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# The Impact of Commercial Health Plan Prior Authorization Programs on the Utilization of Services for Low Back Pain

Robert M. Goodman, DO, MHSA,\* Corey C. Powell, PhD,<sup>†</sup> and Paul Park, MD<sup>‡</sup>

**Study Design.** An observational study.

**Objective.** The aim of this study was to evaluate the impact of a health plan's prior authorization (PA) programs for low back pain (LBP) in a non-Medicare population by assessing changes in pre-surgical nonoperative care; lumbar fusion trends; and overall back surgery rates compared with another health plan with a similar program and national benchmarks. The PA programs require mandatory physiatrist consultation before surgical evaluation, with subsequent additional LBP surgery PA.

**Summary of Background Data.** LBP is prevalent and concern exists that spinal fusion is overutilized for LBP.

**Methods.** Annual rates of lumbar fusion trended over 6 years, and analysis of changes in standardized costs for LBP-related services among a 501-member subset who underwent lumbar fusion before and after program implementations, during the period January 1, 2008, through December 31, 2013, among commercial members aged 18 and 65 years enrolled in a health maintenance organization with commercial membership averaging >500,000 annually.

**Results.** After initiation of the physiatrist PA in December 2010, lumbar fusions decreased from 76.27/100,000 in 2010 to 62.63/100,000 in 2011 with subsequent increases to 64.24/100,000 and 73.84/100,000 in years 2012 and 2013. For members who had

lumbar fusion, per-member, pre-surgical costs increased by \$2,233 with the physiatrist PA and an additional \$1,370 with implementation of the LBP surgery PA (March 2013). Spinal injections and inpatient admissions were the greatest contributors to the overall increase in costs. The physiatrist and LBP surgery PA programs were also associated with lengthening of LBP episodes ending in surgery by 309 and 198 days.

**Conclusion.** Mandatory referral to a physiatrist before surgical evaluation did not result in persistent reduction in lumbar fusions. Instead, these programs were associated with the unintended consequence of increased costs from more non-operative care for only a transitory change in the lumbar fusion rate, likely from delays due to the introduction of both PA programs.

**Key words:** back surgery, cost-effectiveness, health plan, low back pain, lumbar fusion, neurosurgery, orthopedic surgery, physiatrist, prior authorization.

**Level of Evidence:** 3

**Spine 2016;41:810–815**

From the \*Blue Care Network of Michigan, Southfield; <sup>†</sup>Center for Statistical Consultation and Research; and <sup>‡</sup>Department of Neurosurgery, University of Michigan, Ann Arbor.

Acknowledgment date: September 9, 2015. First revision date: October 7, 2015. Acceptance date: October 16, 2015.

The manuscript submitted does not contain information about medical device(s)/drug(s).

Blue Cross Blue Shield of Michigan Foundation grant funds were received in support of this work.

Relevant financial activities outside the submitted work: consultancy, grants, royalties, employment.

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Address correspondence and reprint requests to Robert M. Goodman, DO, MHSA, Medical Director, Blue Care Network of Michigan, Mail Code C336, 20500 Civic Center Drive, Southfield, MI 48076; E-mail: goodman@umich.edu

DOI: 10.1097/BRS.0000000000001329

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Low back pain (LBP) is prevalent being the fifth most common reason for physician visits and the most frequent discomfort experienced by adults in the US.<sup>1,2</sup> Concern has increased that surgery, specifically lumbar fusion, is overutilized. In a study involving the Nationwide Inpatient Sample database, total lumbar fusions increased 356% from 1993 to 2001.<sup>3</sup> In evaluating lumbar fusions for degenerative disease, rates increased from 3.20/100,000 in 1993 to 21.07/100,000 in 2001. A similar trend was noted in the Medicare population with lumbar fusions increasing from 0.3/1000 in 1992 to 1.1/1000 in 2003.<sup>4</sup> In the same investigation, assessment of regional differences in lumbar fusions showed greater than 20-fold variability, suggesting inconsistent surgical criteria. Although limitations of administrative data and other factors could have impacted analysis, the high degree of variability raises concerns for surgery overutilization, as exact indications for when fusion is appropriate remains controversial.

Some label LBP surgery a so-called low-value service, as an apparently anecdotal axiom is surgical outcomes are 33% improved, 33% worsened, and 33% were unchanged.<sup>5,6</sup> A

Cochrane Collaboration review through March 2005 offered no clear guidance.<sup>7</sup> Another review through July 2008 concluded that surgery may not be more effective than “intensive rehabilitation” for one situation but was not the case when compared with “standard (nonintensive)” nonsurgical treatments, with evidence supporting surgery for other circumstances.<sup>8</sup>

To address concerns over back surgery overutilization, Priority Health (PH), a West Michigan based health plan, began requiring in November 2007 that members be evaluated at a health plan approved “spine center of excellence” (SCOE) led by a physiatrist—a physical medicine and rehabilitation specialist—before a spine surgeon referral.<sup>9,10</sup> According to a published analysis of PH’s program, when this requirement was initiated PH’s back surgery rates were above the 90th percentile per the National Committee for Quality Assurance’s (NCQA) Quality Compass (a registered trademark of the NCQA) and concluded mandatory physiatrist evaluation resulted in decreased surgical rates while maintaining patient satisfaction.<sup>11</sup> Starting December 2010, the study health plan (SHP), a health plan *different* from PH functioning as a Health Maintenance Organization (HMO), implemented a similar policy. Our objective was to examine the impact of mandatory physiatrist consultation before spine surgeon referral in a non-Medicare population. Specifically, changes in lumbar spinal fusion rates as well as changes in utilization and costs of pre-surgery care with implementation of SHP’s PA programs.

## SETTING AND METHODS OVERVIEW

During the study period, SHP commercial membership averaged >500,000. We used administrative data for commercial (including self-funded) members aged 18 and 65 years from SHP’s four administrative geographic regions.

Beginning December 1, 2010, SHP began a spine care referral (SCR) prior authorization (PA) program for adults age  $\geq 18$  years, requiring members with LBP see a physiatrist before referral for surgical evaluation for specific International Classification of Diseases, Ninth Revision (ICD9) LBP-related diagnosis codes (Table S1, <http://links.lww.com/BRS/B72>). Except for serious clinical presentations or other reasons (*e.g.*, surgical follow-up), the member must have had a physiatrist evaluation within the previous 6 months. The SHP program differs from PHs, as it applies to LBP only with no SHP-approved so-called centers of excellence, allowing any SHP-contracted physiatrist to satisfy the requirement.<sup>12</sup> The premise is that surgeons may recommend unnecessary surgery and physiatrist involvement is needed to ensure adequate trials of nonoperative interventions. Programs for certain other LBP-related services began before the SCR-PA and others afterward, due to concerns regarding overutilization of nonoperative treatments. A PA specifically for low back surgery (LBS) was also later implemented. LBP-related SHP PA programs and timelines are in Table S2, <http://links.lww.com/BRS/B72>, with setting and methodological details noted in the Supplement.

There are three parts to this analysis: (1) Use and cost of pre-surgical nonoperative care, (2) trends in commercial SPH lumbar fusions, and (3) trends in HEDIS-defined back surgeries for SPH, PH, and national benchmarks. (HEDIS is a registered trademark of the NCQA.)

## RESULTS

### SHP Total Costs and Span of Low Back Pain Episodes

A total of 501 members met criteria for the ordinary least squares (OLS) regression models; their characteristics by pre- *versus* post-SCR-PA are in Table S3, <http://links.lww.com/BRS/B72>. Model coefficients explaining the use of total pre-lumbar fusion clinical services are in Table S4, <http://links.lww.com/BRS/B72>, with details on the modeling methodology, specifications, and diagnostics discussed in the Supplement. The total cost model intercept value of \$4338 represents the base case of the model variables and is the per-member mean of the total of standard allowed amounts of nonoperative patient management before either the SCR-PA or LBS-PA programs were implemented (Table S5, <http://links.lww.com/BRS/B72>). The post-SCR-PA and post-LBS-PA program implementation date coefficients are statistically significant ( $P < 0.01$ ,  $P < 0.05$ ) and substantive, indicating that both programs associated with increased utilization represented by additional total pre-surgery standard cost-allowed amounts of \$2233 and \$1370. A member subjected to both programs generated an average additional cost of \$3602. The scaled member cost-sharing ratio has a statistically significant ( $P < 0.01$ ) negative relationship with utilization, consistent with the literature and accounts for any cost-sharing influence. No other variables are statistically significant, including whether the fusion happened at a community hospital *versus* an academic and/or tertiary center. The presence of a pharmacy benefit is substantive, however, and those members accumulated on average \$1134 in LBP-related prescription medication standard costs before implementation of either program.

The same predictor variables were then regressed on each component of total LBP services to determine the relative contribution of each service type on the change in total costs associated with PA program implementations. Results are detailed in Tables S6 to S9, <http://links.lww.com/BRS/B72>, and summarized in Table 1. Of the \$3602 in total added costs associated with both programs, the top two contributing services are spinal injections (23.2%) and inpatient admissions (18.5%), followed by prescription medications (12.8%) and radiology services (12.1%), accounting for 67% of the total added cost.

The model coefficients explaining episode length, in days, are in Table S10, <http://links.lww.com/BRS/B72>. The model intercept indicates a mean span of 133 days for a completed lumbar fusion episode before implementation of either SHP PA program. The coefficients for both program implementation dates are statistically significant ( $P < 0.01$ ) and substantive, indicating that after a 365-day “clean period,”

**TABLE 1. Summary of Standard Cost Regression Models, by SHP Prior Authorization Program**

Services Related to LBP Care*	Post-SCR-PA	% of Total	Post-LBP Surgery PA	% of Total	Post-SCR and LBP Surgery PA	% of Total
Emergency	\$193	8.7	\$133	9.7	\$326	9.1
Urgent care	\$5	0.2	-\$4	-0.3	\$1	0.0
Observation stays	\$85	3.8	\$124	9.0	\$209	5.8
Inpatient admissions <sup>†</sup>	\$161	7.2	\$504	36.8	\$666	18.5
Office visits (E&M) <sup>‡</sup>	\$266	11.9	\$114	8.3	\$379	10.5
Physical therapy visits	\$325	14.6	-\$34	-2.5	\$290	8.1
Radiology (all modalities)	\$289	12.9	\$149	10.9	\$437	12.1
Chiropractic care	-\$2	-0.1	\$0	0.0	-\$1	0.0
Prescription medications	\$201	9.0	\$260	19.0	\$460	12.8
Lumbar spine injections <sup>§</sup>	\$710	31.8	\$125	9.1	\$835	23.2
Total	\$2233	100.0	\$1370	100.0	\$3602	100.0

\*Includes all applicable professional and facility claims.

<sup>†</sup>Excluding the index lumbar fusion admission.

<sup>‡</sup>Evaluation and management CPT codes only.

<sup>§</sup>Includes epidural and facet injections.

E&M indicates evaluation and management; LBP, low back pain; PA, prior authorization; SCR, spine care referral; SHP, study health plan.

these programs were associated with increased time from the first LBP-related clinical service until the date of surgery. The mean added time is 309 and 198 days for the SCR-PA and LBS-PA programs, respectively, with a total additional average of 507 days for members subject to both programs. The scaled member cost-sharing ratio has a statistically significant ( $P < 0.01$ ) negative relationship with episode length. None of the other coefficients are statistically significant.

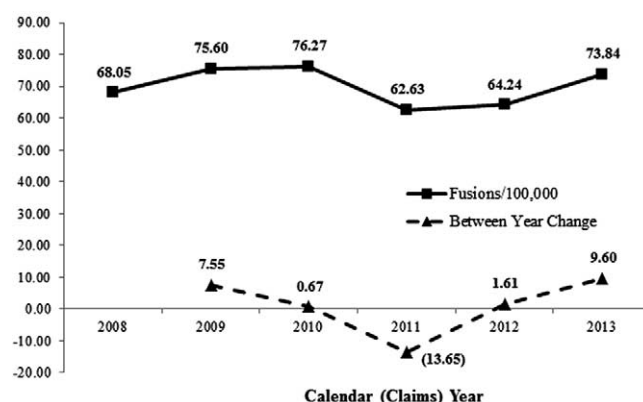
### Surgical Rate Trends

Figure 1 shows the SHP rate of lumbar fusion surgeries, as defined for this study, for SHP Regions 1 and 2 (see Supplement, <http://links.lww.com/BRS/B72>). The SHP SCR-PA started December 1, 2010 in these two regions, with all of 2008 to 2010 considered as substantively the pre-SCR-PA program period. The rate increased from 2008 to 2009 but by a lesser degree from 2009 to 2010, with annual changes of 7.55 (11%) and 0.67 (<1%) lumbar fusions/100,000 members. The fusion rate decreased the first year after implementation of the SCR-PA from 76.27/100,000 in 2010 to 62.63/100,000 in 2011. Subsequent years demonstrate an increase, with the 2013 rate approaching the pre-SCR-PA rate. The 2013 post-SCR-PA rate, while slightly lower than 2010, should be considered in the context of the LBS-PA implementation beginning March 1, 2013, as both programs associated with substantive episode lengthening and additional nonoperative management.

The trended HEDIS results, weighted to a standard population, are in Table 2, with additional detail in the Supplement. Overall change from claim years 2007 to 2013 reveals PH had the largest decrease (-37.6%) in HEDIS-defined

back surgery rates. The HMO benchmark national 50th percentile rate had the next largest decrease (-22.4%), while SHP and the Preferred Provider Organization (PPO) benchmark national 50th percentile rates had smaller and similar declines (-6.5% and -5.9%). PH had a rate about 50% greater than SHP in 2007, declining in 2008 after their SCOE program began. SHP approximated the PPO benchmark for all 7 years. Figure 2 shows that the trends over time were linear in nature for claim years 2007 to 2013 for three measures, and also for PH if excluding the 2007 data point. PH comes to approximate SHP at about the PPO benchmark, which tracks at a higher rate than the HMO benchmark.

Single-predictor OLS models were formulated to compare rates of decrease in SHP, PH, and benchmark surgical



**Figure 1.** SHP commercial lumbar fusion surgeries per 100,000, ages 18 to 65 years, regions 1 and 2 only. SHP program start dates: SCR PA December 1, 2010, lumbar surgery PA March 1, 2013.

**TABLE 2. Overall Back Surgery\* Rates per 1000 by US Population Insured Age and Sex Weights**

HEDIS Reporting Year	Paid Claims Year	SHP HMO	Priority Health HMO/ POS	HMO National 50th Percentile	PPO National 50th Percentile	Priority Health % of SHP	SHP % of PPO
2008	2007	3.78	5.64	3.64	3.78	149.3	100.0
2009	2008	3.79	4.25	3.02	3.62	112.2	104.6
2010	2009	3.85	4.13	3.25	3.75	107.1	102.8
2011	2010	4.06	3.86	3.17	3.77	95.1	107.7
2012	2011	3.84	3.64	3.08	3.59	94.8	107.0
2013	2012	3.52	3.58	3.00	3.64	101.7	96.7
2014	2013	3.53	3.52	2.83	3.56	99.6	99.3
	Change claims year 2007 to 2013	-6.5%	-37.6%	-22.4%	-5.9%		

\*NCQA HEDIS specification.

HMO indicates Health Maintenance Organization; POS, point of service; PPO, Preferred Provider Organization; SHP, study health plan.

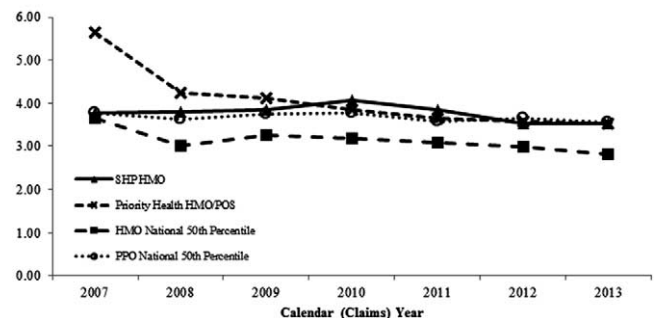
rates over the 2007 to 2013 time interval (for methodological details see Supplement, Table S11, <http://links.lww.com/BRS/B72>, <http://links.lww.com/BRS/B72>). Due to the small number of data points available, the focus is on magnitude and direction of relationships and not statistical significance. The HMO and PPO benchmarks were highly correlated, with the HMO rate decreasing over twice as fast as PPO. SHP best correlated with PPO rather than HMO benchmark rate. SHP and PPO regression did not show a meaningful difference in their rates of decline (slope 1.26), with SHP declining at a substantially slower rate than the HMO benchmark (slope 0.32). PH was best correlated with HMO rather than PPO for both the 7- and 6-year time frames. PH back surgery rates decreased about 2.5 times as rapidly as the HMO benchmark, but no difference (slope 1.14) in their rates of decline with the extreme 2007 data point removed. SHP is more highly correlated with PH over the 6-year time frame, with SHP decreasing less rapidly (slope 0.36) than PH. This difference appears to be driven by the surgical rates in 2008 and 2009. Figure 2 supports these results.

**DISCUSSION**

Controversy exists surrounding lumbar spinal fusion and back surgery in general as LBP is a prevalent condition with no treatment paradigm that results in permanent pain relief for all, and no way to discern who will respond best to which approach. With payers seeking to reduce costs, back surgeries have become viewed as a so-called low-value service to be limited. The standard approach is to advance through progressively more invasive and expensive management options, yet the final outcome can remain less than optimal. The Dartmouth Atlas Project identifies the issues of small area variation and supply-sensitive care.<sup>13,14</sup> In searching for cost reduction opportunities, these works have been interpreted by health plans that LBP cases receive surgical referral too early, surgeons look only at surgical options, and patients seek early surgery. Thus, the standard

step-wise approach, which may still result in surgery, is thought to be not well-utilized, and if followed more rigorously, surgeries would be avoided and costs reduced.

Although other analyses (e.g., Dartmouth Atlas) use Medicare data, this study focuses on the commercially insured. Although there is no known optimal rate of back surgery for a population, there are national commercial health plan benchmarks that should reflect the standard of clinical practice, which is a trial of nonoperative management followed by consideration for surgery if those measures fail after a period of time (typically 6 months). PPOs are largely less restrictive than HMOs with regard to seeing a specialist, and less intrusive regarding treatment choices. The national HEDIS data presented demonstrates that from 2007 to 2013, there has been a general trend toward less back surgery in the commercially insured, with HMOs declining faster than PPOs. Whether the faster rate of HMO decline *versus* PPO is due to specific HMO programs, differing characteristics of enrollees, systematically different benefit designs, or other factors, is beyond the scope of this study.



**Figure 2.** Overall HEDIS back surgery rates per 1000 by US population insured age/sex weights. HEDIS rates include all spinal regions with no diagnosis code criteria. Program start dates: Priority Health SCOE November 2007 (all spinal regions with diagnosis criteria), SHP SCR PA December 1, 2010 (low back only with diagnosis criteria), SHP lumbar surgery PA March 1, 2013.

**TABLE 3. LBP-Related Services with Study Units of Use and Standard Costs**

Services Related to LBP Care*	Standard Cost	Note
<b>Index surgical admission</b>	<b>\$42,986</b>	<b>Index lumbar fusion procedures</b>
Emergency visit	\$1119	Regardless of final disposition
Urgent care visit	\$101	Regardless of final disposition
Observation stay	\$2561	Regardless of final disposition
Inpatient admission <sup>†</sup>	\$11,903	
Office visit (E&M) <sup>‡</sup>	\$96	For a date of service, by provider
Physical therapy visit	\$88	Total costs for a date of service
CT scan of lumbar spine	\$492	Total costs for a date of service
MRI scan of lumbar spine	\$952	Total costs for a date of service
Plain film lumbar radiograph	\$104	Total costs for a date of service
Chiropractic visit <sup>¶</sup>	\$34	Total costs for a date of service
Lumbar spine injection <sup>#</sup>	\$577	Total costs for a date of service

\*Includes all applicable professional and facility allowed amounts for LBP-related events.

<sup>†</sup>Excluding the index lumbar fusion admission.

<sup>‡</sup>Evaluation and management CPT codes only.

<sup>¶</sup>Chiropractic care CPT codes only, no radiology.

<sup>#</sup>Blended value for epidural and facet injections.

E&M indicates evaluation and management; LBP, low back pain.

PH was consistently a high outlier before initiation of their SCOE program. Their significant decline in surgeries was informally reported within the health plan community and then formally in the 2013 study. PH attributed their success to the mandated physiatrist involvement. Health plans look to others in the industry for ideas; thus, SHP pursued a similar approach. SHP did not create a SCOE network, but mandated physiatrist referral (SCR-PA) for LBP patients before permitting surgical referral. SHP later followed with an additional PA for requests for LBS, once referral to a surgeon was allowed.

For SHP, overall cost of a lumbar fusion is the most expensive singular item at \$43,000 (Table 3). The assumption made was inadequate nonoperative management is pervasive and *not* restricted to health plans with very high back surgery rates (e.g., PH before their PA program). Although part of the SHP program premise is that new-onset LBP results in surgery if referred early to a surgeon, it is not known if the episodes in this study represent new-onset LBP or exacerbation of a longstanding but intermittent problem. Members with chronic LBP may have had a lengthy clinical history outside of available SHP data and may have had iterations of nonoperative treatment without achieving a satisfactory long-term outcome. The base case (cost model intercept) shows SHP spent on average \$4338 per member on nonoperative management before the SCR-PA program, with utilization increasing after, and again with the LBS-PA. It appears that there was sizeable use of nonoperative services, as represented by total standard costs *before* the SCR-PA. This is not consistent with the program's perception that patients are eager for early surgery, but rather patients tend to be risk-averse regarding invasive procedures unless no other untried viable alternatives exist.<sup>15-18</sup>

The time span of an LBP episode leading to surgery increased after initiation of the SHP SCR-PA. Considering the added cost and time, it appears that physiatrists and PCPs are engaged in more nonoperative treatment than a single consultative visit to comply with SHP. Spinal injections, despite the April 2011 implementation of a PA program meant to constrain use, contributed 31.8% of the extra post-SHP SCR-PA cost. For members exposed to the LBS-PA program, inpatient admissions for LBP took the place of injections as the largest single contributor (36.8%) to added costs. Although concern about surgeon-induced demand was an impetus for these programs, the same may apply to others with regard to spinal injections and other nonoperative care.

Considering the relative cost of a lumbar fusion, added costs would be acceptable if there is also an offsetting reduction in surgeries. A decrease did occur but was transitory, and considering the substantial delay associated with SCR-PA program implementation, a reversal occurred with increased surgeries. The likely reason the final data point did not exceed the 2010 pre-SHP SCR-PA surgery rate was the implementation of the LBS-PA in 2013 associated with an additional substantive delay. Although unmeasured, any SHP LBP member dis-enrollment in the interim would have also had an impact. The standardized HEDIS rates analysis shows that over the 2007 to 2013 time period, SHP largely followed the national 50th percentile trend of presumably less managed PPOs.

The PH paper reported a cost savings, but their financial analysis is of 1 year before and 1 year after their PA program implementation, and does not indicate whether savings continued to accrue *versus* a one-time reduction. The standardized HEDIS rates show that PH was high in claims year 2007, and then generally matched SHP 2010 to 2013. Despite the reduction in back surgeries after initiation of

their SCOE program, PH did not move consistently or substantially lower than SHP or the PPO benchmark while remaining consistently above the HMO benchmark. It appears that the PH program brought about a persistent reduction, but from an unusually high level of utilization. The SHP results do not support physiatrists as the proximate cause of the PH improvement. One may speculate that the centers of excellence concept was key, but seems unlikely as PH rates did not improve beyond SHP's apparently unproductive physiatrist-only program and never achieved the HMO benchmark level.

This study uses administrative data. Characteristics of the health plans involved and the focus on commercial membership may not be generalizable. Direct and opportunity administrative costs to health plans and providers for implementation and management of these PA processes were not evaluated.

## CONCLUSION

Mandatory referral to a physiatrist before surgical evaluation did not lead to a persistent reduction in lumbar fusion rates for SHP in the trended populations. HEDIS data suggest that the SHP SCR-PA also had no lasting effect on other types of LBS. Instead, there was an increased cost associated with more nonoperative care for only a transitory change in the lumbar fusion rate, likely from delays due to the introduction of the SHP SCR-PA. Fusion and other LBP surgeries may have a natural rate of occurrence for a population due to demographic and other factors until changes in treatment options or decrease in prevalence occurs. Therefore, LBP-related utilization programs that might have been effective in one extreme situation may not be generalizable elsewhere, and expanding across more populations can have the unintended consequence of a greater overall cost for LBP care.

### ➤ Key Points

- ❑ Mandatory referral to a physiatrist before surgical evaluation did not lead to a persistent reduction in lumbar fusion rates in the study health plan's trended populations, and HEDIS data suggest no lasting effect on other types of low back surgery.
- ❑ There was increased cost associated with more nonoperative care for only a transitory change in the rate of lumbar fusion, likely from delays due to the introduction of the mandatory physiatrist referral prior authorization program.
- ❑ Fusion and other low back pain surgeries may have a natural rate of occurrence for a given population due to various demographic and other factors until fundamental changes in treatment options or decrease in prevalence occurs.
- ❑ A previously reported similar low back pain related utilization program that might have been

effective in reducing costs for that extreme situation may not be generalizable to other settings, and expanding across more populations can have the unintended consequence of a greater overall cost for low back pain care.

Supplemental digital content is available for this article. Direct URL citations appearing in the printed text are provided in the HTML and PDF version of this article on the journal's Web site ([www.spinejournal.com](http://www.spinejournal.com)).

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