

Cross-Validation of Insurer and Hospital Price Transparency Data

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There has been a growing and sustained bipartisan policy interest in health services price transparency. Since January 1, 2021, almost all hospitals in the US have been required by federal regulations to publicly post machine-readable data files consisting of their “standard charges.”¹ These standard charge data files must contain, among other things, the payer-specific negotiated rates for all items and services the hospital provides. Additionally, since July 1, 2022, the Transparency in Coverage (TIC) federal rule has mandated most group health plans and insurance issuers to post machine-readable data files consisting of the in-network rates for all covered services and all providers with which the payer contracts.²

These rules are a large step forward in terms of price transparency of health services, and a growing body of research has investigated both compliance with the regulation and price variation apparent in the standard charge data files.³⁻⁸ Additionally, although the TIC data files are complex, researchers have begun to systematically investigate the extent to which TIC networks overlap across large payers and to which TIC pricing data overlap with claims data, as well as the variation contained in the pricing files.⁹⁻¹¹

These files have been costly to produce. CMS estimated a first-year burden of \$71,415,397 with a subsequent-year burden of \$21,672,502 for hospital price transparency files,¹ and a first-year burden of \$2,024,117,160 with a second-year burden of \$414,728,136 for the in-network files of the TIC data.² Regulators and policy makers have high hopes for price transparency information, specifically that it will “enable health care consumers to make more informed decisions, increase market competition, and ultimately drive down the cost of health care services.”¹¹ Given the costs entailed in operationalizing price transparency regulations, as well as stakeholder aspirations for these price transparency data, it is of the utmost importance to understand whether these data sources are accurate.

In this study, we assess the accuracy of these data sources by examining their overlap and concordance for maternal health services. Although each source of price transparency data covers different aspects of the health services delivery system, the data sets overlap in 1 key way: They must both contain the negotiated

ABSTRACT

Given recent congressional interest in codifying price transparency regulations, it is important to understand the extent to which newly available price transparency data capture true underlying procedure-level prices. To that end, we compared the prices for maternity services negotiated between a large payer and 26 hospitals in Mississippi across 2 separate price transparency data sources: payer and hospital. The degree of file overlap is low, with only 16.3% of hospital-billing code observations appearing in both data sources. However, for the observations that overlap, pricing concordance is high: Corresponding prices have a correlation coefficient of 0.975, 77.4% match to the penny, and 84.4% are within 10%. Exact price matching rates are greater than 90% for 3 of the 4 service lines included in this study. Taken together, these results suggest that although administrative misalignment exists between payers and hospitals, there is a measure of signal amid the price transparency noise.

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TAKEAWAY POINTS

Real-world analyses of hospital and insurer price transparency data find low overlap but high concordance between the 2 data sources.

- ▶ Findings suggest that despite compliance issues from insurers and hospitals, the data being put forth are valid.
- ▶ Regulatory efforts to decrease data redundancy on the part of insurers would greatly improve the usability of insurer price transparency data.
- ▶ Insurer and hospital price transparency data are promising free and public sources of previously confidential information on health care prices. However, real-world utility of these data sources is limited by noncompliance on the part of insurers and hospitals.

rates between providers and payers. We compared TIC prices and hospital standard charge prices for maternity services for 26 hospitals in Mississippi and Blue Cross & Blue Shield of Mississippi (BCBS MS), the state's dominant commercial insurer. Although prior research has assessed concordance between telephone-based and internet-based price estimates from hospitals,¹² this is the first study to systematically assess price overlap and concordance between these 2 new sources of price transparency data.

STUDY DATA AND METHODS

Addressing the maternal health crisis is a top priority of HHS¹³; thus, we focused on pricing data for maternity-related services. Specifically, we used *Current Procedural Terminology (CPT)* codes 59000 to 59899, as well as codes for maternity case ultrasounds, fetal echocardiography, prenatal genetic and chromosomal metabolic testing, the analysis of fetal cells and amniotic fluid, and other newborn care. Additional detail is listed in [eAppendix A](#) (eAppendices available at [ajmc.com](#)).

We downloaded and processed the October 2023 BCBS MS TIC file and extracted the prices for the *CPT* billing codes presented in [eAppendix A](#). Additional information on the source of the TIC data is presented in [eAppendix B](#). Because public payers are not required to comply with TIC regulations, we restricted attention to the BCBS MS commercial in-network file.² Although the TIC data contain both institutional prices and professional prices, we retained only institutional prices for this study to maximize the comparability of the 2 price transparency data sources. Within this file, billing codes for maternity services are provided at 52 hospitals. We sampled 26 of these hospitals and collected and processed the hospital-level standard charge data in October to November 2023. Hospital characteristics are derived from the 2023 quarter 3 CMS provider of service files.¹⁴ As with the TIC data, we retained only institutional prices for the hospital pricing data. Additionally, although the hospital pricing files contain negotiated rates for many different plans, we retained only negotiated rates for BCBS MS commercial plans. Additional detail on study hospitals is in [eAppendix C](#) and on data processing in [eAppendix D](#).

We compared these 2 pricing data sources in 2 ways. First, we assessed the extent to which the files overlap in terms of

the hospital–billing code combinations they contain. Then, for the observations that overlapped across the 2 sources, we assessed pricing concordance; that is, the degree to which the prices matched across data sources. Standard charge data can contain several negotiated prices for a given hospital–billing code combination, so we formed all pairwise combinations of hospital price and TIC price data for each hospital–billing code combination. For both sample overlap and price concordance, we examined prices overall and decomposed to

service line. This study was exempt from review by the University of Maryland, Baltimore County Institutional Review Board.

RESULTS

Our TIC pricing sample consisted of 832 unique hospital–billing code observations: 32 codes for each of the 26 study hospitals. In contrast, our hospital pricing sample consisted of 1027 hospital–billing code observations, comprising 595 unique hospital–billing code combinations of 91 billing codes at the 26 study hospitals.

We found that 200 hospital–billing code combinations appear in both data sources, for an overall overlap rate of 16.3%. Only 24% of the TIC prices appear in the hospital data, and 33.6% of the hospital prices appear in the TIC data. Across all services included in this study, there is only 1 source of pricing data for 83.7% of observations.

The degree of overlap varied significantly by service line. Billing codes in the 59000 to 59899 and 90000 to 99999 ranges had little overlap: 8.0% and 5.7% of observations in these service lines appear in both data sources, respectively. However, billing codes in the 80000 to 89999 range appear in both data sources for 25.4% of observations, and billing codes in the 70000 to 79999 range appear in both data sources for 28.4% of observations. Notably, there is total overlap for hospital price transparency prices for the 80000 to 89999 service line: All the observations from the hospital pricing data also appear in the TIC data. Results are presented in [Table 1](#).

For the hospital–billing code combinations that match, the price concordance is high. Results are displayed in [Table 2](#). The correlation coefficient across hospital prices and TIC prices is 0.975, 77.4% of the pricing dyads match to the penny, and 84.4% match within 10%. As above, there is significant heterogeneity within service line. For service lines 59000 to 59899, 80000 to 89999, and 90000 to 99999, exact match rates are 93.2%, 92.8%, and 100%, respectively. For service line 70000 to 79999, however, the exact match rate is only 54.4%.

DISCUSSION

In this study, we sought to cross-validate the 2 primary sources of health services price transparency data—TIC data and hospital standard charge data—for a sample of maternity services. We document

TABLE 1. TIC and Hospital Price Data Sample Overlap by Service Line

Code segment	Code segment description	Hospital only	TIC only	In both	Overlap rate
59000-59899	Surgical procedures	209	318	46	8.0%
70000-79999	Imaging services	159	48	82	28.4%
80000-89999	Laboratory and pathology services	0	194	66	25.4%
90000-99999	Evaluation and management and other services	27	72	6	5.7%
Total		395	632	200	16.3%

TIC, Transparency in Coverage.

TABLE 2. Price Concordance by Service Line

Code segment	Code segment description	% matching exactly	Pricing dyad count
59000-59899	Surgical procedures	93.2%	88
70000-79999	Imaging services	54.4%	147
80000-89999	Laboratory and pathology services	92.8%	111
90000-99999	Evaluation and management and other services	100%	12
Total		77.4%	358

low levels of overlap: Only 16.3% of maternal health services hospital–billing code combinations appeared in both data sources. This is consistent with other research on the TIC files documenting high levels of data redundancy and “zombie” codes: There are many prices present in the TIC files corresponding to procedures that would never actually occur due to licensure or privileges—for example, a cardiologist having a negotiated price for childbirth services.⁹

The low overlap rates between the 2 sources of price transparency data are striking. In these instances, one data source records a negotiated rate between BCBS MS and a particular hospital, whereas another does not. For example, for Anderson Regional Medical Center - South, the TIC data contain a price for billing code 76827, whereas the price transparency data from that hospital do not; however, the price transparency data from that hospital contain a price for billing code 76819, whereas the TIC data do not. Both data sources—TIC and hospital—are intended to convey pricing information that reflect underlying, mutually agreed-upon contractual arrangements. Thus, the relatively low rates of file overlap potentially indicate substantial administrative misalignment between payers and hospitals. We note that of the overall pool of maternity services used in this study, 5 billing codes appear in the list of CMS “shoppable services.”¹¹ Of these 5 billing codes, 4 appear in both the hospital price transparency and TIC data sources. This suggests that required reporting from CMS may mitigate the extent of administrative misalignment.

The higher rates of overlap in certain code segments may reflect additional pricing dynamics. For example, the relatively high rates of overlap for both imaging and laboratory services (28.4% and 25.4%, respectively) may reflect that these types of standardized services may be negotiated nationally (eg, as a percentage of the Medicare fee schedule), whereas other services may be negotiated more on a case-by-case basis. As a result, it may be more straightforward

for both payers and hospitals to encode the underlying prices for imaging and laboratory services in price transparency files than it is for other service lines. An analysis of the drivers of such misalignment is beyond the scope of this study, but differing interpretation of underlying contracts could be a potential cause.

Limitations

This study has 2 primary limitations. First, by design, we collected prices from one payer, and for a sample of hospitals, and for a sample of procedure codes. Thus, we acknowledge that these results may have limited generalizability to other states, payers, or procedures.

We believe that, even as a case study, these results are meaningful given the health services landscape in Mississippi. BCBS MS is the dominant commercial payer in Mississippi, with 279,112 covered lives across the individual, small-group, and large-group markets; it also provides administrative services for 632,744 individuals with self-funded coverage.¹⁵ This is large relative to other commercial payers in the state: The Herfindahl-Hirschman Index for BCBS MS is 3555, indicating high concentration, and, as of 2021, it had 55% market share; UnitedHealth Group, the second-largest insurer, had 17% market share.¹⁶ Additionally, this payer’s negotiated rates have recently been the subject of both contracting disputes and state legislation: BCBS MS and the University of Mississippi Medical Center—the state’s sole academic medical center—spent much of 2022 in a contracting dispute, which was resolved in December 2022, and the state legislature subsequently passed SB2224 in 2023, which would have empowered the state insurance commissioner to “examine and address any inequalities regarding provider reimbursement rates paid by an insurer.”^{17,18} The governor vetoed the bill.¹⁸

Moreover, we collected pricing data for 26 hospitals in Mississippi, which represent 50% of the hospitals for which a price is reported in the BCBS MS TIC file. The hospitals used in this study are all

TRENDS FROM THE FIELD

short-term or critical access hospitals, and they account for 46.0% of beds across all of Mississippi's active short-term or critical access hospitals. Additionally, although we focused only on billing codes related to maternal health, this is a policy-relevant set of procedure codes. Maternal mortality in Mississippi was second highest in the nation from 2018 to 2021,¹⁹ and its infant mortality rate was highest in the nation in 2020.²⁰

More broadly, we hope other researchers and regulators conduct similar analyses using other states, payers, hospitals, and sets of procedures using the methodology outlined in this study. Recent research has investigated the high-level concordance among TIC pricing data, hospital pricing data, and commercial claims, but these are not matched to the payer-provider level; thus, more research is needed to investigate the accuracy of these new and promising price transparency sources.²¹

The second limitation relates to the nature of hospital standard charge data. These data are currently relatively unstandardized and, as such, require substantial parsing before they are analytically tractable. We list the details of our cleaning and filtering steps in eAppendix D; however, we recognize that limitations of the hospital price transparency data render direct comparisons challenging. Upcoming changes to the hospital price transparency data standards should make future comparisons more straightforward.²² Additionally, although third-party data vendors play an important role in the research ecosystem, we believe researchers should, whenever possible, work directly with the raw, underlying price transparency data to mitigate the possibility of unnecessary data filtering or standardization.

CONCLUSIONS

As the policy drive for price transparency continues, it is important to assess the usability and validity of the novel data being generated by these efforts. Policy goals can be realized only if, among other things, the pricing data issued by insurers and hospitals are accurate. Although there is low overlap between insurer and hospital data, the high degree of price concordance is encouraging: When the files contain the same hospital–billing code combinations, the prices tend to match. This suggests that a measure of signal exists within a relatively large pool of noise in the price transparency data writ large. As the research community takes stock of the tremendous amount of new, freely available price transparency data, we encourage future researchers and regulators to continue to assess the overlap and concordance of these 2 promising new data sources. ■

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eAppendix A

This table describes the billing codes used in this study.

eAppendix Table 1: Billing Codes

Billing Code	Description
59000-59899	Surgical procedures for maternity care and delivery.
99460	Initial hospital or birthing center care, per day, for evaluation and management of normal newborn infant
99461	Initial care, per day, for evaluation and management of normal newborn infant seen in other than hospital or birthing center
99462	Subsequent hospital care, per day, for evaluation and management of normal newborn
99463	Initial hospital or birthing center care, per day, for evaluation and management of normal newborn infant admitted and discharged on the same date
99464	Attendance at delivery (when requested by the delivering physician or other qualified health care professional) and initial stabilization of newborn
99465	Delivery/birthing room resuscitation, provision of positive pressure ventilation and/or chest compressions in the presence of acute inadequate ventilation and/or cardiac output
99477	Initial hospital care, per day, for the evaluation and management of the neonate, 28 days of age or younger, who requires intensive observation, frequent interventions, and other intensive care services
99478	Subsequent intensive care, per day, for the evaluation and management of the recovering very low birth weight infant (present body weight less than 1500 grams)
99479	Subsequent intensive care, per day, for the evaluation and management of the recovering low birth weight infant (present body weight of 1500-2500 grams)
99480	Subsequent intensive care, per day, for the evaluation and management of the recovering infant (present body weight of 2501-5000 grams)

76801	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, first trimester (< 14 weeks 0 days), transabdominal approach
76802	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, first trimester (< 14 weeks 0 days), transabdominal approach
76805	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, after first trimester (> or = 14 weeks 0 days), transabdominal approach
76810	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, after first trimester (> or = 14 weeks 0 days), transabdominal approach
76811	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation plus detailed fetal anatomic examination, transabdominal approach
76812	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation plus detailed fetal anatomic examination, transabdominal approach
76815	Diagnostic Ultrasound Procedures of the Pelvis Obstetrical
76816	Diagnostic Ultrasound Procedures of the Pelvis Obstetrical
76817	Diagnostic Ultrasound Procedures of the Pelvis Obstetrical
76818	Fetal biophysical profile
76819	Fetal biophysical profile
76825	Echocardiography, fetal, cardiovascular system, real time with image documentation (2D), with or without M-mode recording
76826	Echocardiography, fetal, cardiovascular system, real time with image documentation (2D), with or without M-mode recording
76827	Doppler echocardiography, fetal, pulsed wave and/or continuous wave with spectral display
76828	Doppler echocardiography, fetal, pulsed wave and/or continuous wave with spectral display

93325	Doppler echocardiography
76945	Ultrasonic Guidance Procedures
76946	Ultrasonic Guidance Procedures
82143	Chemistry Procedures
83661	Fetal lung maturity assessment
83662	Fetal lung maturity assessment
83663	Fetal lung maturity assessment
83664	Fetal lung maturity assessment
84081	Chemistry Procedures
88235	Tissue culture for non-neoplastic disorders
88267	Cytogenetic Studies
88269	Cytogenetic Studies
80055	Obstetric blood test panel.

eAppendix B.

The Blue Cross & Blue Shield of Mississippi index file was downloaded from <https://www.bcbsms.com/about-us/transparency-in-coverage>.

Blue Cross & Blue Shield of Mississippi data in-network data were downloaded on October 19, 2023, from the following link. Since data is refreshed monthly, these links are unlikely to function in future months.

https://bcbsms.mrf.bcbs.com/2023-10_230_30B0_in-network-rates.json.gz?&Expires=1700596850&Signature=bdU9ibjQfw1C6BwTuUYBnh0H0LYDBBy6jt3PR0vTnHN~vd6B8MZH4VDXdBuOt4qh0SgavpayCNfElh3caJhmTO7Ioj~x5WI9zNeQu02rf1GVHJiV1WWyhyPjsJrgdX0e~tAJd4UCsfofFxnoQfjEki2PJYsj~Ple9XqIqDzqvVOK0wxutPgluB3uydk2v45w5oqlGX21otStCW8jXA~AInFdAxg0scJkoXZPSDVy6P6X5XI-t8seEu6JmSnWcvoCSMoRNL7wxpt4lSQhLVMntvHvdFTJpfLhDpoffyQcSQgA2JcNEICvMYkZ8jt7zi3cc6X-nXka9y~swZTsIG5qecA__&Key-Pair-Id=K27TQMT39R1C8A

eAppendix C

This table describes the hospitals in the analytic sample.

eAppendix Table 2: Hospitals included in Study Sample

Hospital Name	City	Ownership	# Beds
Anderson Regional Medical Center South Campus	Meridian	Private forprofit	140
Baptist Memorial Hospital - Golden Triangle Inc.	Columbus	Private nonprofit	328
Baptist Memorial Hospital North Mississippi, Inc	Oxford	Private nonprofit	217
Baptist Memorial Hospital-Booneville, Inc.	Booneville	Church	114
Baptist Memorial Hospital-Desoto, Inc,	Southaven	Private forprofit	161
Forrest County General Hospital	Hattiesburg	Local	537
George County Hospital	Lucedale	Local	48
Greenwood Leflore Hospital	Greenwood	Local	260
Jefferson Davis General Hospital	Prentiss	State	35
King's Daughters Medical Center	Brookhaven	Other	122
Marion General Hospital	Columbia	Local	79
Memorial Hospital at Gulfport	Gulfport	Local	445
Merit Health Natchez	Natchez	Private forprofit	179
Merit Health River Oaks	Flowood	Private forprofit	106
Mississippi Baptist Medical Center, Inc.	Jackson	Private nonprofit	639
Neshoba County General Hospital	Philadelphia	Local	82
North Mississippi Medical Center, Inc.	Tupelo	Private nonprofit	650
Noxubee General Critical Access Hospital	Macon	Local	25
Och Regional Medical Center	Starkville	Local	96
Ochsner Laird Hospital	Union	Private nonprofit	25
Pearl River County Hospital & Nursing Home	Poplarville	Local	24
South Central Regional Medical Center	Laurel	Local	285
State Of Mississippi - University of Mississippi Medical Center	Jackson	State	710
Tyler Holmes Memorial Hospital	Winona	Local	25
University Of Mississippi Center-Grenada	Grenada	State	156
Walthall General Hospital	Tylertown	Local	35

eAppendix D

This appendix describes the detailed file cleaning and processing steps.

TiC Data

We retained all prices linked with NPIs that linked with organization names containing either “HOSPITAL” or “MEDICAL CENTER”. We retained only institutional prices¹.

Hospital Price Transparency Data

We discarded “inpatient” prices and professional fees². We identified professional fees either by the setting (“Professional” or “ProFee”) in the underlying files, or if the description contained the string fragments “PR “, “PF “, “PROF “, or “PHYSICIAN “. Additionally, for each hospital, we retained the insurer corresponding most closely to Blue Cross Blue Shield of Mississippi. For each hospital, the included insurers are:

Appendix Table 3: Payers included in Hospital Pricing Data Sample

Hospital Name	Insurer Name
Anderson Regional Medical Center South Campus	BLUE CROSS OF MS, BLUE CROSS OF MS FED EMP
Baptist Memorial Hospital - Golden Triangle Inc.	BLUE CROSS MISSISSIPPI AHS [1100306001]
Baptist Memorial Hospital North Mississippi, Inc	BLUE CROSS MISSISSIPPI AHS [1100306001]
Baptist Memorial Hospital-Booneville, Inc.	BLUE CROSS MISSISSIPPI AHS [1100306001], BLUE CROSS MISSISSIPPI [1100330002], BLUE CROSS MISSISSIPPI HIGH PERFORMANCE [1100330003], BLUE CROSS MS, AR, AND ALL OUT OF STATE [1100312001], BLUE [128], B C OF MISSISSIPPI [1100302005], B C OF MISSISSIPPI [1100303001], B C OF MS AHS [1100303002], BLUECROSS BLUESHIELD [1100366001]

¹ We retained only institutional prices in the TiC data to ensure the comparability of the two data sources (hospital price transparency and TiC data). Hospital price transparency data files are only required to include institutional prices; professional fees are not required if the hospital does not employ physicians. While some hospital files do include professional fees, these fees are not consistently included in hospital pricing files. Our processing retains only institutional prices for hospital files (by discarding the “professional” fees).

² Depending on the file structure, there can be both inpatient and outpatient prices for the same CPT code. Since inpatient admissions are not reimbursed based on CPT codes and this study was restricted to examining maternity-related CPT codes, any inpatient prices that might have been included in the hospital files were not included.

Baptist Memorial Hospital-Desoto, Inc,	BLUE CROSS MISSISSIPPI AHS [1100306001], BLUE CROSS MISSISSIPPI [1100330002]
Forrest County General Hospital	Payer-Blue Cross 230 Plan-BC of MS
George County Hospital	BCBS of MS
Greenwood Leflore Hospital	BLUECROSS230
Jefferson Davis General Hospital	Payer-Blue Cross 230 Plan-BC of MS
King's Daughters Medical Center	Blue Cross of MS
Marion General Hospital	Payer-Blue Cross 230 Plan-BC of MS
Memorial Hospital at Gulfport	BLUE CROSS BC STATE, BLUE CROSS BLUE CROSS, BLUE CROSS FEDERAL
Merit Health Natchez	BCBSMS PPO - All Plans
Merit Health River Oaks	BCBSMS PPO - All Plans
Mississippi Baptist Medical Center, Inc.	BLUE CROSS MISSISSIPPI [1100330002]
Neshoba County General Hospital	BLUE_CROSS_BLUE_SHIELD-ALL_PLANS
North Mississippi Medical Center, Inc.	Blue Cross of Mississippi
Noxubee General Critical Access Hospital	BCBS, BCBS AHS
Och Regional Medical Center	BLUECROSS
Ochsner Laird Hospital	BCBSMS COMMERCIAL ALT PLAN [1144102]
Pearl River County Hospital & Nursing Home	Payer-Blue Cross 230 Plan-BC of MS
South Central Regional Medical Center	SCNT Blue Cross 230 Mississippi
State Of Mississippi - University of Mississippi Medical Center	Blue Cross of Mississippi
Tyler Holmes Memorial Hospital	BCBS_-_ALL_PLANS
University Of Mississippi Center-Grenada	Blue Cross of Mississippi
Walthall General Hospital	Payer-Blue Cross 230 Plan-BC of MS