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Trends in Inpatient Hospital Prices, 2008 to 2010

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Objectives: Our goal was to present detailed descriptive data on transaction prices paid by commercial insurers and their enrollees for inpatient hospital care.

Data and Methods: To estimate transaction prices for inpatient hospital stays (hospital cost only), we used the MarketScan data set of commercial claims and administrative records for 45 to 50 million covered enrollees under age 65 years with commercial group health insurance. Prices are defined as average allowed charges, including insurer-paid reimbursements plus patient costsharing obligations, and are shown for 350 specific admission categories and for many states and localities. Intensity adjustments to account for increased complexity or resource use in hospital stays were estimated from changes in the numbers of procedures per admission, the complexity of admission codes, and patients' risk scores.

Results: Unadjusted inpatient hospital prices per admission grew by 8.2% per year from 2008 to 2010 for the commercially insured population (under age 65 years) in the MarketScan data set. We estimate that approximately 1.3 to 1.9 percentage points of the growth in prices can be attributed to increased intensity per admission. Thus, weestimate that intensity-adjusted price increases ranged from 6.2% to 6.8% annually in the 2008-2010 period. Price levels and trends varied considerably across admission types, states, and localities.

Despite the keen interest in US healthcare costs, there is surprisingly little detailed public information available on one of its key components: transaction prices paid by commercial insurers for inpatient hospital care. To be sure, tracking hospital prices can be difficult in the US healthcare system. Private insurers customarily negotiate prices with individual hospitals and health systems. Public data sources on commercial prices may lack sufficient detail for benchmarking or specific research questions. The academic literature on commercial hospital prices tends to be qualitative in nature or related to hospital group consolidation or mergers, with little in the way of basic descriptive information on the prices themselves.[1-9]

Measures of overall US health spending, such as total national health expenditure accounts, reflect more than prices, and are thus too broad for use in price research. Spending measures are affected by prices, but they are also affected by changes in the volume of services, the numbers of persons covered, and the types of services patients receive. In a recession, the growth of health spending may decelerate because fewer people are insured and thus may not have ready access to healthcare services, regardless of trends in the prices of services or the cost of insurance coverage.

Likewise, health insurance premiums reflect more than just prices of services covered. Premium data reflect the volume and composition of health services received by policy holders, which may be affected by the demographics (such as age, sex, or health status) of the insured pool and their insurance benefits.

Several states require hospitals to report their list prices, or charges. However, hospital charges are typically much higher than the prices insurers and consumers actually pay.[10] For example, California reports aggregated hospital charges and actual reimbursements by type of payer. In 2011, total charges assessed by the 321 general acute care hospitals reporting for private commercial managed care patients were $71.3 billion. However, actual reimbursements from insurance plans and patients based on negotiated reimbursement levels were much lower: $27.1 billion.[11]

Finally, the official prices indexes for consumer and producer prices may not be sufficiently targeted or detailed for research on inpatient hospital prices. For example, the Consumer Price Index for medical care (CPI-M) is designed to measure the inflation rate for consumer out-ofpocket health costs. Therefore, the CPI-M contains prices for healthcare services that are not covered by insurance. The CPIM contains some elements for insured benefit costs, since consumers pay a share of their premiums and have out-of-pocket costs for coinsurance and deductibles. However, many of the components of the CPI-M are prices for non-covered goods and services, such as over-the-counter medications and supplies.

The Producer Price Index (PPI) for hospital and surgical services tracks hospital transaction prices from 3 categories of payers (Medicare, Medicaid, and other payers). However, the PPI includes outpatient hospital prices, and its "other payers" component includes prices for uninsured patients not using insurer-negotiated rates (or not able to pay at all). The PPI also does not provide detail by region, and the available detail by type of diagnosis does not include a breakdown by payer categories.

To get a more precise picture of transaction prices for hospital services, we used a large source of claims data for the commercially insured population under age 65

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years to develop estimates of price levels and growth rates in detail, by admission type, state, and locality. Our goals were to track price levels and changes in the most current period, and to provide detailed benchmark information for use by managed care plans and hospitals, and to facilitate further study on reasons for changes and variations in hospital prices.

DATA AND METHODS

To estimate inpatient hospital prices and changes in the intensity of inpatient hospital services, we used the MarketScan data set of commercial claims records for 2008-2010. Our price estimates were based on average allowed charges (adjudicated reimbursement amounts from insurer claims data) for acute hospitalizations, including payments made by insurers and patient obligations for copayments and deductibles. Intensity estimates were derived from detailed procedure and diagnosis codes contained in each hospital record.

Data Characteristics. The MarketScan data set includes 49 million enrollees under age 65 years with commercial group health insurance in 2008 and 2009, and about 45 million in 2010 (**Table 1**). The data set contains 2.2 million enrollees with at least 1 hospitalization in 2008 and 1.9 million such enrollees in 2010 (**Table 2**). The average age of hospitalized patients (including infants) in the data set was approximately 36 years, and the average length of hospital stay was about 4 days per admission throughout the 2008-2010 period.

Because the MarketScan data set is so large, we are able to report prices by diagnosis-related group (DRG) for more than 350 types of admissions with a large number of cases (800 or more cases per year). MarketScan used DRG version 28 as the case grouper for all years. Thus, each admission during the 3-year period was grouped into DRG categories using the same system. This allows our analysis to avoid potential issues related to the annual or periodic redefinition of DRGs.

The 2008 MarketScan data are from 147 large employers and 20 insurers (mostly regional or single-state plans). The 2010 data are from 142 employers and 17 health plans.[12] None of the employers or health insurers included in the MarketScan data set are identified. To maintain the confidentiality of the employers and health insurance plans that contribute data, MarketScan restricts the publication of information to states or localities where the data reflect a sufficient number of respondents. Despite this restriction, we are able to provide data from more than half of the states and about 100 localities.

Estimating Changes in Intensity. Changes in the nature of a service or product can complicate efforts to measure its underlying price over time. For example, if a particular type of surgery or hospital treatment is affected by changes in technology or patterns of care, the average allowed charges could reflect not only the price but also additional (or fewer) services provided or changes in the intensity of services for a given hospitalization or hospital day.

To assess possible changes in intensity that could account for some of the observed price increases, we examined average lengths of stay and the number of procedure codes associated with hospital stays. We also examined changes in the average DRG weights (the payment multiplier associated with each DRG in Medicare) as a way of assessing whether the types of hospitalizations in a particular state or region were becoming more complex. Finally, we assessed patients' risk scores, using a simplified version of the formula used by Medicare for riskadjusted reimbursement to health plans.

We adjusted for intensity change in 2 alternative ways. First, for price measures spanning all DRGs—nationally, statewide, or within a Metropolitan Statistical Area—we adjusted for changes in the distribution of DRGs using the Medicare DRG weight or payment amount. Under the Medicare system, DRGs are assigned weights meant to compensate hospitals for their relative complexity or likely resource use. For example, a transplant DRG will have a higher weight than the DRG for an uncomplicated birth, since transplant cases have longer lengths of stay and require more intensive care. We further adjusted for the number of procedures coded within each DRG level. Thus, even for a particular DRG, such as normal delivery, where adjusting for the mix of DRGs is not relevant, we adjusted for the fact that the number of procedures performed may be increasing.

We also examined the risk scores associated with patients' hospitalizations. For this method of adjustment, we used a slightly simplified version of the Medicare risk score computation used for reimbursement. The Medicare risk scores assign values to categories of major illnesses (known as hierarchical condition categories, or HCCs) and also for age and sex groupings. The scores are used for reimbursement of health plans and are based on diagnosis codes gathered from all claims (including physician and outpatient visits), not just from hospital stays. Moreover, they are based on diagnoses attached to claims, not on healthcare procedures or services provided. Nevertheless, they provide a coherent and easily duplicated measure of patient risk that can be used as a proxy for the intensity of care that hospitalized patients may receive. For example, a severely ill patient with multiple chronic health conditions and diagnoses spanning several HCC codes would have a high risk score, and would probably also be a likely candidate for more intense services in the hospital for any given DRG than a patient with a lower risk score.

Sample Weighting. For our price and intensity estimates, we used the sample weights provided by MarketScan to adjust the data set toward estimated national geographic and demographic totals for commercial insurance enrollment. The sample weights are based on information from the Medical Expenditure Panel Survey (MEPS), which is conducted by the Agency for Healthcare Research and Quality and is regarded as a source for overall benchmarks in healthcare costs and utilization.[13] Compared with the post-weighting distribution of enrollment, the unweighted MarketScan data set slightly overrepresents the population in the Southern and Central states, and underrepresents the population in the Northeast and West. Although we provide some price results without the use of these sample weights, we believe that the relatively small correction for geographic representation achieved via the weighting process produces more accurate estimates of hospital price growth and levels. For example, we observe that hospital price levels are lower in the South and North Central states (which are slightly overrepresented in MarketScan) than in the Western and Northeastern states. However, prices are growing more rapidly in the South and Central states than in the West and Northeast. Thus, using the sample weights raises our estimates of the nationwide hospital price levels but lowers estimated growth in prices during this period.

RESULTS

We estimate that unadjusted hospital prices per admission rose from $13,016 in 2008 to $15,236 in 2010, an average annual growth rate of 8.2% (**Table 3**). Using the growth of both DRG weights and the number of procedures yields an intensity adjustment estimate of 1.3% annually during this period. Alternatively, estimating intensity as the growth of patient risk scores during the period implies an intensity measure of 1.9% on an annual basis. Thus, we estimate that intensityadjusted prices increased by 6.2% to 6.8% per year during the 2008-2010 period, based on factoring out 1.3% to 1.9% of the unadjusted 8.2% increase. For 2009-2010, we estimate that intensity-adjusted prices rose by 4.9% to 5.5%, based on an unadjusted price increase of 6.5% and estimated intensity adjustments of 0.9% (risk score method) to 1.6% (DRG weights and number of procedures method).

These estimates used MarketScan sample weights to correct for geographic differences between the MarketScan sample and national totals. By contrast, the average price per admission on the unweighted MarketScan data was $12,747 in 2008 and $15,111 in 2010, a growth rate over the 2-year period of 8.9%. Thus, the application of the sample weights slightly raises the average national price level and lowers its rate of growth compared with using unweighted data. Our analysis indicates that the main impact of using the sample weights is to correct for differences in the geographic distribution of enrollment between the unweighted MarketScan data set and national totals. This is because there are substantial differences in the levels and rates of growth of hospital prices by region. However, other differences between the unweighted MarketScan data and national totals produced only negligible changes in the price estimates. For example, the average age of the MarketScan data set's population is slightly younger than the national average age of people with private commercial insurance coverage in the MEPS data set. However, these slight age differences did not seem to noticeably affect the price estimates.

Table 4 lists prices for the 20 highest volume admission categories in the MarketScan data. Since the mix of DRGs is not relevant for within-DRG price changes, we provided an intensity adjustment for these data based on changes in the numbers of procedures only. The highest volume DRG was for vaginal delivery without complicating diagnoses (version 28 DRG 775). Prices per admission in this category rose from $4806 in 2008 to $5543 in 2010, an unadjusted price increase of 7.4% per year. The number of procedures per admission grew by 1.9% per year during this period. Therefore, our estimate of the intensity-adjusted price increase of admissions for uncomplicated vaginal delivery is 5.4% per year in 2008-2010.

Among the highest volume DRGs, the admission category with the most rapid intensity-adjusted price increase during the 2008-2010 period was spinal fusion (except cervical) without major complications or comorbidities (version 28 DRG 460). The price for this type of admission rose from $33,240 in 2008 to $44,126 in 2010, an unadjusted annual price increase of 15.2%. After adjusting for intensity growth via the number of procedures per admission, we estimate that price increases averaged 14.9% for this category of admissions in 2008-2010.

Using the US Census definitions of Metropolitan Statistical Areas, we were able to show the estimates of price changes for rural areas and many of the largest metropolitan areas (Table 5). Average prices per admission in rural areas rose from $12,541 in 2008 to $14,811 in 2010, an unadjusted price increase of 8.7%. After adjusting for intensity, price increases in these areas ranged from 5.8% per year (using risk scores) to 6.8% per year (using DRG weights and number of procedures). Thus, price increases in rural areas were fairly close to the national average.

However, some metropolitan areas showed much higheror lower-than-average price increases, even within the same state. For example, we estimate that intensity-adjusted prices in the Houston, Texas, metro area grew by only 0.8% to 2.8% annually, while intensity-adjusted prices grew by 6.3% to 6.8% in the Dallas, Texas, area and 8.3% to 8.5% in the San Antonio, Texas, metropolitan area.

The Appendix Tables 1-8 contain detailed price estimates by DRG, state, and Metropolitan Statistical Area, including the background information used to compute intensity adjustments.

DISCUSSION

We estimate that unadjusted prices for inpatient hospital care rose by 8.2% per year during the 2008-2010 period in a large sample of 45 to 49 million enrollees under age 65 years with commercial health insurance. Based on changes in patients' risk scores and changes in the mix of admissions and the numbers of procedures performed, we estimate that approximately 1.3 to 1.9 percentage points of the unadjusted 8.2% growth in prices could be attributed to increased intensity per admission. Thus, we estimate that intensity-adjusted price increases ranged from 6.2% to 6.8% annually in the 2008-2010 period.

The MarketScan data are broadly consistent with 2 other emerging sources of data on inpatient hospital prices: the Health Care Cost Institute (HCCI), which reports aggregated hospital prices based on data collected from 3 large health insurance plans,[14] and the states of California and Oregon, which make available some basic information on transaction prices for commercial payers.[15] Using the MarketScan data, we estimate that unadjusted hospital prices grew by 6.5% in 2009-2010; in the HCCI data set, unadjusted inpatient hospital prices grew by about 7.4%. However, HCCI's estimated intensity adjustment (3.3%) in 2010 was larger than our adjustment (0.9% to 1.6%) in that year. Thus, HCCI's estimate of intensity-adjusted hospital prices (4.0%) is somewhat lower than our estimate of 4.9% to 5.5%. Our estimate of the average price for inpatient hospitalizations in California in 2009 ($20,592) is roughly equivalent to the average from California's Office of State Health Planning and Development ($20,800), and our estimate of the growth of prices in Oregon in 2009 (9.6%) is consistent with the double-digit growth rates implied by data provided by Office for Oregon Health Policy and Research in the 2005-2009 period.

There are several important limitations with our data and approach. First, before weighting, the MarketScan data set represents about 30% of the non-elderly US population with private health coverage. However, despite the sample's large size and the sample weighting used, there is no guarantee that the MarketScan data are representative of the entire commercially insured US population. The sample weights help adjust for demographic and regional differences between the MarketScan data and the national totals, but there may be other factors unique to the MarketScan data that are not corrected by weighting. Therefore, we would not assert that even the weighted data are necessarily representative. However, we do believe that the weighting provides a helpful improvement in the accuracy of our estimates.

A second question is whether the intensity adjustments are sufficient or overdone. By combining DRG weights and procedures, we may be overestimating intensity growth, since the extra procedures may have been associated with the move toward more complex DRG codes. However, using risk scores as a proxy for intensity produces results similar to using the DRG severity weights in combination with procedure counts.

There may be other ways of thinking about intensity that we cannot measure. For example, if more patients stayed in individual hospital rooms, as opposed to double rooms, would that qualify as an intensity gain? It would not show up under the number of procedures or in the severity of DRG codes, but one could argue that the additional cost of single rooms represents a service enhancement rather than a price increase. Likewise, a higher nurse-to-bed ratio might enhance safety and service, but unless the additional staffing were reflected in DRG severity, procedures performed, or patients' risk scores, our method would not capture the additional services.

Finally, prices for individual DRGs, states, and localities may be affected by specific clinical, social, regulatory, or economic factors that could explain some price levels and changes. Likewise, it is possible that temporal changes in the composition of MarketScan enrollment itself could affect price trends in some localities. We did not publish information for states or localities where the MarketScan enrollment changed substantially between 2008 and 2010. However, for the states and localities we do show, we did not undertake a systematic study of the underlying enrollment composition. Therefore, some local price changes could result from an enrollment effect not captured in our study of risk scores, procedures, and DRG distributions.

On balance, we believe our results support the general proposition that US hospital prices rose rapidly in the 2008-2010 period. A key advantage of the MarketScan data is that price changes and levels can be disaggregated by admission type and by many states and localities. We believe the MarketScan data set is large enough to provide helpful benchmarks across these dimensions. We hope that the specific price information we present in the appendices will help facilitate future research on why prices are increasing and why price levels and price growth rates may differ across admission types and geographic locations.

Take-Away Points ⬆

Prices for inpatient hospital care in the United States rose sharply in the 2008-2010 period.

Even after adjustment for growth in intensity—more numerous or complex procedures performed per admission—prices rose rapidly for most types of hospitalizations.

We observed a wide variation in price levels and growth rates across states and localities; the detailed benchmarks we present can help facilitate additional research on why prices vary.

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