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LESS IS MORE

Association of Reference Payment for Colonoscopy With Consumer Choices, Insurer Spending, and Procedural Complications

ONLINE FIRST

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ABSTRACT

Importance Regulatory limits on consumer cost sharing permit wide variation in the prices charged for screening and diagnostic tests such as colonoscopy. Employers are experimenting with reference payment initiatives that offer full insurance coverage at low-priced facilities but require substantial cost sharing if patients select high-priced alternatives.

Objective To ascertain the effect of reference payment on facility choice, insurer spending, consumer cost sharing, and procedural complications for colonoscopy.

Design, Setting, and Participants The California Public Employees' Retirement System (CalPERS) implemented reference payment in January 2012. We obtained data on 21 644 CalPERS enrollees who underwent colonoscopy in the 3 years prior to implementation and on 13 551 patients in the 2 years after implementation. Control group data were obtained on 258 616 Anthem Blue Cross enrollees who underwent colonoscopy and who were not subject to reference payment initiatives during this 5-year period.

Main Outcomes and Measures Consumer choice of facility, price paid per procedure, total insurer spending, consumer cost sharing, and procedural complications.

Exposures Choices, prices, and complications were compared for CalPERS and Anthem patients before and after implementation of reference payments, using difference-in-difference multivariable regressions to adjust for patient demographic characteristics and comorbidities, procedure indications, and geographic location.

Results Utilization of low-priced facilities for CalPERS members increased from 68.6% in 2009 to 90.5% in 2013. After adjusting for patient demographic characteristics, comorbidities, and other factors, the implementation of reference payment increased use of low-priced facilities by 17.6 percentage points (95% CI, 11.8 to 23.4; $P < .001$). The mean price paid for colonoscopy for the CalPERS population increased from $1587 (95% CI, $1555-$1618) in 2009 to $1716 (95% CI, $1678-$1753) in 2011 and then decreased to $1508 (95% CI, $1469-$1548) in 2013 for patients subject to reference payment. After adjustment for other

relevant factors, reference payment was responsible for a 21.0% (95% CI, −26.0% to −15.6%, $P < .001$) reduction in the price. Reference payment was associated with a small but statistically insignificant decline in procedural complications, from 2.1% in 2009 to 2.0% in 2013 ($P = .47$). In the first 2 years after implementation, CalPERS saved $7.0 million (28%) on spending for the procedure.

Conclusions and Relevance Implementation of reference payment for colonoscopy was associated with reduced spending and no change in complications.

INTRODUCTION

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Cost sharing at the time of receipt of care has been shown to reduce consumer adherence to a wide range of clinical services, including screening tests for cancer.[1-4] The Affordable Care Act contains a list of preventive services that employers and insurers must provide without co-payments, deductibles, or other forms of cost sharing.[5] An unintended consequence of limits on cost sharing, however, is reduced incentive for hospitals and other facilities to restrain their prices.

Employers, insurers, and consumers face varying prices for the same procedures within the same local communities, including screening tests such as colonoscopy.[6-9] Prices charged to private insurers can be especially high for procedures provided in hospital-based outpatient departments (HOPDs) even when also available in freestanding ambulatory surgery centers (ASCs).[10] Medicare also pays substantially more for ambulatory procedures if they occur in an HOPD than if they occur in a freestanding ASC.[11,12]

Some employers now are experimenting with payment methods that seek to counter high health care prices while upholding consumer access to valuable services. They are establishing reference payments in their insurance benefits, providing full coverage up to a defined contribution limit while requiring the patient to pay the difference between this limit and the price actually charged if a high-priced facility is chosen.[13-15] Reference payment may be interpreted as a softer consumer-directed incentive than "narrow network" contracting. It offers partial coverage when a consumer selects a high-priced health care facility, whereas narrow network insurance designs offer no coverage in those contexts. Reference payment often is referred to as reference pricing or reference-based benefits.[16]

The reference payment limit is established at a level adequate to offer full coverage for the services provided at many facilities in the community. Patients who need to use a high-priced facility, due to exceptional clinical circumstances or to residence in an area without access to low-priced facilities, are exempted from the extra cost sharing. This study assesses the impact of reference payment on patient choice between high-priced and low-priced facilities for colonoscopy, plus the subsequent impacts on employer spending, consumer cost sharing, and procedural complications.

METHODS

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Data on Patients

Comprehensive insurance claims data were obtained for patients undergoing colonoscopy who were enrolled in the self-insured health benefits plan maintained by the California Public Employees' Retirement System (CalPERS) between January 2009 and December 2013. The California Public Employees' Retirement System provides health insurance coverage for employees of the state of California and other public employers such as schools and municipalities. It covers 1.3 million individuals, of whom 450 000 are enrolled in its self-insured preferred provider organization (PPO) product.

In January 2012, the CalPERS PPO insurance product shifted to reference payment for colonoscopy and several other ambulatory procedures, building on its program for inpatient knee and hip replacement surgery.[17-19] The reference payment program was designed in response to the variation in procedure prices between HOPDs and nonhospital ASCs.

Under its reference payment initiative, CalPERS paid the facility's negotiated price (allowed charge), without consumer cost sharing, if the patient selected an ASC. However, it limited its payment contribution to $1500 for patients selecting an HOPD. The reference payment initiative focused on type of facility (ASC vs HOPD) rather than on the specific price at each ASC and HOPD in order to reduce the complexity of the program for the patient.

Patients were exempted from the initiative if their physician presented a clinical case for needing services in an HOPD or if the patient lived more than 30 miles from an ASC. For patients exempted from the initiative, CalPERS paid the HOPD allowed charge. The California Public Employees' Retirement System exempted colonoscopies performed for preventive screening purposes from the normal deductible and coinsurance provisions of its PPO plan. Colonoscopies performed for diagnostic purposes, however, were subject to the usual deductible and coinsurance requirements.

A control group was obtained for this study consisting of all enrollees covered by Anthem Blue Cross who underwent colonoscopy during these 5 years in California but who were not subject to reference payment initiatives. The study was approved by the institutional review board at the University of California, Berkeley. Informed consent was waived due to the retrospective nature of the study.

Characteristics of Procedures

Measured characteristics of the patients included age, sex, and the diagnostic and procedure codes from claims incurred for all purposes by the patients who underwent colonoscopy. The diagnostic and procedure codes were used to develop a measure of patient health status and comorbidities using the Charlson comorbidity index.[20] The study population was limited to individuals younger than 65 years. All inpatient, outpatient, emergency department, and ambulatory service claims were included in the analysis.

Colonoscopy procedures were identified using *Current Procedural Terminology* (*CPT*) codes 44388 through 44394 and 45378 through 45385 and using *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) codes 45.22, 45.23, 45.25, 45.41, and 45.42. We differentiated colonoscopy into diagnostic procedures performed on patients with symptoms or conditions that would prompt physician referral, and screening procedures scheduled under routine circumstances. We also distinguished procedures performed solely for diagnostic or screening purposes from those accompanied by a therapeutic intervention.

Colonoscopies performed for diagnostic purposes were identified using *ICD-9-CM* codes for gastrointestinal symptoms and diseases reported within 6 months prior to colonoscopy. These codes included *Clostridium difficile* colitis (8.45), ulcerative colitis (556), Crohn disease (555), ischemic colitis (557), colitis not otherwise specified (558), anorectal bleeding (569.3), melena (578.1), gastrointestinal bleeding (286.5, 459.0, 562.02, 562.03, 562.12, 562.13, 562.3, 569.84-569.86, 678.9, 792.1, and 998.1), abdominal pain (789.00-789.09), abdominal swelling (789.09-789.30), abdominal tenderness (789.60-780.69), abdominal bloating (787.3), megacolon (564.7), change in bowel habits (564.0, 787.99, 787.91), diverticulitis or diverticular hemorrhage (562.11-562.13), volvulus (560.2), and a history of colorectal cancer (153-154.8, 239.0, 230.3-230.6). To identify elective diagnostic procedures performed to evaluate an abnormal test result, we used *ICD-9-CM* codes for iron deficiency anemia (280.0-280.9, 285.9) and abnormal stool contents (792.1). This is similar to algorithms used in prior published analyses.[21]

A small proportion of procedure claims (3.9% of total) did not fit our inclusion criteria as either a screening or diagnostic colonoscopy and were excluded from the study. Some procedures that we classified as screening colonoscopies were found to involve cost sharing by individual patients. This presumably is due to unidentified differences between our coding criteria and the criteria used by CalPERS in adjudicating these claims. These procedures may have been performed for diagnostic rather than screening reasons (and hence have been subject to cost sharing). These anomalies affected 1726 (9% of the 19 064 total) CalPERS screening colonoscopies.

Procedures involving a therapeutic intervention were identified as colonoscopy accompanied by removal of foreign body (*CPT* 45379), biopsy (45380), directed submucosal injection (45381), control of bleeding (45382), ablation of tumor (45383), removal of tumor (45384-45385), dilation by balloon for strictures (45386), stent placement (45387), or fine-needle aspiration (45392).

Measures of Outcomes

The study used 4 categories of outcome measures: facility choice, prices and payments, consumer cost sharing, and procedural complications. For each patient, we measured whether an ASC or an HOPD was selected and, if an HOPD was selected, whether the patient was exempted from reference payment cost sharing because of clinical or geographic considerations. Prices paid to ASCs and HOPDs were measured in terms of the allowed charges for the procedure. Consumer cost sharing was measured in terms of the deductibles and co-payments paid as part of the procedure. For patients who were not exempted from reference payment but nevertheless selected an HOPD, we also measured the difference between the HOPD allowed charge and the CalPERS reference payment limit ($1500) as an additional component of consumer cost sharing.

Patient outcomes were assessed in terms of complications within 30 days after the procedure date. Complications were grouped into 4 categories as (1) serious gastrointestinal, (2) other gastrointestinal, (3) cardiovascular, and (4) any complication. Serious gastrointestinal complications include perforation (*ICD-*

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9-CM codes 569.83, 998.2), lower gastrointestinal bleeding (558.9, 578.1, 995.2, 995.89, 998.1-998.13, 286.5, 459, 562.02-562.03, 562.12, 562.13, 569.3, 569.84-569.86, 578.9, 792.1), and infection (*CPT* 78066, 790.7, 424.9-424.99). Other gastrointestinal complications include paralytic ileus (560.1), nausea, vomiting, dehydration (276.5, 536.2, 787.0-02), abdominal pain (789.0), diverticulitis (562.01, 562.03, 562.11, 562.13), and enterocolitis (555-556). Cardiac complications include arrhythmia (427.0-427.4, 427.6-427.9), congestive heart failure (428.0-428.9), cardiac or respiratory arrest (427.5, 799.1, 997.1), and syncope, hypotension, or shock (453.29, 458.8-458.9, 639.5, 780.2, 785.50-785.51, 998.0, 995.4).

Our measure of outcomes was based on complications reported on inpatient or outpatient claims within 30 days after the colonoscopy procedure. We excluded complications listed on the same day as the colonoscopy itself because we could not differentiate between indications for the procedure and complications of the procedure. Our 30-day window for complications is consistent with the published literature on colonoscopy.[22]

Analytic Methods

We analyzed trends in facility choice, prices paid, consumer cost sharing, and procedural complications for the 3 years prior and the 2 years subsequent to the implementation of reference payments.

We calculated the percentage of CalPERS and Anthem patients selecting an ASC and HOPD in each year. We calculated the mean price paid per procedure by CalPERS and Anthem in each year. We differentiated the payments by CalPERS itself from those made by its members (as part of cost-sharing requirements). For patients selecting an HOPD, we differentiated between patients who were subject to the reference payment limit and those exempted from that limit. We calculated rates of total, severe gastrointestinal, other gastrointestinal, and cardiovascular complications for CalPERS and Anthem patients, respectively.

We conducted multivariable difference-in-differences regression analyses using the individual patient as the unit of observation. These regressions analyze the association between implementation of reference payment and facility choice, prices paid, and complications experienced, after adjusting for patient demographic characteristics, comorbidities, and other factors. Difference-in-difference statistical analyses measure the change in facility choices, prices, and procedural complications for CalPERS patients compared with changes for Anthem patients.[23]

Covariates in the regression analyses included year, payer (CalPERS vs Anthem), interaction terms between year and payer, an indicator variable for whether the patient was exempted from the initiative because of clinical or geographic considerations, the Charlson comorbidity index, an indicator variable distinguishing diagnostic from screening procedures, an indicator variable distinguishing interventional from noninterventional procedures, an interaction term for procedures that are both diagnostic and interventional, patient age categories, patient sex, and indicators for each hospital referral region.[24]

The regression parameters for patient choice of facility and probability of complications were estimated using both linear probability and logistic regression because the dependent variable is dichotomous. The 2 models generated similar results. For easier interpretation, we report the linear probability model results.

The price regressions used a generalized linear model with a log-link and a gamma distribution because the dependent variable is continuous.[25] Park tests supported using a gamma distribution.[25] All analyses were performed using Stata, version 11.0, and all standard errors were clustered at the facility level and are robust to heteroskedasticity.[26]

RESULTS

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Trends in Consumer Choice of Facility

Descriptive statistics for the data used in the study are presented in eTable 1 in the Supplement.

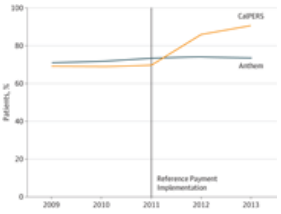
For CalPERS, the number of annual procedures was 7097 in 2009 and 6508 in 2013; for Anthem Blue Cross, 50 094 in 2009 and 56 943 in 2013. Throughout the study years, 42% to 44% were male in CalPERs and 46% to 47% were male in Anthem Blue Cross. Mean ages were 54 to 55 years (CalPERS) and 53 (Anthem). The rate of complications ranged from 2.0% to 2.4% (CalPERS) and from 2.3% to 2.6% (Anthem). The eFigure in the Supplement presents the variance in colonoscopy prices across HOPDs and ASCs in 2011, the year prior to implementation of reference payment by CalPERS. In that year, HOPD prices for colonoscopy ranged from $552 to $8883, with a median of $2273. Ambulatory surgery center prices ranged from $500 to $6003, with a median of $878. The $1500 reference payment limit subsequently imposed by CalPERS in January 2012 was set at approximately the 80th percentile of the distribution of ASC prices. A total of 83% of HOPDs and

20% of ASCs had allowed charges in excess of the CalPERS limit.

Figure 1 presents the percentage of CalPERS and Anthem enrollees selecting an ASC (as distinct from an HOPD) for their colonoscopy procedure. From 2009 to 2011, prior to implementation of reference payment, the share of CalPERS members receiving a colonoscopy at an ASC remained unchanged at 69% (4873 of 7097 in 2009, 5026 of 7299 in 2010, 5023 of 7248 in 2011). After implementation, the share selecting an ASC increased to 86% (5434 of 6355) in 2012 and to 90% (5176 of 5722) in 2013 for patients who were not exempted from the reference payment initiative. For Anthem enrollees, use of an ASC stayed between 71% and 74% during the entire period (35 337 of 50 091 in 2009, 35 387 of 49 443 in 2010, 36 137 of 49 406 in 2011, 38 925 of 52 733 in 2012, 41 737 of 56 943 in 2013).

Figure 1.

Percentage of Patients Choosing Ambulatory Surgery Centers Over Hospital Outpatient Departments Before and After Implementation of Reference-Based Benefits at California Public Employees Retirement System (CalPERS)



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eTable 2 in the Supplement presents difference-in-difference regression analyses of the association between reference payment and consumer choice of ASC vs HOPD. As indicated in the first column, the shift by CalPERS to reference payments was associated with an increase in probability of ASC use of 8.2 percentage points (95% CI, 5.2-11.0; $P < .01$) in 2012 and of 17.6 percentage points (95% CI, 11.8-23.4; $P < .001$) in 2013, compared with probability of use by Anthem enrollees and after controlling for differences in patient demographic characteristics, comorbidities, and other factors.

Trends in Prices Paid per Procedure

Figure 2 presents mean price paid per procedure for colonoscopy between 2009 and 2013 by CalPERS and Anthem, respectively. Prior to implementation of reference payments, mean prices paid by CalPERS were higher than prices paid by Anthem due to the concentration of public employees in the Sacramento state capital. Health care market consolidation in Sacramento has fostered high prices.[27] The Anthem membership is more broadly distributed across the state, with a large percentage living in the competitive Los Angeles market. In the year after implementation, the mean price charged to CalPERS decreased by 14.3% while continuing to increase for Anthem.

Figure 2.

Mean Price (Allowed Charge) Before and After Implementation of Reference-Based Benefits at California Public Employees Retirement System (CalPERS)

Error bars indicate 95% confidence interval.

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Changes in the prices paid for colonoscopy are presented in percentage terms in the second column of eTable 2 in the Supplement. The mean price decreased by 20.3% in the first year after implementation (95% CI, −24.7% to −15.6%; $P < .001$), when other relevant factors were controlled for. Prices paid in the second year after implementation were 21.0% lower than those paid prior to implementation (95% CI, −26.0% to −15.6%; $P < .001$).

Colonoscopy prices are analyzed in dollar terms in the third column of eTable 2 in the Supplement. In 2012, CalPERS paid $476 less per colonoscopy procedure (95% CI, −$616 to −$335; $P < .001$) than did Anthem,

after adjustment for other relevant factors. Prices paid continued to decrease in the second year after implementation and in 2013 were $562 less than 2011 levels (95% CI, −$715 to −$410; $P < .001$).

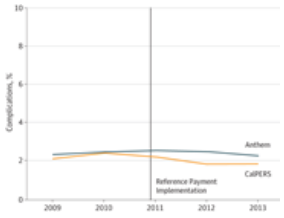
Trends in Procedural Complications

Figure 3 presents the 2009 to 2013 rates of total complications for CalPERS and Anthem patients. Rates of complications were consistently lower for CalPERS than for Anthem enrollees, but the differences are small and not statistically significant. There were no meaningful differences or trends in the rates of the 3 subgroups of complications, including serious gastrointestinal, other gastrointestinal, and cardiovascular.

Figure 3.

Rate of Procedural Complications for Colonoscopy Before and After Implementation of Reference-Based Benefits at California Public Employees Retirement System (CalPERS)

$P = .47$.



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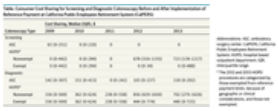
As indicated in the fourth column of eTable 2 in the Supplement, the multivariable statistical analyses found no statistically significant association between implementation of reference payment and the probability of a procedural complication. Implementation of reference payment was associated with a 0.18% reduction in the rate of total complications (95% CI, −0.69% to 0.32%; $P = .47$). Analyses of the 3 subcategories of complications (serious gastrointestinal, other gastrointestinal, and cardiovascular) revealed no association with implementation of reference payment.

Trends in Consumer Cost Sharing

The Table presents median (interquartile range) cost sharing for CalPERS members according to whether they received a screening or a diagnostic colonoscopy and whether the procedure occurred at an ASC or an HOPD. The Table also differentiates cost sharing for CalPERS patients who selected an HOPD but were exempt from the reference payment initiative from CalPERS patients who were not exempt.

Table. Consumer Cost Sharing for Screening and Diagnostic Colonoscopy Before and After Implementation of Reference Payment at California Public Employees Retirement System (CalPERS)



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Colonoscopies performed for screening purposes had been fully covered by CalPERS even before implementation of the Affordable Care Act. This is evident in the zero median cost sharing incurred by CalPERS members between 2009 and 2011 regardless of whether they selected an ASC or an HOPD. With the implementation of reference payment in 2012, CalPERS members undergoing their procedure at an HOPD were responsible for the difference between the facility's allowed charge and the reference payment limit of $1500. For those exempted from the reference payment limit for clinical or geographic reasons, cost sharing remained at zero. The CalPERS members not exempt from reference payment limits who nevertheless selected an HOPD paid a median cost sharing of $678 in 2012 and $723 in 2013.

Colonoscopies performed for diagnostic rather than screening purposes are not subject to the ban on consumer cost sharing in the Affordable Care Act. As indicated in the Table, median cost sharing for CalPERS members receiving a diagnostic colonoscopy was $194 higher for members selecting an HOPD than for those selecting an ASC in 2009, prior to implementation of reference payment. After implementation, median cost sharing was $584 higher for those selecting a HOPD than for those selecting as ASC unless the member was exempted because of clinical or geographic reasons.

DISCUSSION

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Reference payment may be of particular value for preventive screening tests such as colonoscopy, where social policy and the Affordable Care Act seek to encourage utilization by minimizing consumer cost sharing. Consumer cost sharing can induce facilities to moderate prices, and the elimination of cost sharing can increase the price of preventive services. As reported in this study, the implementation of reference payments for colonoscopy accelerated the shift in patient choice toward lower-priced facilities. This led to a substantial reduction in the mean price paid for the procedure, without any observed reduction in safety. In the first 2 years after implementation, CalPERS saved $7.0 million (28%) compared with what it would have spent on colonoscopy in the absence of a reference payment initiative.

The findings of this study should be interpreted in light of its limitations. The data reflect the experience of working-age individuals covered by employment-based health insurance and may not be replicable in an older Medicare-eligible population.[28] We were not able to measure whether implementation of reference payments influenced the propensity of CalPERS members to undergo a colonoscopy procedure because we did not have data on age-adjusted total enrollment and past history of screening colonoscopy (a procedure usually recommended only once per decade). There is no strong reason to assume that the initiative would affect the probability of undergoing a procedure because the patient faced no cost sharing at any ASC. The patient also faced no cost sharing at any HOPD if the treating physician indicated a clinical reason for needing hospital-based care or if the patient resided in a geographic area without convenient access to an ASC.

Reference payment designs have been evaluated by the US Department of Health and Human Services and the US Department of the Treasury with respect to their compatibility with the limitations on cost sharing embodied in the Affordable Care Act.[29] The Departments have decided that reference payment does not violate the Act if implemented appropriately. The Departments will continue to monitor whether payment limits are established at levels high enough to ensure access to a reasonable number of facilities in each market, that the policy is not applied to emergency services for which the consumer does not have the time to shop among alternative facilities, and that an exception policy is developed for patients with special clinical or geographic circumstances. All these conditions were met by the CalPERS reference payment initiative for colonoscopy.

ARTICLE INFORMATION

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Study concept and design: All authors.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Robinson, Whaley.

Critical revision of the manuscript for important intellectual content: All authors.

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