, m) to the out-of-pocket total, as the Texas and Oklahoma rules provide[19,20]. Without credit, the order of care does not matter, because annual cost under the plan depends only on total allowed spending; with credit, it does.

Without credit, paying cash is cheaper exactly when other spending S is below a break-even level S*. Because billing the plan adds less and less to annual cost as other spending increases, there is a single threshold, which can be written piecewise. If $C \geq P_n$, cash is never cheaper ($S^* = 0$). If $cP_n < C < P_n$, the threshold lies where the deductible is not yet met: $S^* = D - (C - cP_n)/(1 - c)$, and $S^* = 0$ if this is negative. If $C \leq cP_n$, cash is cheaper even after the deductible is met, but not once the patient approaches the out-of-pocket maximum, because billing the plan then costs nothing extra: $S^* = D + (M - D - C)/c$. A credited cash payment produces the same result as an insured claim priced at C only when C does not exceed the deductible remaining at the time of payment and the out-of-pocket total stays below M; otherwise, the credited payment costs the patient more than such a claim would. These expressions hold when the room between the deductible and the out-of-pocket maximum is at least the coinsurance owed on the test ($M - D \geq cP_n$), which is true for every plan we modeled. We checked the piecewise rule against the sequential calculation at points on both sides of every threshold and in 250,000 random combinations of plan and price meeting this condition.

Inputs and How They Were Aligned

Table 1 lists every input with the population, payer, service and year it describes. All dollar amounts were converted to 2025 dollars using the consumer price index for medical care services[21]. Cash prices were taken from mid-2021 hospital postings[9]. Negotiated prices were taken from September 2021 postings (head CT and mammography)[16] and 2022 postings (brain MRI)[22]. The cash and negotiated figures are therefore drawn from different hospital samples and dates; they are national benchmarks, not prices a patient could compare at a single hospital. To account for this, we took three approaches. First, we report the benchmark comparison only as such. Second, for brain MRI, the only service for which both interquartile ranges are published, we simulated 300,000 hospitals in which cash and negotiated prices follow log-normal distributions matching the published medians and ranges, with correlations between the two prices from 0 to 0.9. We calibrated the median paired cash-to-negotiated ratio to 1.04, the value reported for radiology services when both prices are taken from the same hospital and setting[10]. Third, a price for a procedure code may not cover the same bundle of services, because hospital-based imaging often generates separate bills from independent radiologists[23,24]. We could not check sampled prices against paid claims. As a limited check of what posted prices include, we reviewed the self-pay price lists of four facilities that post MRI prices online (Supplementary Table S1, accessed November 5, 2026). All three freestanding or physician-group imaging centers stated that their price included the radiologist's interpretation and either included contrast or listed a separate price for contrast studies. However, the hospital-affiliated system stated that its self-pay prices excluded the professional fees of hospital-based radiologists. Because hospital negotiated rates for the facility service also exclude separately billed radiologist fees, the comparison of hospital cash and negotiated prices is like for like. A patient at a hospital, however, would owe the radiologist's fee under either option, whereas a freestanding center's bundled price may already include it.

For spending, we used commercial claims instead of national survey data, because only spending allowed by a commercial plan counts toward its deductible. Among people under 65 with employer coverage in 2023, 12% had no spending billed to their plan, 44% spent less than $1,000 and 85% spent less than $10,000[25]. For people with any spending, we fitted a log-normal distribution that passes through these points after adjustment to 2025 dollars. Its mean ($8,303) is 16% above the reported mean ($7,129 in 2025 dollars), so the fitted upper tail is somewhat heavy; this affects results only for patients near the out-of-pocket maximum. To test whether the results depend on this choice, we also fitted Weibull and gamma distributions to the same points and interpolated between the points on a logarithmic scale. For plans, we kept each plan's deductible, coinsurance and maximum together. The base-case deductible is $1,886, the 2025 KFF average for single coverage among workers with a general deductible, and the base-case coinsurance is 20%, the KFF average for hospital admissions; KFF reports that outpatient cost sharing follows a similar pattern but does not publish an outpatient coinsurance average[5]. We used the average among workers with a general deductible because the 12% of single-coverage workers without one do not face this choice. The sensitivity analysis spans the averages at larger firms ($1,670, close to our $1,650 value) and smaller firms ($2,631)[5]. The base-case out-of-pocket maximum is $9,200, the 2025 federal ceiling[26]; because no average out-of-pocket maximum is pub-

© The National High School Journal of Science 2026

lished, we also tested $4,000. We added the 2025 minimum HSA-qualified plan, with a $1,650 deductible and an $8,300 out-of-pocket maximum[27], and three observed plan designs, the federal 2025 standardized gold ($1,500 deductible, 25% coinsurance, $7,800 maximum), silver ($5,000, 40%, $8,000) and expanded bronze ($7,500, 50%, $9,200) options, each of which states its own deductible, imaging coinsurance and maximum[28]. We used diagnostic rather than screening mammography because screening is covered without cost sharing[29].

Analyses

For each service, at the median and 25th-percentile cash prices, we calculated the added annual cost of paying cash for a patient with no other care and for a patient who meets the deductible anyway, the break-even level of other spending, and the share of commercially insured people below that level. The break-even analysis was repeated for each plan design and for every combination of three deductibles ($1,650, $1,886 and $2,631), three coinsurance rates (10%, 20% and 30%) and two out-of-pocket maximums. In the paired-price simulation, the paired difference, paired ratio, break-even level and population share were calculated for each simulated hospital and summarized across hospitals. For the credit scenarios, we drew 400,000 patient-years from the spending distribution and placed the test at a random point in the year, splitting other spending into amounts before and after it. Analyses used Python 3 (NumPy, SciPy and Matplotlib); the code is provided as Supplementary Material, and the screening log is available from the authors.

Ethical Considerations

This study used only published, aggregate data. It involved no human participants and no individual-level records, so ethics review and informed consent were not required.

Results

Literature Search

The two searches returned 194 records (81 and 113), of which 18 were duplicates (Figure 1). Of the 176 records screened, 34 were not about prices or price information. Of the 142 assessed against the full criteria, 108 were excluded, most often because they reported only price variation or compliance (48) or were commentaries or reviews (30). Thirty-four studies met the criteria, and five more were found through reference lists, for 39 in total: 14 on cash prices, 23 on responses to prices and 2 on the completeness of posted prices. Fourteen were rated low risk of bias, 19 moderate and 6 high (Table 2).

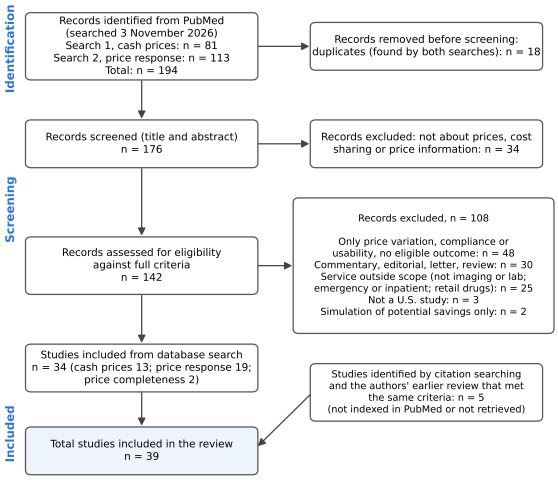


Figure 1 PRISMA 2020 flow diagram of study identification, screening, eligibility and inclusion.

Searches run in PubMed on November 3, 2026; the full screening log with the reason for every exclusion is available from the authors.

How Cash Prices Compare with Negotiated Rates

Among hospitals that posted both prices in mid-2021, the share whose cash price was below their median commercial negotiated rate ranged from 39% to 53% across 13 radiology services, while only 7% to 15% had a cash price below every commercial negotiated rate at that hospital (Figure 2)[9]. When cash and negotiated prices were compared at the same hospital and in the same setting across 2,379 hospitals, the cash price was lower than the median negotiated rate in 47% of comparisons. The median paired cash-to-negotiated ratio was 1.03 overall and 1.04 for radiology services[10]. These results imply that at a typical hospital the cash price and the median negotiated rate are close, and either may be lower. Cash was more often lower at government or nonprofit hospitals, outside metropolitan areas and in counties with more uninsured residents[10]. Within a hospital, the largest insurer negotiated prices for shoppable services that were 23% lower than those of nonmajor insurers, while cash prices were 17% higher than nonmajor insurers' prices[30]. Negotiated rates for the same radiology service also varied widely within one hospital[60]. Similar patterns appear for physician-administered drugs, where hospital cash prices were often below the median and sometimes below the lowest negotiated price[11].

Cheapest Cash Options and Differences across Markets

Comparing the lowest cash price available in a market with a typical insured price makes cash look more favorable than comparing the two prices at a single hospital. In a peer-

© The National High School Journal of Science 2026

Table 1 Model inputs, in 2025 dollars, with the population, payer, service and year each source describes

Input	Value used	Source: population, payer and year
Brain MRI with and without contrast (CPT 70553)	Cash: 25th percentile $1,536, median $2,540, 75th $3,875. Negotiated: 25th $1,072, median $1,990, 75th $3,348	Hospital postings; cash mid-2021 [9], commercial negotiated 2022 [22]
Head CT without contrast (70450)	Cash: 25th $655, median $1,142. Negotiated median $896	Hospital postings 2021 [9,16]
Diagnostic mammogram, one breast (77065)	Cash: 25th $173, median $248. Negotiated median $253	Hospital postings 2021 [9,16]
Diagnostic mammogram, both breasts (77066)	Cash: 25th $216, median $305. Negotiated median $318	Hospital postings 2021 [9,16]
Paired cash-to-negotiated ratio	Median 1.04 (radiology, same hospital and setting)	2,379 hospitals, 2022 [10]
Annual in-network spending	12% zero; 44% below $1,063; 85% below $10,632 (fitted median $1,454, including people with no spending)	Employer coverage, age under 65, commercial claims 2023 [25]
Base-case plan	Deductible $1,886; coinsurance 20%; maximum $9,200 (sensitivity $4,000)	Employer survey 2025 [5]; federal ceiling 2025 [26]
HSA-qualified minimum plan	$1,650; 20%; $8,300	IRS 2025 limits [27]
Observed standardized plans	Gold $1,500, 25%, $7,800; silver $5,000, 40%, $8,000; expanded bronze $7,500, 50%, $9,200	Federal marketplace 2025, imaging cost sharing [28]
Price index	2021 to 2025: $\times$1.102; 2022: $\times$1.047; 2023: $\times$1.063	CPI medical care services [21]
Deductible credit	None, or full credit up to remaining deductible and maximum	Texas and Oklahoma rules [19,20]

Prices for one code may not include separately billed radiologist or contrast charges. Cash and negotiated percentiles come from different samples and are benchmarks, not paired prices.

Table 2 Summary of the 39 included studies by topic and design

Topic and design (risk of bias)	Studies	Main findings
A. Cash prices: cross-sectional analyses of hospital postings or claims (moderate)	12 [9–12,30–37]	Cash is below the median negotiated rate at 39% to 53% of hospitals, depending on the service; the median paired ratio is close to 1
A. Cash prices: telephone audits (high)	2 [38,39]	Quoted cash prices for the same scan vary several-fold within and across markets
B. Price response: randomized trials of price display to clinicians (low)	2 [40,41]	Showing prices to clinicians did not reduce imaging orders
B. Price response: quasi-experimental studies with comparison groups (low)	12 [14,15,42–51]	Reference pricing and insurer outreach lowered imaging and laboratory prices by about 4% to 32%; simply offering a tool did not lower spending
B. Price response: observational studies (moderate or high)	8 [13,52–58]	Few patients search; searchers pay less; referring physicians drive where scans happen
B. Price response: hypothetical-choice survey (high)	1 [59]	Respondents trade lower cost against quality signals
C. Completeness of posted prices: claims analyses (moderate)	2 [23,24]	Hospital-based imaging often generates bills from several entities, so one posted price may not equal the total cost

The studies measured different outcomes (prices paid, spending, tool use or ordering rates) in different populations and years, so their percentages are not directly comparable with each other or with the model results.

reviewed study of 142 imaging facilities in the San Francisco Bay Area, patients could have saved 10% to 22% of their insurer's in-network price by paying cash at the same facility, but 45% to 64% by choosing the lowest-priced facility in the region (Figure 3) [12]. Prices also vary by location. A telephone audit of outpatient knee MRI found bundled cash prices ranging from $259 to $2,042, with lower prices in more densely populated areas [39]; for a head CT, quoted cash prices ranged from $211 to $2,200 [38]. In 2024 data, the ratio of average cash price to household income for brain MRI and other imaging differed widely across states [35], and cash and commercial prices tended to be somewhat higher in socially disadvantaged areas [33]. Three features of a market therefore shape the model's result: the local ratio of cash to negotiated prices, which is lower where hospitals have more market power and where insurers have less [10]; the number of freestanding imaging centers, which determines how low the cheapest option is [12,39]; and the plan designs common in that market, since higher deductibles widen the range in which paying cash is cheaper (Table 4).

Model Results at Benchmark Prices

At national median prices, paying cash for a brain MRI cost $633 more than billing the plan for a patient with no other care and $2,142 more for a patient who met the deductible anyway. For a head CT, these figures were $246 and $963, respectively (Table 3). At these prices, cash was never cheaper. The comparison becomes more favorable at a hospital whose cash price is at the 25th percentile, if its negotiated rate is at the national

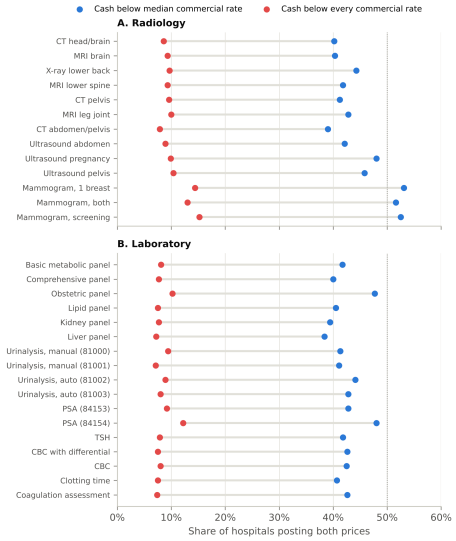


Figure 2 Share of hospitals posting both prices whose cash price was below the middle (median) of their commercial negotiated rates (blue) and below all of their commercial negotiated rates (red), by service.

Data from Jiang et al., hospital postings as of July 1, 2021[9].

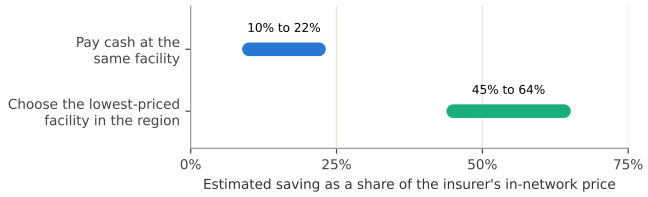


Figure 3 Estimated savings at San Francisco Bay Area imaging facilities from paying cash at the same facility compared with choosing the lowest-priced facility in the region.

Source: Epstein et al.[12], five private insurers and 142 imaging facilities, 2014–2016. Savings are shares of the insurer's in-network price.

median: paying $1,536 in cash for a brain MRI saved $371 for a patient with no other care but cost $1,138 more for one who met the deductible anyway. Cash was cheaper than billing the plan only when other spending stayed below $464, which describes 30% of commercially insured people. The break-even level was $1,291 (48%) for a head CT and $1,733 (53%) for a one-breast diagnostic mammogram. Figure 4 shows the brain MRI case for a single scan and over a whole year.

Why the Results Differ across Services

How often cash pays depends largely on two features of a service. The first is its price relative to the deductible. The negotiated rate for a brain MRI ($1,990) is above the $1,886 deductible. Thus, even a patient with no other care pays coinsurance on part of the scan through the plan, and any other spending quickly moves the patient into the range where billing the plan costs only 20% of the price. The negotiated rates for a head CT ($896) and a mammogram ($253) fit inside the deductible. As a result, billing the plan costs the full negotiated rate for either test until the deductible is met, and cash keeps its advantage over a wider range of other spending. The second feature is the cash price relative to the negotiated rate. At median prices, cash exceeded the negotiated rate for MRI and CT, while for mammography the two prices were within about 5%. Lower-priced services therefore benefit more people, but by smaller amounts: $80 for the mammogram versus $371 for the MRI at a 25th-percentile cash price.

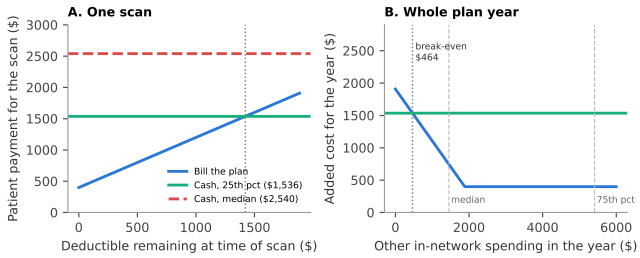


Figure 4 Brain MRI (CPT 70553) under the base-case plan. (A) Patient payment for one scan by deductible remaining at the time of the scan. (B) Added cost for the whole plan year by other in-network spending.

Negotiated rate $1,990; cash $1,536 (25th percentile) and $2,540 (median); 2025 dollars. Dashed grey lines in B mark the median and 75th percentile of commercial spending.

Plan Design

The share of people for whom cash is cheaper depends strongly on the plan (Table 4). At 25th-percentile cash prices, the brain MRI share was 30% in the base case, 22% in the minimum HSA-qualified plan and 17% in the gold plan, whereas it reached 69% in the silver plan and 78% in the expanded bronze plan, whose deductibles ($5,000 and $7,500) exceed most people's annual spending. Across the grid of three deductibles and three coinsurance rates, the MRI share ranged from 19% to 48%. The out-of-pocket maximum did not change these shares, because the break-even levels lie far below the spending at which any of the maximums is reached. Refitting the spending distribution in the three other ways changed the shares little: the base-case brain MRI share was 33% to 35% instead of 30%, the base-case CT and mammogram shares moved by 2 percentage points or less, and the largest change was in the gold plan, where the MRI share rose from 17% to between 21% and 24%.

© The National High School Journal of Science 2026

Table 3 Added annual out-of-pocket cost of paying cash rather than billing the plan, base-case plan, national benchmark prices (2025 dollars)

Service and cash price	Negotiated rate	No other care	Deductible met anyway	Cash cheaper if other spending below	Share of people below that level
Brain MRI (70553), median cash ($2,540)	$1,990	Costs $633 more	Costs $2,142 more	Never	0%
Brain MRI (70553), 25th percentile cash ($1,536)	$1,990	Saves $371	Costs $1,138 more	$464	30%
Head CT (70450), median cash ($1,142)	$896	Costs $246 more	Costs $963 more	Never	0%
Head CT (70450), 25th percentile cash ($655)	$896	Saves $241	Costs $476 more	$1,291	48%
Mammogram, one breast (77065), median cash ($248)	$253	Saves $5	Costs $197 more	$1,639	52%
Mammogram, one breast (77065), 25th percentile cash ($173)	$253	Saves $80	Costs $122 more	$1,733	53%
Mammogram, both breasts (77066), median cash ($305)	$318	Saves $13	Costs $241 more	$1,584	52%
Mammogram, both breasts (77066), 25th percentile cash ($216)	$318	Saves $102	Costs $152 more	$1,696	53%

Positive values mean cash costs more. Base case: deductible $1,886, 20% coinsurance, maximum $9,200, no credit. Shares use commercial claims spending [25]. The 25th-percentile rows pair a low cash price with the median negotiated rate and are therefore best-case benchmarks, not prices at one hospital.

Table 4 Break-even other spending and share of people for whom paying cash is cheaper, by plan design, at 25th-percentile cash prices

Plan (deductible, coinsurance, maximum)	Brain MRI ($1,536)	Head CT ($655)	Mammogram, one breast ($173)
Employer average deductible (base case) ($1,886, 20%, $9,200)	$464 (30%)	$1,291 (48%)	$1,733 (53%)
HSA-qualified minimum ($1,650, 20%, $8,300)	$228 (22%)	$1,055 (44%)	$1,497 (51%)
Gold standardized plan ($1,500, 25%, $7,800)	$116 (17%)	$925 (41%)	$1,354 (49%)
Silver standardized plan ($5,000, 40%, $8,000)	$3,767 (69%)	$4,506 (72%)	$4,880 (73%)
Expanded bronze standardized plan ($7,500, 50%, $9,200)	$6,418 (78%)	$7,086 (79%)	$7,407 (80%)

Each plan keeps its own deductible, coinsurance and maximum together. Standardized plans are the federal 2025 options, using their stated cost sharing for imaging [28]. Cells show the break-even level of other in-network spending and, in parentheses, the share of commercially insured people below it [25]. These shares are illustrations for the plans shown, using employer-coverage spending; marketplace enrollees may spend differently.

Cash and Negotiated Prices at the Same Hospital

When the cash and negotiated prices for brain MRI were simulated as a pair at each hospital and calibrated to the paired median ratio of 1.04, the median paired difference was about $62 to $71, and cash was at or below the negotiated rate at 46% to 49% of hospitals, close to the 47% reported from paired data [10] (Table 5). The spread of paired ratios narrowed as the correlation increased, from 0.26–4.19 (10th to 90th percentile) with no correlation to 0.64–1.68 with a correlation of 0.9. Averaged over hospitals, the share of commercially insured people for whom cash was cheaper fell from 19% with no correlation to 9% at a correlation of 0.8 and 7% at 0.9, well below the 30% obtained by pairing a 25th-percentile cash price with a median negotiated rate. With the alternative spending distributions, the average share was 7% to 20%. Even among hospitals whose cash price was below their own negotiated rate, the average share was 15% to 39%. Using the unadjusted benchmark medians instead (median ratio 1.27), the average share was 2% to 14%. The benchmark comparison therefore overstates how often an individual patient at one hospital would gain. Figure 5 shows the saving or extra cost across cash-to-negotiated ratios.

Share of People for Whom Cash Is Cheaper

Figure 6 shows the share across the full range of cash prices. The share is zero when the cash price equals or exceeds the negotiated rate; for brain MRI, it is already zero when cash exceeds about 96% of the negotiated rate, because a patient with no other care pays less than the full rate through the plan. When the cash price is below the coinsurance share of the negotiated rate, the share is high but does not reach 100%: for people whose spending carries them to the out-of-pocket maximum, billing the plan costs nothing extra, so any cash payment costs more. This caps the share at 96% in the base case and at 85% in the bronze plan.

Fixed Copayments

Some plans charge a fixed copayment for imaging rather than applying the deductible. The comparison is then straightforward: billing the plan costs the copayment, or the negotiated rate if that is lower, and paying cash is cheaper only if the cash price is below that amount. With a hypothetical $350 copayment for advanced imaging, the 25th-percentile cash price would cost $1,186 more than billing the plan for a brain MRI

Table 5 Brain MRI with cash and negotiated prices paired at each simulated hospital, base-case plan

Correlation between cash and negotiated price	Median paired difference (cash − negotiated)	Paired ratio, 10th–90th percentile	Hospitals with cash ≤ negotiated	Average share of people for whom cash is cheaper	Same, uncalibrated benchmark medians
0.0	$71	0.26–4.19	49%	19%	14%
0.5	$65	0.39–2.81	48%	14%	9%
0.8	$62	0.54–1.99	47%	9%	4%
0.9	$63	0.64–1.68	46%	7%	2%

Calibrated to a median paired ratio of 1.04 for radiology[10]; price spreads from published interquartile ranges[9,22]. The last column uses the national median cash and negotiated prices without calibration (median ratio 1.27). 300,000 simulated hospitals per row.

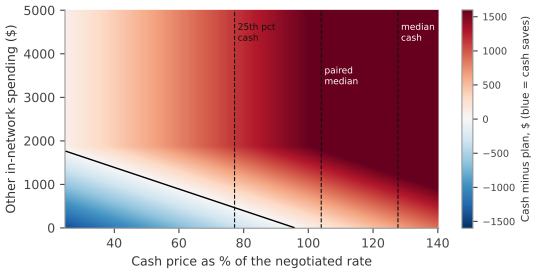


Figure 5 Saving (blue) or extra cost (red) from paying cash rather than billing the plan for a brain MRI, by cash price as a share of the negotiated rate and other in-network spending.

Base-case plan, no credit; the black line is the break-even level. Dashed lines mark the benchmark 25th-percentile and median cash prices and the paired median ratio of 1.04[10].

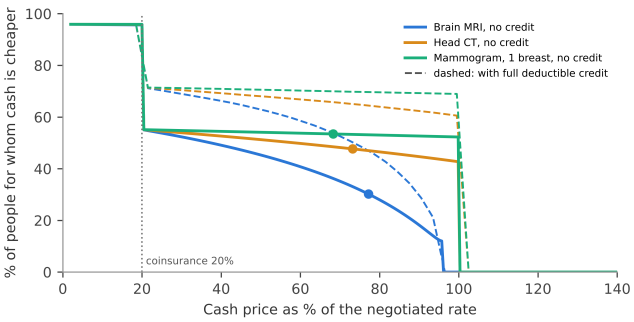


Figure 6 Share of commercially insured people for whom paying cash is cheaper over the plan year, by cash price as a share of the negotiated rate, without credit (solid) and with full deductible credit (dashed).

Base-case plan; negotiated rates $1,990 (MRI), $896 (CT) and $253 (mammogram). Points mark 25th-percentile cash prices[9]. Credited results place the test at a random point in the year.

and $305 more for a head CT. A one-breast mammogram, billed at its $253 negotiated rate, would still cost $80 more through the plan than in cash. With a $100 copayment, the mammogram would cost $73 more in cash. Even when cash is cheaper than a copayment, the cash payment does not count toward the out-of-pocket maximum unless the plan credits it.

Deductible Credit: An Idealized Scenario and Real Rules

The credited results describe an idealized scenario in which every cash payment is credited in full. They have not been tested against real claims. Under this scenario, with the scan at a random point in the year, paying $1,536 in cash for a brain MRI was cheaper than billing the plan for 47% of people, compared with 30% without credit, but still cost more for 51%. Credit does not help a patient who has already met the deductible, because that patient would pay only 20% of the negotiated rate through the plan. Timing also matters: for a patient with $1,000 of other care, a credited cash MRI saved $91 if the other care came after the scan but cost $429 more if it came before. A credited cash payment reproduced an insured claim at the cash price only when the cash price did not exceed the deductible remaining at the time of the scan, which held for 43% of simulated patient-years for the MRI and 64% for the CT.

Real rules add conditions that the idealized scenario ignores. Under Texas law, a preferred provider plan must credit a direct payment only for a covered, medically necessary service, when the enrollee provides documentation, no claim is filed with the insurer and the payment does not exceed the plan's average discounted rate paid to an equivalently licensed preferred provider[19]. Oklahoma requires a negotiated price lower than the plan's average amount, electronic documentation of the service and the payment, and the provider's acceptance of the payment as payment in full; credited amounts cannot exceed the enrollee's required cost sharing and do not carry over to a new plan year[20]. Tennessee and Idaho have enacted related rules[61,62]. Using the national median negotiated rate as a proxy for the plan's average rate, the benchmark 25th-percentile cash prices for MRI and CT would pass the price test, but the median cash prices would not; in the paired simulation, 48% of hospitals' MRI cash prices would pass. We found no published study or insurer procedure showing how often such credits are actually granted.

Do Patients and Physicians Respond to Price Information?

The availability of price information alone has little effect on behavior. Only about 10% to 12% of employees offered a price tool used it, offering the tool did not lower

© The National High School Journal of Science 2026

overall spending, and only 1% of people who had advanced imaging searched for prices first[14,44]. Users of insurer tools were younger and healthier and had higher deductible spending[52]. Patients who did search paid less: 13% less for advanced imaging in one multi-employer study[13] and 14% less in another[14], and patients who viewed price estimates chose lower-priced facilities[53]. Programs that steer patients have larger effects: insurer outreach about MRI prices lowered the price paid per test by 18.7%[42], reference pricing lowered laboratory prices by 31.9%[43] and CT and MRI prices by 12.5% and 10.5%, respectively[15], and cash rewards for choosing lower-priced providers lowered MRI prices by 3.7% to 6.5%[47]. Public price websites lowered imaging prices, partly through lower negotiated prices rather than patient shopping[48,50]. Moving workers to a high-deductible plan reduced spending through less use of care, not through price shopping[49]. Referring physicians matter more than prices: they explained 52% of the variation in what patients paid for lower-limb MRI, compared with under 1% for patient cost sharing[55], while displaying prices to clinicians did not reduce imaging orders[40,41]. Cost information can also deter care: patients who sought out-of-pocket estimates themselves were less likely to complete their imaging[56,57], although another study found no such association[58].

Discussion

Principal Findings

Whether paying cash saves an insured patient money depends on the facility chosen for the scan and the other care that follows in the same plan year. The largest savings come from choosing a low-priced facility, mostly available through in-network prices[12]. At one hospital, the cash price and the median negotiated rate are usually close; with paired prices, cash is cheaper for only about 7% to 19% of commercially insured people needing a brain MRI under a typical employer plan, whereas benchmark comparisons suggest 30%. The share is much larger in high-deductible plans, and lower-priced services benefit more people, but by smaller amounts. Because the answer depends on facts that most patients do not know, many will find it hard to judge on their own[7].

Who Benefits

Cash prices matter most for uninsured individuals, who numbered 26.7 million (7.9% of the population) in 2025[63]. Among insured patients, those with high deductibles and little expected care gain the most, and their number is growing: since 2026, bronze and catastrophic marketplace plans qualify as high-deductible health plans for health savings accounts[64]. A cash payment is a qualified expense for a health savings account, but only amounts the plan credits count toward the plan's deductible[65]. Hospitals serving disadvantaged populations are less likely to comply with price transparency rules[66], and prices are higher in socially disadvantaged areas[33], so the patients who most need lower prices may be the least able to find them.

The Role of Referring Physicians

Because referring physicians largely determine where scans take place[55], and because showing prices to clinicians alone did not change ordering[40,41], a cost comparison is most useful at the moment the scan is ordered. When the same scan is clinically appropriate at several sites, the ordering physician or staff can check the patient's plan cost at the default site and at in-network freestanding centers, mention any posted cash price, and offer the lower-cost site, while keeping the physician's preferred site when quality or continuity requires it. Insurer programs that informed or rewarded patients for using lower-priced MRI sites lowered prices[42,47], and the rewards program did so without changing the use of care[47]. Estimates generated by staff rather than by patients were also associated with higher completion of scheduled imaging[56].

How a Patient Would Use a Price Comparison Tool

Consider a hypothetical patient with the base-case plan who has spent $300 so far, so $1,586 of her deductible remains, and who needs a brain MRI. A tool built on the fields in Table 6 would show three options. At hospital A, the plan cost is $1,667 ($1,586 plus 20% of the remaining $404 of the $1,990 negotiated rate) and the cash price is $2,540. At hospital B, the plan cost is also $1,667, but the cash price is $1,536. At freestanding center C, the in-network rate is $905 and the cash price is $760; these values apply the midpoint savings in the Bay Area study (about 55% for the lowest-priced facility and 16% for paying cash there) to hospital A's negotiated rate[12]. If she expects no other care, paying cash at B saves $131 compared with billing the plan there. If she expects $1,000 of other care later in the year, paying cash at B costs $2,536 for the year compared with $1,867 by billing the plan, unless her state credits the payment, in which case it costs $1,776. At center C, billing the plan costs $1,650 for the year, less than any option at A or B without credit; paying cash there saves $145 if no other care follows but costs $110 more if it does, unless the payment is credited, in which case the year costs $1,621. The tool's most useful message is therefore not "pay cash" but "compare sites, and if you pay cash, check whether it will count toward your deductible." The 2026 requirement to post actual allowed amounts will make the plan-price field more accurate[4].

© The National High School Journal of Science 2026

Table 6 What a price comparison should show for the self-pay versus plan decision

Field	What to show	Evidence
Plan cost at each site	Negotiated rate run through the deductible remaining and coinsurance, or the copayment	Decision model (Methods)
Cash price at each site	Posted cash price and the services it includes	Prices vary widely [9,39]; bundles differ [24]
Effect on the year	Cost with no other care and with the deductible met, or the break-even level of other care	Table 3; Figure 4
Deductible credit	Whether the plan or state law credits the cash payment, and its conditions	State rules [19,20,61,62]
Who keeps the saving	Patient share and plan share of a lower price after the deductible	Reference pricing study [15]

Policy Options and Expected Effects

The following policy options are based on the external evidence in Table 2, not on the model. Steering programs have the strongest evidence. Reference pricing lowered imaging and laboratory prices by 10% to 32% [15,43], and rewards for choosing lower-priced providers lowered MRI prices by 3.7% to 6.5% [47]; in the imaging study, employees kept 45.5% of the savings and the employer kept the rest [15]. Price display tools alone have weak evidence of effect [14,44], and their main benefit may come through insurer bargaining [48,50].

Allowing cash payments to be credited toward the deductible would remove much of the risk of paying cash early in the plan year. However, our results show that even full credit leaves cash more expensive for about half of patients needing an MRI at a low-cash-price hospital, and that the benefit depends on timing. The state rules are recent and include documentation and price conditions [19,20]; we found no evaluation of how often credits are granted or how they change patient costs, and commentators have noted that state insurance rules determine whether cash price transparency helps patients [67]. State credit laws also do not reach self-funded employer plans, which cover 67% of covered workers [5]. Credit is therefore a promising but untested policy, and its effects should be measured with claims data before it is extended.

Two smaller steps follow from the evidence on how patients choose. The advance explanation of benefits required by the No Surprises Act, which would give insured patients a cost estimate before scheduled care, has not been enforced pending rulemaking [68]; finalizing it would supply the plan-cost field in Table 6. In addition, patients who pay in full can ask a provider not to disclose the service to their plan [69], and self-pay patients are entitled to a good faith estimate [70]. Scheduling systems could record the patient's choice to pay cash, and whether the payment will be submitted for credit, before the service.

Limitations

This study has several limitations. First, the credit scenarios are idealized and have not been tested against real claims. Second, the review searched one database; one reviewer screened records with the help of an AI tool, a second reviewer checked those decisions without being blinded to them, and eligibility was judged from titles and abstracts, so some relevant studies may have been missed. Third, all prices predate the 2026 requirement to post allowed amounts [4]. Fourth, the cash and negotiated prices come from different hospital samples and dates; we treated them as benchmarks, simulated paired prices over a range of correlations and calibrated to one published paired ratio, but we did not observe insurer-specific negotiated rates beside cash prices at the same facility, and the paired simulation was possible only for brain MRI. Fifth, a posted price for a procedure code may exclude separately billed radiologist, contrast or facility charges [23,24], and our check of what posted prices include covered only four facilities and no paid claims. Sixth, the spending distribution was fitted to three published points from employer-coverage claims, includes services such as prescription drugs that some deductibles exclude, and may not describe marketplace enrollees. Because it counts some spending that would not reduce the deductible, it overstates how quickly patients meet their deductibles, so the true share for whom paying cash is cheaper is probably somewhat higher than our estimates; the shares in Tables 3 and 4 are illustrations for the plans shown, although refitting the distribution in three other ways changed them by at most 7 percentage points. Seventh, the base-case coinsurance is the average reported for hospital admissions, and no average out-of-pocket maximum is published, although the maximum did not affect the results. Finally, the model ignores family deductibles, tiered networks, the tax treatment of health savings accounts and the chance that a patient changes plans.

Conclusion

This study aimed to review the evidence on cash and negotiated prices and on how patients and physicians respond to price information, to build a decision model of the patient's annual cost under each way of paying, to estimate how often paying cash is cheaper for commercially insured people, and to turn the results into guidance. The review found that at a typical hospital the cash price and the median negotiated rate are close, and that price information alone does little to change behavior unless a program steers patients or reaches the referring physician. The model showed that paying cash saves money mainly when the deductible is unmet and little other

© The National High School Journal of Science 2026

care follows. With cash and negotiated prices paired at the same hospital, cash was cheaper for about 7% to 19% of commercially insured people needing a brain MRI under a typical employer plan. The share was much larger in high-deductible plans, and choosing a lower-priced site usually saved more than paying cash. With full deductible credit, the benchmark brain MRI share rose from 30% to just under half, and the benefit depended on when in the year the scan took place. A price tool should therefore show the plan cost and the cash price at several sites and state whether a cash payment will count toward the deductible.

Three questions remain open. Future studies should confirm these estimates using insurer-specific negotiated rates, cash prices and paid claims from the same facilities; measure how often state credit laws are used and whether credited payments are processed as the laws intend; and extend the model to family deductibles, tiered networks and services beyond imaging. The 2026 requirement to post allowed amounts should make the first of these possible. Until then, the most useful advice for an insured patient facing a scheduled scan is not to pay cash, but to compare sites first.

Conflicts of Interest

The authors declare no conflicts of interest.

Use of AI Tools

Claude (Anthropic) was used to run the literature searches and screen records against the stated criteria, writing and running the analysis code, finding the facility price pages, and formatting references. The writing is by the authors.

Data and Code Availability

All inputs are published. The analysis code, including the robustness checks, is provided as Supplementary Material, and Supplementary Table S1 lists the facility price pages reviewed. The screening log is available from the authors on request.

Acknowledgments

The authors thank their independent advisor, Harsh Jaiswal, for his guidance and review.

References

All web sources were accessed on November 3rd, 2026.

1 Centers for Medicare & Medicaid Services. Hospital price transparency. 2026, https://www.cms.gov/priorities/key-initiatives/hospital-price-transparency.

2 U.S. Government Accountability Office. Health care transparency: CMS needs more information on hospital pricing data completeness and accuracy. GAO-25-106995. 2024, https://www.gao.gov/assets/gao-25-106995.pdf.

3 N. Maleki, B. Padmanabhan, K. Dutta. Usability of health care price transparency data in the United States: mixed methods study. Journal of Medical Internet Research. Vol. 26, pg. e50629, 2024, https://doi.org/10.2196/50629.

4 Centers for Medicare & Medicaid Services. CY 2026 OPPS and ambulatory surgical center final rule (CMS-1834-FC): hospital price transparency policy changes. Fact sheet. 2025, https://www.cms.gov/newsroom/fact-sheets/cy-2026-opps-ambulatory-surgical-center-final-rule-hospital-price-transparency-policy-changes.

5 KFF. 2025 Employer Health Benefits Survey. 2025, https://www.kff.org/health-costs/report/2025-employer-health-benefits-survey/.

6 Texas House Research Organization. Bill analysis: CSHB 2002. 2023, https://lrl.texas.gov/scanned/hroBillAnalyses/88-0/HB2002.PDF.

7 G. Loewenstein, J. Y. Friedman, B. McGill, S. Ahmad, S. Linck, S. Sinkula, J. Beshears, J. J. Choi, J. T. Kolstad, D. Laibson, B. C. Madrian, J. A. List, K. G. Volpp. Consumers' misunderstanding of health insurance. Journal of Health Economics. Vol. 32, pg. 850–862, 2013, https://doi.org/10.1016/j.jhealeco.2013.04.004.

8 K. Van Nuys, G. Joyce, R. Ribero, D. P. Goldman. Frequency and magnitude of co-payments exceeding prescription drug costs. JAMA. Vol. 319, pg. 1045–1046, 2018, https://doi.org/10.1001/jama.2018.0102.

9 J. X. Jiang, M. A. Makary, G. Bai. Comparison of US hospital cash prices and commercial negotiated prices for 70 services. JAMA Network Open. Vol. 4, pg. e2140526, 2021, https://doi.org/10.1001/jamanetworkopen.2021.40526.

10 Y. Wang, M. K. Meiselbach, J. S. Cox, G. F. Anderson, G. Bai. The relationships among cash prices, negotiated rates, and chargemaster prices for shoppable hospital services. Health Affairs. Vol. 42, pg. 516–525, 2023, https://doi.org/10.1377/hlthaff.2022.00977.

11 A. Liu, Y. Wang, G. C. Alexander, G. F. Anderson, G. Bai. Cash and commercial negotiated prices of physician-administered drugs in US hospitals. American Journal of Managed Care. Vol. 32, pg. 143–145, 2026, https://doi.org/10.37765/ajmc.2026.89892.

12 J. Epstein, S. Nicholson, L. X. Wang, K. Hempstead, S. Asin. The secret menu in health care: a cash market for imaging in California. Inquiry. Vol. 57, pg. 0046958020981449, 2020, https://doi.org/10.1177/0046958020981449.

13 C. M. Whaley, J. Schneider Chafen, S. Pinkard, G. Kellerman, D. Bravata, R. Kocher, N. Sood. Association between availability of health service prices and payments for these services. JAMA. Vol. 312, pg. 1670–1676, 2014, https://doi.org/10.1001/jama.2014.13373.

14 S. Desai, L. A. Hatfield, A. L. Hicks, A. D. Sinaiko, M. E. Chernew, D. Cowling, S. Gautam, S. J. Wu, A. Mehrotra. Offering a price transparency tool did not reduce overall spending among California public employees and retirees. Health Affairs. Vol. 36, pg. 1401–1407, 2017, https://doi.org/10.1377/hlthaff.2016.1636.

15 J. C. Robinson, C. M. Whaley, T. T. Brown. Reference pricing, consumer cost-sharing, and insurer spending for advanced imaging tests. Medical Care. Vol. 54, pg. 1050–1055, 2016, https://doi.org/10.1097/MLR.0000000000000605.

16 J. X. Jiang, M. A. Makary, G. Bai. Commercial negotiated prices for CMS-specified shoppable radiology services in U.S. hospitals. Radiology. Vol. 302, pg. 622–624, 2022, https://doi.org/10.1148/radiol.2021211948.

17 R. Seth, M. Seth, A. Gupta. Comparing U.S. healthcare price transparency platforms: a structured narrative review. National High School Journal of

© The National High School Journal of Science 2026

Science. 2026, https://nhsjs.com/2026/comparing-u-s-healthcare-price-transparency-platforms-a-structured-narrative-review/.

18 M. J. Page, J. E. McKenzie, P. M. Bossuyt, I. Boutron, T. C. Hoffmann, C. D. Mulrow, L. Shamseer, J. M. Tetzlaff, E. A. Akl, S. E. Brennan, R. Chou, J. Glanville, J. M. Grimshaw, A. Hróbjartsson, M. M. Lalu, T. Li, E. W. Loder, E. Mayo-Wilson, S. McDonald, L. A. McGuinness, L. A. Stewart, J. Thomas, A. C. Tricco, V. A. Welch, P. Whiting, D. Moher. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. Vol. 372, pg. n71, 2021, https://doi.org/10.1136/bmj.n71.

19 Texas Legislature. House Bill 2002, 88th Legislature, enrolled version: Insurance Code §1301.140, out-of-pocket expense credit. 2023, https://capitol.texas.gov/tlodocs/88R/billtext/html/HB02002F.htm.

20 Oklahoma Insurance Department. Bulletin No. 2025-10: Senate Bill 515, crediting of out-of-pocket payments toward deductibles and annual out-of-pocket maximums. 2025, https://www.oid.ok.gov/bulletin-no-2025-10/.

21 U.S. Bureau of Labor Statistics. Consumer Price Index for All Urban Consumers: medical care services in U.S. city average (series CUUS0000SAM2). Retrieved from FRED, Federal Reserve Bank of St. Louis. 2026, https://fred.stlouisfed.org/series/CUUS0000SAM2.

22 J. X. Jiang, A. Malhotra, G. Bai. Factors associated with hospital commercial negotiated price for magnetic resonance imaging of brain. JAMA Network Open. Vol. 6, pg. e233875, 2023, https://doi.org/10.1001/jamanetworkopen.2023.3875.

23 M. Horný, P. R. Shafer, S. B. Dusetzina. Concordance of disclosed hospital prices with total reimbursements for hospital-based care among commercially insured patients in the US. JAMA Network Open. Vol. 4, pg. e2137390, 2021, https://doi.org/10.1001/jamanetworkopen.2021.37390.

24 M. Mukherjee, M. Horný. Complex billing for nonemergency outpatient imaging: an obstacle to the success of health care price transparency initiatives. Journal of the American College of Radiology. Vol. 20, pg. 63–70, 2023, https://doi.org/10.1016/j.jacr.2022.11.009.

25 K. Vu, L. Cotter, M. Rae. How much do people with employer plans spend out-of-pocket on cost-sharing? Peterson-KFF Health System Tracker (analysis of Merative MarketScan commercial claims, 2023). 2025, https://www.healthsystemtracker.org/chart-collection/how-much-do-people-with-employer-plans-spend-out-of-pocket-on-cost-sharing/.

26 Centers for Medicare & Medicaid Services. Premium adjustment percentage, maximum annual limitation on cost sharing, reduced maximum annual limitation on cost sharing, and required contribution percentage for the 2025 benefit year. Guidance. 2023, https://www.cms.gov/files/document/2025-papi-parameters-guidance-2023-11-15.pdf.

27 Internal Revenue Service. Revenue Procedure 2024-25: 2025 inflation-adjusted amounts for health savings accounts and high deductible health plans. 2024, https://www.irs.gov/pub/irs-drop/rp-24-25.pdf.

28 Centers for Medicare & Medicaid Services. Plan year 2025 qualified health plan issuer application instructions, Appendix F: standardized plan option requirements. 2024, https://www.qhpcertification.cms.gov/s/PY2025QHPIssuerInstructions_AppF_SPORequirements.pdf.

29 U.S. Code. 42 U.S.C. §300gg-13: coverage of preventive health services. 2026, https://www.law.cornell.edu/uscode/text/42/300gg-13.

30 Y. Wang, M. K. Meiselbach, J. Xu, G. Bai, G. F. Anderson. Do insurers with greater market power negotiate consistently lower prices for hospital care? Evidence from hospital price transparency data. Medical Care Research and Review. Vol. 81, pg. 78–84, 2024, https://doi.org/10.1177/10775587231193475.

31 Y. Wang, E. Plummer, Y. Wang, P. Cram, G. Bai. Comparison of commercial negotiated price and cash price between physician-owned hospitals and other hospitals in the same hospital referral region. JAMA Network Open. Vol. 6, pg. e2319980, 2023, https://doi.org/10.1001/jamanetworkopen.2023.19980.

32 S. Linde, L. E. Egede. Hospital price transparency in the United States: an examination of chargemaster, cash, and negotiated, price variation for 14 common procedures. Medical Care. Vol. 60, pg. 768–774, 2022, https://doi.org/10.1097/MLR.0000000000001761.

33 E. Chang, W. Psek. The relationship between community social risk factors and regional hospital-reported cash, negotiated, and chargemaster prices for 14 common services. BMC Health Services Research. Vol. 24, pg. 299, 2024, https://doi.org/10.1186/s12913-024-10762-1.

34 P. Krotenok, S. Kaplan. An analysis of radiology procedure price variation in children's hospitals between 2023 and 2024: hospital price transparency in action. Journal of the American College of Radiology. Vol. 22, pg. 1203–1206, 2025, https://doi.org/10.1016/j.jacr.2025.04.037.

35 T. Jacobsen, J. Ibrahim, Y. Ahmad, A. Bikmal, M. Schacht. Cash price transparency of common radiology services in the United States: an analysis of 2024 healthcare transparency data by state. Clinical Imaging. Vol. 131, pg. 110707, 2026, https://doi.org/10.1016/j.clinimag.2025.110707.

36 R. Lin, R. Duszak, R. C. Carlos, G. Sadigh. Relationship between hospital compliance with Medicare's price transparency rule, proposed cash prices, and consumer ratings for MRI lumbar spine. Journal of the American College of Radiology. Vol. 19, pg. 561–563, 2022, https://doi.org/10.1016/j.jacr.2022.01.005.

37 K. King, J. J. Skydel, J. S. Ross, J. D. Wallach. Commercial price variation for 11 outpatient-based psychiatric services. JAMA Network Open. Vol. 9, pg. e2552939, 2026, https://doi.org/10.1001/jamanetworkopen.2025.52939.

38 A. B. Paul, R. Oklu, S. Saini, A. M. Prabhakar. How much is that head CT? Price transparency and variability in radiology. Journal of the American College of Radiology. Vol. 12, pg. 453–457, 2015, https://doi.org/10.1016/j.jacr.2014.12.016.

39 D. Pasalic, R. K. Lingineni, H. J. Cloft, D. F. Kallmes. Nationwide price variability for an elective, outpatient imaging procedure. Journal of the American College of Radiology. Vol. 12, pg. 444–452, 2015, https://doi.org/10.1016/j.jacr.2014.11.024.

40 A. T. Chien, L. S. Lehmann, L. A. Hatfield, K. E. Koplan, C. R. Petty, A. D. Sinaiko, M. B. Rosenthal, T. D. Sequist. A randomized trial of displaying paid price information on imaging study and procedure ordering rates. Journal of General Internal Medicine. Vol. 32, pg. 434–448, 2017, https://doi.org/10.1007/s11606-016-3917-6.

41 A. T. Chien, S. Ganeshan, M. A. Schuster, L. S. Lehmann, L. A. Hatfield, K. E. Koplan, C. R. Petty, A. D. Sinaiko, T. D. Sequist, M. B. Rosenthal. The effect of price information on the ordering of images and procedures. Pediatrics. Vol. 139, pg. e20161507, 2017, https://doi.org/10.1542/peds.2016-1507.

42 S. J. Wu, G. Sylwestrzak, C. Shah, A. DeVries. Price transparency for MRIs increased use of less costly providers and triggered provider competition. Health Affairs. Vol. 33, pg. 1391–1398, 2014, https://doi.org/10.1377/hlthaff.2014.0168.

43 J. C. Robinson, C. M. Whaley, T. T. Brown. Association of reference pricing for diagnostic laboratory testing with changes in patient choices, prices, and total spending for diagnostic tests. JAMA Internal Medicine. Vol. 176, pg. 1353–1359, 2016, https://doi.org/10.1001/jamainternmed.2016.2492.

44 S. Desai, L. A. Hatfield, A. L. Hicks, M. E. Chernew, A. Mehrotra. As-

© The National High School Journal of Science 2026

sociation between availability of a price transparency tool and outpatient spending. JAMA. Vol. 315, pg. 1874–1881, 2016, https://doi.org/10.1001/jama.2016.4288.

45 X. Zhang, A. Haviland, A. Mehrotra, P. Huckfeldt, Z. Wagner, N. Sood. Does enrollment in high-deductible health plans encourage price shopping? Health Services Research. Vol. 53 (Suppl. 1), pg. 2718–2734, 2018, https://doi.org/10.1111/1475-6773.12784.

46 C. M. Whaley. Provider responses to online price transparency. Journal of Health Economics. Vol. 66, pg. 241–259, 2019, https://doi.org/10.1016/j.jhealeco.2019.06.001.

47 C. M. Whaley, N. Sood, M. E. Chernew, L. Metcalfe, A. Mehrotra. Paying patients to use lower-priced providers. Health Services Research. Vol. 57, pg. 37–46, 2022, https://doi.org/10.1111/1475-6773.13711.

48 Y. Feng. Price transparency in healthcare: bargaining incentives and patient responses. Journal of Health Economics. Vol. 102, pg. 102998, 2025, https://doi.org/10.1016/j.jhealeco.2025.102998.

49 Z. C. Brot-Goldberg, A. Chandra, B. R. Handel, J. T. Kolstad. What does a deductible do? The impact of cost-sharing on health care prices, quantities, and spending dynamics. Quarterly Journal of Economics. Vol. 132, pg. 1261–1318, 2017, https://doi.org/10.1093/qje/qjx013.

50 Z. Y. Brown. Equilibrium effects of health care price information. Review of Economics and Statistics. Vol. 101, pg. 699–712, 2019, https://doi.org/10.1162/rest_a_00765.

51 G. Kim, S. Glied. Assessing utilization of a marketwide price transparency tool. American Journal of Managed Care. Vol. 27, pg. 472–478, 2021, https://doi.org/10.37765/ajmc.2021.88774.

52 A. D. Sinaiko, M. B. Rosenthal. Examining a health care price transparency tool: who uses it, and how they shop for care. Health Affairs. Vol. 35, pg. 662–670, 2016, https://doi.org/10.1377/hlthaff.2015.0746.

53 A. D. Sinaiko, K. E. Joynt, M. B. Rosenthal. Association between viewing health care price information and choice of health care facility. JAMA Internal Medicine. Vol. 176, pg. 1868–1870, 2016, https://doi.org/10.1001/jamainternmed.2016.6622.

54 A. Mehrotra, T. Brannen, A. D. Sinaiko. Use patterns of a state health care price transparency web site: what do patients shop for? Inquiry. Vol. 51, pg. 0046958014561496, 2014, https://doi.org/10.1177/0046958014561496.

55 M. E. Chernew, Z. Cooper, E. Larsen-Hallock, F. Scott Morton. Physician agency, consumerism, and the consumption of lower-limb MRI scans. Journal of Health Economics. Vol. 76, pg. 102427, 2021, https://doi.org/10.1016/j.jhealeco.2021.102427.

56 A. Rashidi, T. Pham, A. Arce, D. Garg, G. Sadigh. Association between price transparency and patient decision to complete outpatient imaging. Clinical Imaging. Vol. 119, pg. 110397, 2025, https://doi.org/10.1016/j.clinimag.2024.110397.

57 G. Grant, A. Rashidi, R. C. Carlos, G. Sadigh. Unintended consequences of price transparency initiatives: examining patient decision making in imaging services. Journal of the American College of Radiology. Vol. 22, pg. 185–190, 2025, https://doi.org/10.1016/j.jacr.2024.10.002.

58 B. Mitchell, G. Sadigh, A. M. Fendrick, M. Horný. No evidence on association between prospective exposure to out-of-pocket cost information and appointment cancelations or no-shows: a case-control pilot study. Inquiry. Vol. 62, pg. 00469580251320174, 2025, https://doi.org/10.1177/00469580251320174.

59 R. Manik, R. C. Carlos, R. Duszak, G. Sadigh. Costs versus quality in imaging examination decisions. Journal of the American College of Radiology. Vol. 19, pg. 450–459, 2022, https://doi.org/10.1016/j.jacr.2021.11.015.

60 J. X. Jiang, H. P. Forman, S. Gupta, G. Bai. Price variability for common radiology services within U.S. hospitals. Radiology. Vol. 306, pg. e221815, 2023, https://doi.org/10.1148/radiol.221815.

61 Tennessee General Assembly. Senate Bill 1392 / House Bill 1213, 113th General Assembly: revisions to the Tennessee Right to Shop Act (Public Chapter 244). 2023, https://wapp.capitol.tn.gov/apps/BillInfo/default.aspx?BillNumber=SB1392&GA=113.

62 Idaho Legislature. House Bill 929, 2026 session: out-of-pocket payments for health care services (Session Law Chapter 275). 2026, https://legislature.idaho.gov/sessioninfo/2026/legislation/H0929/.

63 L. N. Bunch, H. Ketema. Health insurance coverage in the United States: 2025. Current Population Reports P60-291, U.S. Census Bureau. 2026, https://www.census.gov/library/publications/2026/demo/p60-291.html.

64 Internal Revenue Service. Notice 2026-5: expanded availability of health savings accounts. Internal Revenue Bulletin 2026-2. 2026, https://www.irs.gov/irb/2026-02_IRB.

65 Tennessee Department of Commerce and Insurance. Bulletin 2023-03: high deductible health plans and health savings accounts. 2023, https://www.tennessee.gov/content/dam/tn/commerce/documents/insurance/bulletins/UnintendedTaxConsequencesBulletin05112023.pdf.

66 D. Hao, V. K. Rathi, J. S. Ross, R. K. V. Sethi, R. Xiao. Price transparency compliance among hospitals caring for disadvantaged populations. JAMA Network Open. Vol. 9, pg. e266312, 2026, https://doi.org/10.1001/jamanetworkopen.2026.6312.

67 D. Hyman, S. Letchuman, G. Bai. Will cash price transparency benefit patients? State insurance regulation matters. JAMA Health Forum. Vol. 5, pg. e244322, 2024, https://doi.org/10.1001/jamahealthforum.2024.4322.

68 U.S. Departments of Labor, Health and Human Services, and the Treasury. FAQs about Affordable Care Act and Consolidated Appropriations Act, 2021 implementation, part 49. 2021, https://www.cms.gov/CCIIO/Resources/Fact-Sheets-and-FAQs/Downloads/FAQs-Part-49.pdf.

69 U.S. Code of Federal Regulations. 45 CFR §164.522(a)(1)(vi): right of an individual to request restriction of uses and disclosures. 2026, https://www.ecfr.gov/current/title-45/subtitle-A/subchapter-C/part-164/subpart-E/section-164.522.

70 Centers for Medicare & Medicaid Services. FAQs about Consolidated Appropriations Act, 2021 implementation: good faith estimates for uninsured (or self-pay) individuals, part 1. 2021, https://www.cms.gov/CCIIO/Resources/Regulations-and-Guidance/Downloads/Guidance-Good-Faith-Estimates-FAQ.pdf.

Supplementary information

The online version contains supplementary material available at https://nhsjs.com/?p=64161