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Increases In Consumer Cost Sharing Redirect Patient Volumes And Reduce Hospital Prices For Orthopedic Surgery

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ABSTRACT Some employers are implementing reference-pricing benefit designs, which establish limits on the amount they will pay for some procedures covered by employer-sponsored insurance. Employees are required to pay the difference between the employer's contribution limit and the actual price received by the hospital. These initiatives encourage patients to select low-price facilities and indirectly encourage facilities to reduce prices to increase patient volume. We evaluated the impact of reference pricing on the use of and prices paid for knee and hip replacement surgery by members of the California Public Employees' Retirement System (CalPERS) from 2008 to 2012, using enrollees in Anthem Blue Cross as a comparison group. In the first year after implementation, surgical volumes for CalPERS members increased by 21.2 percent at low-price facilities and decreased by 34.3 percent at high-price facilities. Prices charged to CalPERS members declined by 5.6 percent at low-price facilities and by 34.3 percent at high-price facilities. Our analysis indicates that in 2011 reference pricing accounted for \$2.8 million in savings for CalPERS and \$0.3 million in lower cost sharing for CalPERS members.

Employers have responded to the continued escalation in health care expenditures by increasing deductibles, copayments, and other forms of cost sharing for employees. In 2012, 31 percent of firms that offered health benefits used a high-deductible health insurance design, and 51 percent of employees with single coverage had an annual deductible of at least \$2,000.¹

Deductibles may reduce the use of preventive and primary care services while having only limited effects on the use of hospitals, because expenditures for high-cost services typically fall above the deductible limit. Yet hospitals account for 31 percent of health care expenditures and exhibit wide variance in the prices they charge.^{2,3} Some large employers have begun to implement

insurance benefit designs that explicitly target hospital services, both to counteract perceived increases in hospital market power and to forestall the need to increase cost sharing for primary care services.⁴

Employers can limit the coverage of their insurance programs to a subset of the facilities in each geographic market, in the hope of obtaining lower prices from included facilities. Alternatively, employers can allow employees to use any hospital but establish a limit on what the employer will pay. This latter strategy, known as *reference pricing*, offers a broader range of choices to employees but requires them to bear more financial responsibility for their choices.⁴

The employer focus on benefit design and consumer cost sharing contrasts with the focus on

provider contracting in traditional price negotiations, as these strategies have been countered by consolidation and market power on the part of providers. Once hospitals in a local market have merged, they can refuse to contract with a health insurer except as a group and thus can successfully demand higher prices for their services.

In reference pricing, the focus is on the prices negotiated between hospitals and insurers, sometimes referred to as the *allowed charge*, instead of the higher list price nominally charged by the hospital, sometimes referred to as the *billed charge*. Employees must pay the full difference between the employer's payment limit and the hospital's allowed charge, not the difference between the payment limit and the higher billed charge.

Most of the consumer's out-of-pocket cost sharing is limited by an annual maximum. However, payments to hospitals for services subject to reference pricing above the employer's contribution are not limited. The consumer therefore is potentially exposed to very high cost sharing if he or she does not select a provider whose charge will be covered by the employer. The employer sets the contribution level high enough to cover the prices charged by a sufficient number of hospitals in each geographic region. The employer decides how many hospitals in each region it wishes to include, balancing the employees' preferences for larger numbers of hospitals and the price reductions it can expect if it uses smaller numbers.

It is expected that consumers will prefer to obtain care at one of the hospitals designated by their employer as exempt from reference-price cost sharing. However, the magnitude of the consumer response to these financial incentives has not been evaluated.

The impact of the new benefit designs on pricing strategies by hospitals is even less clear. Facilities whose prices fall below the employer's maximum payment may respond by increasing their prices. This would not make them less appealing to consumers, because employers typically do not share with employees the savings from selecting hospitals whose prices fall below the limit. However, facilities may reduce their prices if they believe that the employer is likely to reduce its payment contribution further in future years or share savings with employees who choose low-price hospitals.

Hospitals whose prices exceed the employer's maximum payment may reduce their prices in order to be designated a high-value facility and retain patient volume. Alternatively, high-price facilities may not change their prices on the assumptions that price reductions would not be offset by volume gains and that some patients

would continue to use their services and pay the extra cost sharing. Hospitals' pricing responses may depend on whether the employers using reference pricing serve as bellwethers for other employers.

This article evaluates the impact of reference pricing on the use and price of orthopedic surgery, using detailed claims data from the California Public Employees' Retirement System (CalPERS) and Anthem Blue Cross of California.

In January 2011 CalPERS implemented reference pricing for knee and hip replacement surgery in response to a fivefold variation in prices, with no measurable difference in quality, that it was being charged by California hospitals. It identified forty-one hospitals as value-based purchasing design (VBPD) facilities based on the following criteria: Procedure prices were less than \$30,000, quality was acceptable, and collectively the hospitals provided sufficient geographic dispersion. A hospital's quality was ascertained with the help of Anthem. Quality measurements included whether the facility had been accredited by a recognized quality accrediting entity, whether it performed a sufficient number of joint replacement surgeries annually (because surgical volume is associated with positive outcomes), and its scores on the surgical prevention indicators reported by hospitals to the Joint Commission,⁵ as well as its participation in the California hospital quality reporting system and its results reported by that system.⁶

The \$30,000 payment limit applied only to the hospital's allowed charges, not to the fees charged by the surgeons and other physicians involved in the patient's care. There was very little variation across the Anthem physician network in surgeons' and anesthesiologists' fees, so CalPERS did not consider it important to create incentives to reduce physicians' prices.

Employees were educated about the VBPD program in part through a brochure that explained the program, included a list of VBPD facilities, and provided a phone number and website through which more information could be obtained.⁷ Employees selecting a VBPD hospital were subject to the usual CalPERS 20 percent coinsurance, up to an annual maximum of \$3,000. Those selecting a non-VBPD facility were subject to the \$3,000 cost sharing plus the difference between the CalPERS contribution and the allowed charge of the hospital. For example, a patient using a non-VBPD hospital with an allowed charge of \$40,000 would be required to pay \$13,000 in cost sharing (\$3,000 for the annual maximum plus \$10,000 for the difference between \$30,000 and \$40,000).

We compared changes in joint replacement

volumes and prices across VBPD and non-VBPD facilities between 2008 and 2012. To control for other factors influencing hospital referral volumes and prices during this period, we compared the CalPERS changes with comparable changes using data from non-CalPERS patients enrolled in Anthem Blue Cross, the largest health insurer in California. These Anthem patients were not subject to reference pricing. Additional insights into the dynamics of benefit design and hospital pricing were obtained from interviews with staff at CalPERS and Anthem.

Study Data And Methods

CalPERS covers 1.3 million current and retired employees—and their dependents—of the State of California and other public-sector entities in the state, such as schools and municipalities. We obtained comprehensive professional and hospital claims from CalPERS for all employees, dependents, and retirees who chose the system's preferred provider organization (PPO) product between 2008 and 2012. We excluded retirees who were eligible for Medicare, because we did not have access to Medicare claims data. We also excluded CalPERS members who selected a health maintenance organization (HMO) product, because their benefits differed from the PPO and did not include reference pricing. In addition, we excluded people who received a bilateral joint replacement, combination knee and hip replacement, or revision surgery and those whose procedures were performed outside of California, because they were not subject to reference pricing.

Patients were categorized according to whether they selected a VBPD or non-VBPD hospital, based on the list of facilities provided by CalPERS. Hospital prices were measured for each patient in terms of the actual payment negotiated by Anthem and CalPERS with the hospital (the allowed charge) rather than in terms of the hospital's list price (the billed charge). The allowed charge includes both the payment made by CalPERS and the cost-sharing payment made by the patient. We obtained data on each patient's age, sex, and comorbidities and the geographic location of the hospital used. Location was measured in terms of the Hospital Referral Region of the hospital where the patient received surgery.⁸ Comorbidities were measured using the Charlson Comorbidity Index.⁹

To ensure that changes in hospital volumes and prices for CalPERS members did not result from factors unrelated to reference pricing, we obtained comparable claims data on non-CalPERS patients undergoing joint replacement in California hospitals. These data were provided

by Anthem Blue Cross and included all enrollees in its insured PPO products. Anthem enrollees in HMO, Medicare, and Medicaid products were excluded.

We measured the number and price of joint replacement surgeries for CalPERS members in each year for VBPD and non-VBPD hospitals separately. Procedures performed from January 2008 through December 2010 were not subject to reference pricing; those performed beginning in January 2011 were covered by the new benefit design. We present data for all years but focus on the changes in volumes and prices between 2010 and 2011. We present data for 2008 and 2009 to ensure that 2010 was not an unusual outlier year, and for 2012 to ascertain whether the first-year changes were sustained. For 2012 we have data for only those procedures that occurred through September 30.

We used multivariate statistical methods to adjust the observed change in prices for CalPERS members by the observed change for non-CalPERS Anthem members. We combined knee and hip replacement patients, because separate analyses did not identify any relevant differences in prices or in the association between price and VBPD designation. Covariates in the multivariate analyses included age, sex, comorbidities, and Hospital Referral Region.

For prices we estimated a difference-in-differences generalized linear model with a log link and a gamma distribution, and with standard errors adjusted for patient clustering within hospitals. For the use of VBPD facilities, we estimated a linear probability model with similarly adjusted standard errors. Full statistical details are presented in the online Appendix.¹⁰

Study Results

IMPACTS ON PATIENT CHOICE OF HOSPITAL The overall number of joint replacement surgeries for CalPERS members rose slightly from 2008 to 2011 (Exhibit 1). The number of people who chose low-price hospitals designated by CalPERS as VBPD facilities increased by 21.2 percent in the year after the implementation of reference pricing, while the number who chose high-price facilities that did not have the VBPD designation declined by 34.3 percent.

The distribution of joint replacement procedures between VBPD and non-VBPD facilities shifted markedly over time (Exhibit 2). In 2010, prior to the implementation of reference pricing, 52 percent of CalPERS procedures were in high-price, non-VBPD facilities. In contrast, only 37 percent occurred in those facilities in 2011. Conversely, the percentage of CalPERS procedures in low-price, VBPD facilities increased

from 48 percent in 2010 to 63 percent in 2011.

Changes in hospital market share were not observed for Anthem enrollees who were not subject to reference pricing. The relative use of VBPD and non-VBPD hospitals by Anthem patients who had joint replacement procedures remained almost unchanged between 2008 and 2012.

The procedure volume data presented in Exhibits 1 and 2 do not reflect differences in patient characteristics between the CalPERS and Anthem populations or the changes in those characteristics over time that might influence patients' choice of hospitals. We thus conducted multivariate statistical analyses that did account for these factors. Taking into consideration the changes observed in the Anthem data, and after adjusting for patient demographic characteristics, comorbidities, and geographic location, we estimated that reference pricing itself caused a 28.5 percent increase in volume for VBPD facilities among CalPERS enrollees in 2011 (see the online Appendix).¹⁰

IMPACTS ON HOSPITAL PRICES For CalPERS members, the average price paid for joint replacement surgery in 2008 was \$35,461 in non-VBPD facilities and \$22,640 in VBPD facilities—a difference of 57 percent (Exhibit 3; also see the online Appendix).¹⁰ For non-CalPERS members covered by Anthem Blue Cross, non-VBPD hospitals' average price was \$31,724, compared to \$20,102 for VBPD facilities—a 58 percent difference. The large differences in prices between the two sets of hospitals mask fivefold differences in prices across individual facilities. All prices include amounts paid by the insurer and by the patient.

Prior to the implementation of reference pricing in 2011, there was an upward trend in prices charged to CalPERS across all hospitals, rising from \$28,636 per case in 2008 to \$34,742 in 2010 (Exhibit 3; also see the online Appendix).¹⁰ In 2011, however, the average price fell to \$25,611—a decline of 26.3 percent. This price reduction was mostly attributable to changes in prices at non-VBPD facilities. After the implementation of reference pricing, the average price charged by VBPD hospitals decreased by 5.6 percent in 2011 and rose slightly in 2012. However, the average price charged by non-VBPD facilities as a group declined dramatically, from \$43,308 in 2010 to \$28,465 in 2011 (a 34.3 percent decrease) and to \$27,149 in 2012.

There was substantial variability across individual hospitals in their pricing strategies after the implementation of reference pricing. Almost half of the hospitals not designated as VBPD by CalPERS, and hence subject to reference pricing, continued to increase prices in 2011, while half

EXHIBIT 1

Volume Of Knee And Hip Replacement Surgery In High-Price And Low-Price California Hospitals, 2008–12

	2008	2009	2010	2011	2012 ^a
CalPERS members					
All patients	402	428	485	447	278
Patients choosing VBPD (low-price) hospitals	214	214	231	280	178
Patients choosing non-VBPD (high-price) hospitals	188	214	254	167	100
Anthem members (non-CalPERS)					
All patients	1,824	1,685	1,786	1,801	1,108
Patients choosing VBPD (low-price) hospitals	1,009	934	984	919	596
Patients choosing non-VBPD (high-price) hospitals	815	751	802	882	512

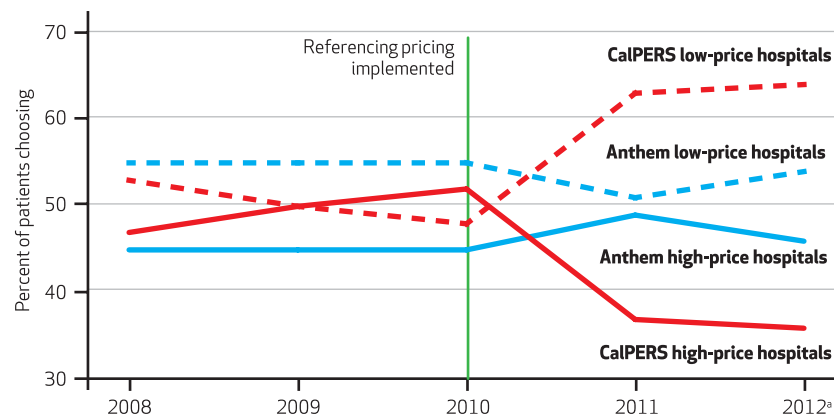
SOURCE Authors' analysis of data from California Public Employees' Retirement System (CalPERS) and Anthem Blue Cross of California. **NOTES** VBPD is value-based purchasing design, a designation created by CalPERS for hospitals charging low prices and meeting specified geographic accessibility and quality standards. CalPERS implemented a new benefit design with this designation in January 2011, imposing reference pricing (see the text for more details). ^aJanuary–September 2012.

reduced their prices. However, the average price reduction was more than twice as large for the facilities that reduced prices (\$11,048 per patient) as the average price increase for those that increased prices (\$4,097). The aggregate effect across hospitals, therefore, was to significantly decrease prices charged to CalPERS enrollees. Combined with the reductions in patient volumes at non-VBPD hospitals, this change implies that CalPERS realized substantial overall savings.

Factors unrelated to reference pricing may

EXHIBIT 2

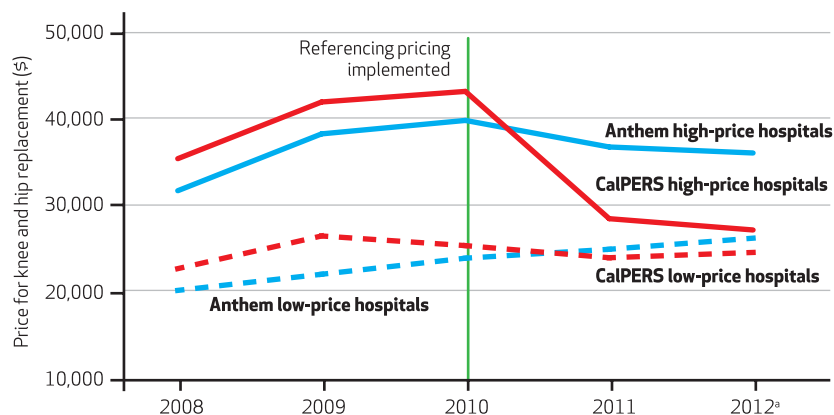
Patients Choosing High-Price Or Low-Price California Hospitals For Knee Or Hip Replacement Surgery, 2008–12



SOURCE Authors' analysis of data from California Public Employees' Retirement System (CalPERS) and Anthem Blue Cross of California. **NOTES** VBPD is value-based purchasing design, a designation created by CalPERS for hospitals charging low prices and meeting specified geographic accessibility and quality standards. VBPD facilities are low-price hospitals. Non-VBPD facilities are high-price hospitals. ^aJanuary through September 2012.

EXHIBIT 3

Prices Paid For Knee And Hip Replacement Surgery In High-Price And Low-Price California Hospitals, 2008–12



SOURCE Authors' analysis of data from California Public Employees' Retirement System (CalPERS) and Anthem Blue Cross of California. **NOTES** VBPD is value-based purchasing design, a designation created by CalPERS for hospitals charging low prices and meeting specified geographic accessibility and quality standards. VBPD facilities are low-price hospitals. Non-VBPD facilities are high-price hospitals. *January through September 2012.

partly explain the observed decline in prices charged to CalPERS members at non-VBPD hospitals. This possibility is suggested by the observed modest decline in prices charged to non-CalPERS enrollees in Anthem Blue Cross (Exhibit 3; also see the online Appendix).¹⁰ Between 2010 and 2011 prices charged across all hospitals to Anthem patients declined from \$31,072 to \$30,739 (1 percent). This represented the net impact of an increase in prices at VBPD facilities (4.4 percent) and a decrease in prices at non-VBPD facilities (7.8 percent).

Prices were much higher at non-VBPD hospitals than at VBPD hospitals for both CalPERS and Anthem enrollees between 2008 and 2012 (Exhibit 3; also see the online Appendix).¹⁰ Before 2011 prices charged to CalPERS members were substantially above those charged to Anthem members who were not in CalPERS, but CalPERS members' prices were lower than those of Anthem members in 2011 and 2012 because of the sharp decreases associated with reference pricing.

To estimate the impact of reference pricing alone between 2010 and 2011, we subtracted the percentage change for Anthem members (1 percent) from the change for CalPERS members (26.3 percent). Thus, our preliminary estimate—with differences in patient characteristics between the CalPERS and Anthem populations not controlled for—was that reference pricing led to a reduction in average prices of 25.3 percent between 2010 and 2011. Our final estimate, using multivariate statistical methods to take into account changes in the demographic and

severity mix of patients, is that reference pricing was responsible for a 20.2 percent (\$7,028 per case) decrease in hospital prices on average in 2011. These changes were sustained in the second year after implementation and were significant.¹⁰

The total savings in 2011 attributable to reference pricing were \$3.1 million (\$7,028 per patient multiplied by 447 patients). Of this amount, \$2.8 million accrued to CalPERS from lower payments to hospitals, and \$0.3 million accrued to CalPERS enrollees from lower out-of-pocket cost sharing.

Hospital Pricing Strategies

Hospitals are under pressure to offset with increased revenues both increased costs and the need to provide charity care to indigent patients. The primary means of obtaining additional revenues is by increasing prices to private insurers and self-insured employers, since Medicare pays hospitals a rate that is administratively determined and is not negotiable.

Private insurers traditionally have countered these price increases by seeking to contract selectively with only a subset of hospitals in each market, demanding that facilities give price concessions to be included in the insurer's provider network. In turn, hospitals have recently responded by merging with nearby facilities and insisting that insurers contract with all or none of the newly merged facilities. Insurers typically are unable to market their product to employers if they do not include a substantial number of hospitals in each market. As a result, they are obliged to accede to the hospital systems' demands for higher prices.

The declining effectiveness of hospital contracting as a means of achieving price reductions has increased employers' interest in strategies that rely on consumer cost sharing, since these changes do not need to be negotiated with hospitals. Reference pricing is an attractive strategy for employers, because it places pressure on hospitals to moderate price increases while allowing employees to choose high-price facilities if they are willing to pay the extra cost. CalPERS and other employers see reference pricing, which targets high-cost hospital services, as preferable to deductibles, which are aimed at low-cost preventive and primary care services.

Conclusion

This article shows that reference pricing does change consumers' choices and thereby the market shares of low-price and high-price hospitals. The influence on hospital pricing is greater than

the influence on patient volumes. Many hospitals with prices below the CalPERS payment limit continued to increase their rates, albeit only slightly. But many facilities that charged prices above the CalPERS payment limit in the years before reference pricing, and that therefore faced a potential loss of patient volume, did reduce their rates significantly. The difference in prices charged by VBP and non-VBP hospitals thus narrowed markedly in the two years after the implementation of reference pricing.

This study was limited by the span of the available data, covering three years before and two years after the implementation of reference pricing. It is possible that hospital prices for orthopedic surgery will resume their upward trajectory. Moreover, the study was not able to measure whether the observed reductions in prices for knee and hip replacements were offset by price increases for other services. Interviews with CalPERS and Anthem staff indicated that offsetting price increases for other services have

not been observed to date.

Future trends may diverge from present practices, especially as the economy emerges from the recession and hospitals continue to consolidate into ever-stronger local systems. However, interviews with hospital executives indicated that many facilities are focusing on reducing costs instead of on increasing prices. Hospitals fear continued decreases in the market shares of high-paying employers, such as CalPERS, and increases in the market shares of low-paying insurance plans offered through Medicaid programs and the new state health insurance exchanges.

It is possible that reference pricing created a tipping point in hospitals' pricing strategies and that the observed reductions in prices for Anthem patients were influenced by the reductions obtained by the bellwether CalPERS program. Reference pricing may be both a catalyst and an indicator of deeper changes in hospital pricing strategies. ■

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NOTES

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- 10 To access the Appendix, click on the Appendix link in the box to the right of the article online.