Utilization Review for Lumbar Fusion

Economic evaluation of the utilization review program for Worker's Compensation claims in Washington State

Report completed on June 10, 2021 for Comagine Health by the Occupational Epidemiology and Health Outcomes Research Program at the University of Washington

Introduction

Comagine Health is contracted by the Washington State Department of Labor and Industries ("L&I") to provide utilization review (UR) services for injured worker claims in Washington State. This report presents findings from an economic analysis of the costs and savings to L&I from UR conducted by Comagine Health for lumbar fusion among work-related back injuries in Washington State. The current Surgical Guideline for Lumbar Fusion (Arthrodesis) was implemented in March 2016. This guideline provides detailed review criteria related to the treatment of back injuries.

Methods

This analysis utilized workers compensation claims data for work-related back injuries from January 2010 through February 2021. Claims data was provided by L&I and included administrative data, medical bill data, and UR information. Claims were restricted to accepted claims for back injuries. The primary unit of analysis was the accepted claim.

Descriptive statistics of back claims assessed age and gender of the claimants, lumbar fusion rates, and three-year total costs of claims. Lumbar fusion rates were calculated for claims with at least one fusion within three years since injury. Three-year costs were calculated as the total cost of medical, hospital, and pharmacy bills within three years after injury. For the cost analyses, claims were restricted to claims with injuries from January 1, 2010 to December 31, 2017 to allow for three years of follow-up in the calculation of three-year costs. Costs were adjusted for medical inflation to December 2019, near the end of the available medical bills.

This study calculated the direct cost savings to L&I from denials of UR requests for lumbar fusion among back injury claims in the post-guideline period. The direct cost savings of the UR program estimated the return on investment (ROI) from denied lumbar fusion requests. UR direct cost savings analyses included back claims with injuries in 2017 to (a) restrict to the post-guideline period and (b) allow for three years of follow-up in cost calculations. UR information was unavailable or incomplete prior to January 2017.

Back claims were categorized as approved or denied for fusion based on the decision for UR lumbar fusion requests made within three years after the injury date. Back claims with injuries in 2017 were categorized as:

- Claims with no UR request for lumbar fusion
- Claims with all UR requests for lumbar fusion denied
- Claims with a mixture of approved and denied UR requests for lumbar fusion
- Claims with all UR requests for lumbar fusion approved

ROI was calculated for claims with (a) lumbar fusion denials versus all-approved claims and (b) lumbar fusion denials versus claims with at least one approved lumbar fusion procedure. The direct cost savings analyses were performed using unadjusted costs.

Descriptive Analyses of Back Claims

Trends in Back Injuries

There were approximately 11,500-14,000 accepted back claims per year between 2010-2019 as determined by injury date. The annual number of accepted back claims decreased modestly between 2010-2019 (Figure 1). Claimants did not differ by age or gender before or after the lumbar fusion guideline implementation in August 2016.

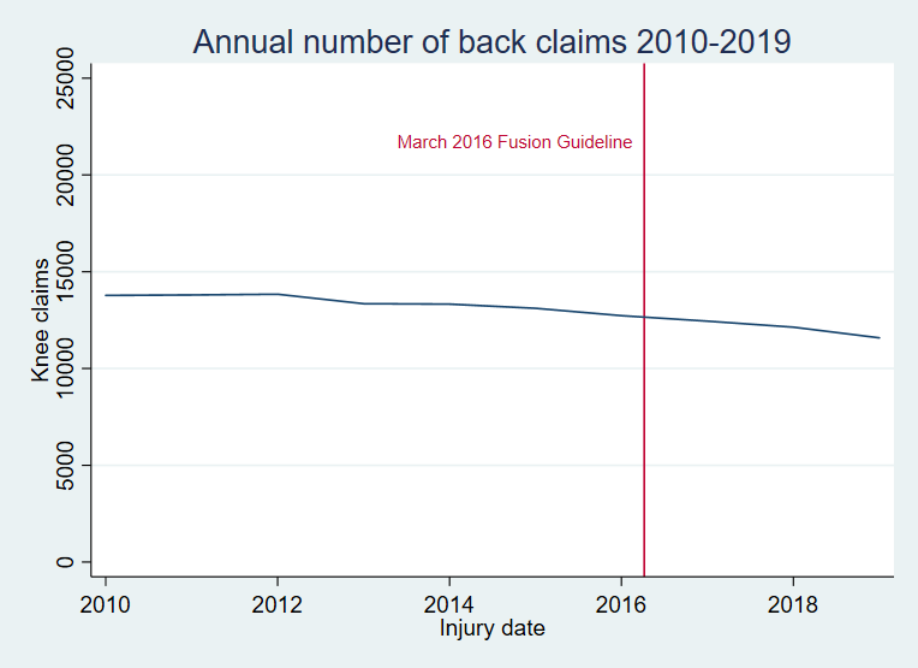


Figure 1. Annual number of accepted back claims for work-related injuries 2010 through 2019

Lumbar Fusion Trends

Most claims have their first lumbar fusion surgery within the first four years (1,460 days) after injury (Figure 2). However, due to data limitations we assessed the rate of lumbar fusions which occurred within three years for back claims.

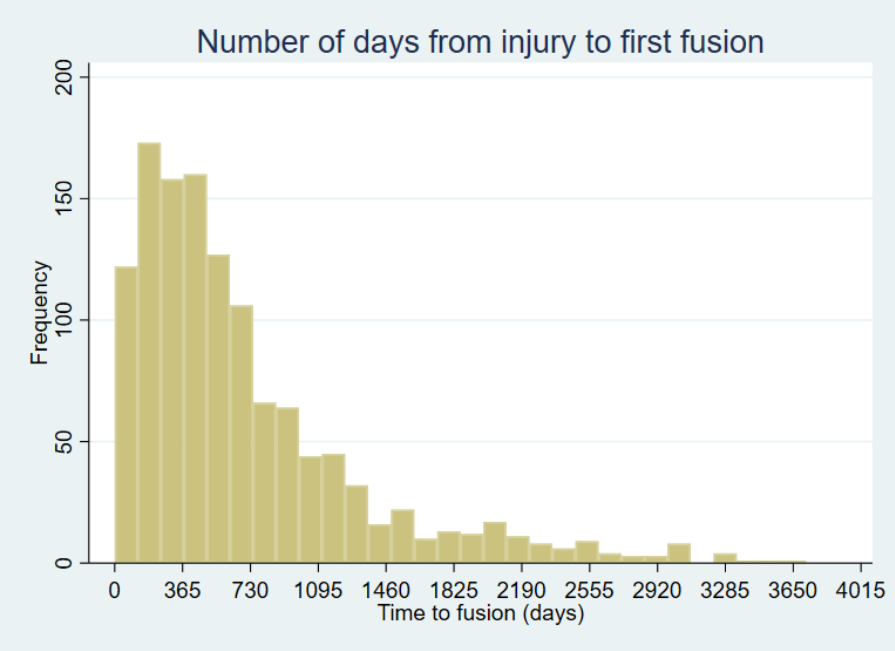


Figure 2. Number of days from the injury date to the date of the first fusion for back claims 2010-2019

The rate of lumbar fusions among back claims declined between 2010 and 2017 (Figure 3). The steepest decline occurred for back claims prior to 2015 with a possible leveling off of the decline for claims thereafter. In 2010, approximately 1.2% of back claims had a lumbar fusion within three years. By 2016, when the fusion guideline was implemented, approximately 0.5% of back claims had a lumbar fusion within three years. Note that claims with injuries up to four years prior to the 2016 guideline would be affected by the guideline due to the window of when first fusions occurred after injury.

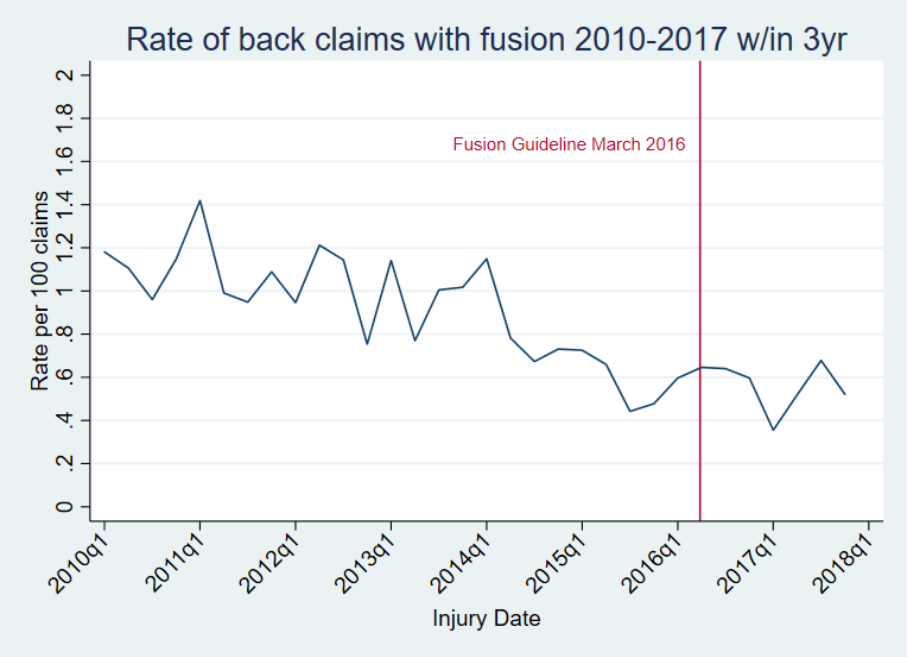


Figure 3. Rate of back claims with a lumbar fusion within 3 years after injury for back claims 2010-2017.

Cost of Back Claims with Lumbar Fusion

The average adjusted cost of back claims within three years since injury declined for claims 2010-2017 (Figure 4). In 2010, the average adjusted three-year cost of a back claim was approximately $8,500. At the end of 2017, the average adjusted three-year cost of a back claim was approximately $6,000.

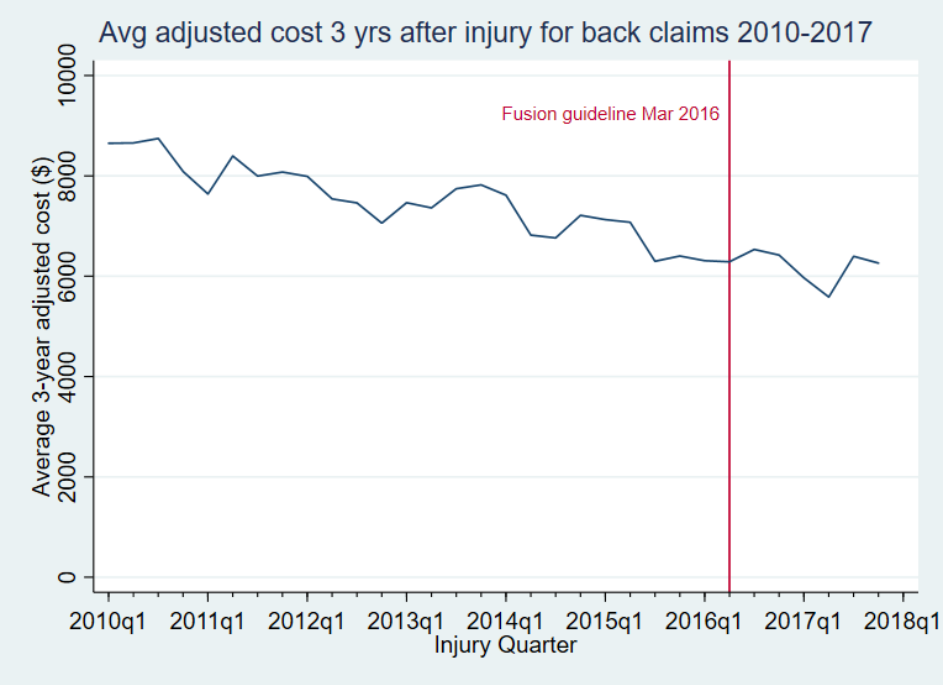


Figure 4. Average three-year adjusted cost of back claims

When back claim costs were differentiated by claims which had at least one lumbar fusion within three years and claims that did not have a fusion within three years, claims with fusions were substantially more costly (Figure 5). The average adjusted three-year costs of back claims with a fusion within three years ranged between $80,000 to over $150,000 per claim over the study period. Claims without a fusion within three years since injury cost approximately $8,000 per claim in 2010 and decreased to approximately $5,500 by 2018 (Figure 6).

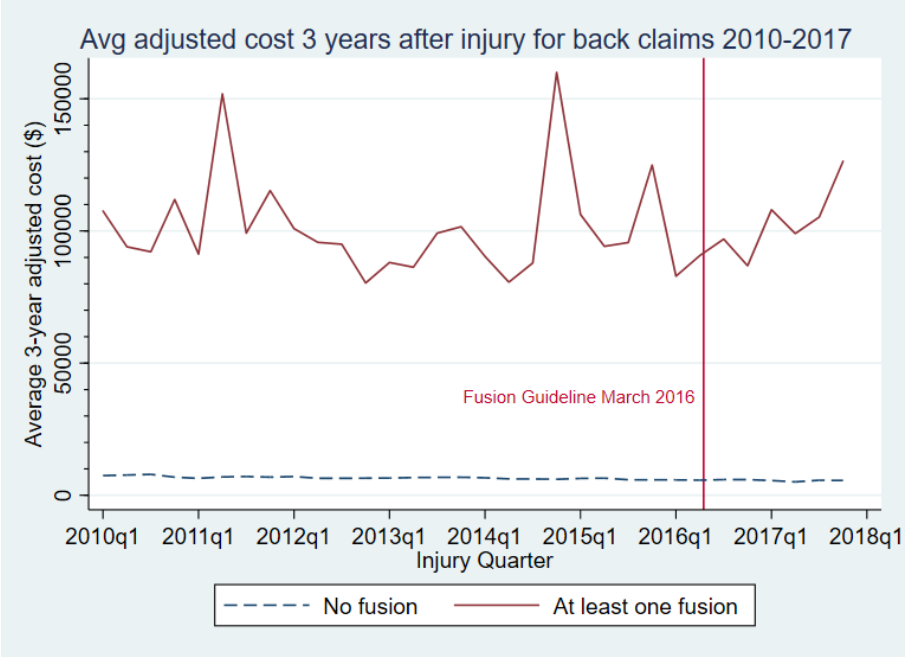


Figure 5. Three-year adjusted cost of back claims differentiated by fusion within 3 years since injury

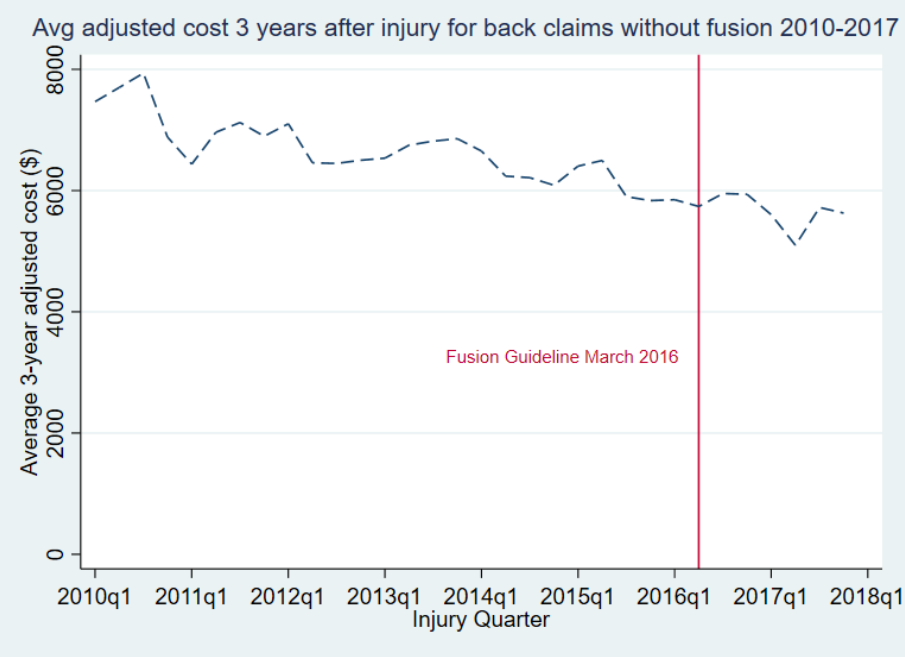


Figure 6. Three-year adjusted cost of back claims without a lumbar fusion within 3 years since injury

Utilization Review for Lumbar Fusion

From the UR data set provided, there were 108 UR requests for a lumbar fusion within three years after injury among 12,433 back claims with injuries from January 1, 2017 through December 31, 2017 (Table 1). For this 2017 cohort of back claims with UR requests for a lumbar fusion, about 66% of these claims

with UR were approved, about 24% of claims were denied fusion, and 9% had a mix of UR request approvals and denials for fusion.

Table 1. Back claims (claims with injuries January 1, 2017 through December 31, 2017) categorized by UR decision for lumbar fusion requests.

Lumbar fusion UR Decision Category	n Claims	Percent of all back claims	Percent of claims with UR requests for lumbar fusion	Total three-year claims costs	Average three-year cost per claim	Average Comagine Outpatient surgery review UR cost per claim*	Total Outpatient surgery Review Comagine UR costs	Average Comagine UR cost per claim*
No UR requests for fusion	12,325	99%	--	66,523,350	5397	--		--
All UR requests denied	26	0.21%	24%	1,052,157	40,468	228	5,928	135
Mixed UR approval	10	0.08%	9%	1,114,214	111,421	236	2,360	169
All UR requests approved	72	0.58%	67%	6,758,103	93,863	232	16,704	156
Total	12,433							

** Comagine Health UR bills were most commonly for physical therapy and imaging. Comagine Health bills for outpatient surgery review among back claims with a lumbar fusion request were used to estimate the cost of the Comagine Health UR program for lumbar fusion, by claim and in total.*

Claims with all UR requests for fusion approved were more expensive (~$94,000) than claims that had all UR requests for fusion denied ($40,000) in 2017. Claims with a mix of approved and denied fusion requests were most expensive (~$111,000). These average three-year costs included the amount paid to Comagine Health for outpatient surgical utilization review of lumbar fusion requests. It is unknown whether these Comagine Health UR bills were for fusion or another surgical procedure; however, a single UR Comagine Health outpatient surgical bill cost $225-252 for the 2017 back claims cohort. Table 1 shows the average Comagine Health UR cost per claim which averaged $228-236. For a small number of claims, these average UR costs may represent multiple UR requests for that claim if the UR requests were made within three years since injury.

Direct Cost Savings

The direct cost savings estimates the average per-case and aggregate cost savings due to UR request denials for lumbar fusion. The equation is as follows:

$$\left(\frac{Total\ approved\ claims\ costs}{\#\ Approved\ claims}\right) - \left(\frac{Total\ denied\ claims\ costs}{\#\ denied\ claims}\right) = Average\ per\ claim\ savings\ from\ UR\ denials$$

All approved versus all denied UR lumbar fusion requests

Using the total three-year claims costs in Table 1 for the "All-UR requests approved" and "All-UR requests denied" for lumbar fusion categories, we calculated the average per claim savings from UR denials for fusion. These aggregate numbers include bills for the UR service from Comagine Health. Note that the claims with mixed approval/denial of lumbar fusion UR are not included in this calculation.

$$\left(\frac{\$6{,}758{,}103}{72}\right) - \left(\frac{\$1{,}052{,}157}{26}\right) = \$\mathbf{53{,}395}\ average\ per\ claim\ savings\ from\ UR\ denials\ for\ lumbar\ fusion$$

Claims with denied UR requests for lumbar fusion cost L&I $53,395 less, on average, than claims that were approved for all UR requests for lumbar fusion. Readers should note this estimate ($53,395) accounts for whatever substitution of services occurred as a result of the UR-request denial because it is based on the total claim cost of health services received by claimants. The aggregate cost savings for claims with lumbar fusion denials was $53,395 x 26 denied claims = $1,388,270. (Note that this cost-saving estimate includes only medical costs, not time loss costs.)

Costs were calculated for a three-year follow-up period post-injury for claims with back injuries occurring in 2017. Thus, the cost of the Comagine Health lumbar fusion review program is calculated as UR costs for approved claims plus UR costs for denied claims: $16,704 (UR costs for approved claims) + $5,928 (UR costs for denied claims) = $22,632.

These cost figures show a positive return on investment (ROI) for the UR services provided by Comagine Health.

ROI for lumbar fusion review of back injuries was calculated as $1,388,270 - $22,632= $1,365,638. With $22,632 in UR costs, there was a savings of $1,388,270 from lumbar fusion denials for a net savings of $1,365,638. This is the net amount saved for one year of claims with three years of follow-up costs per claim. Put another way, for every dollar spent on lumbar fusion UR, L&I saved $61.34. Thus, if L&I spent $10,000 on Comagine Health UR for lumbar fusion requests, we estimate it would save $613,400 in medical costs for back injury claims.

At least one approved versus all denied UR lumbar fusion requests

The return on investment when comparing claims that had at least one UR approval for lumbar fusion within 3 years since injury versus claims with all UR requests for lumbar fusion denied is similar to the ROI for all approved claims versus all denied claims.

$$\left(\frac{Total\ at\ least\ 1\ approved\ claim\ costs}{\#\ claims\ with\ at\ least\ 1\ approval}\right) - \left(\frac{Total\ denied\ claims\ costs}{\#\ denied\ claims}\right) = Average\ per\ claim\ savings\ from\ UR\ denials$$

From Table 2, the average per claim savings from UR denial for lumbar fusion was:

$$\left(\frac{\$7{,}872{,}317}{82}\right) - \left(\frac{\$1{,}052{,}157}{26}\right) = \$\mathbf{55{,}536}\ average\ per\ claim\ savings\ from\ UR\ denials\ for\ lumbar\ fusion$$

Claims with denied UR requests for lumbar fusion cost L&I $55,536 less on average than claims that had at least one approval of a UR requests for lumbar fusion. Again, readers should note this estimate ($55,536) accounts for whatever substitution of services occurred because of the UR request denial because it is based on the total claim cost of health services received by claimants. The aggregate cost savings for claims with lumbar fusion denials was $55,536 x 26 denied claims = $1,443,936. (Note that this cost-saving estimate includes only medical costs, not time loss costs.)

Costs were calculated for a three-year follow-up period post-injury for claims with back injuries occurring in 2017. Thus, the cost of the Comagine Health lumbar fusion review program is calculated as

UR costs for claims with at least one lumbar fusion approval plus UR costs for lumbar fusion denied claims: $19,064 (UR costs for approved claims) + $5,928 (UR costs for denied claims) = $24,992.

Table 2. Back claims (claims with injuries January 1, 2017 through December 31, 2017) categorized by UR decision for lumbar fusion requests (denied requests versus at least one request approved).

Lumbar fusion UR Decision Category	n Claims	Percent of all back claims	Percent of claims with UR requests for lumbar fusion	Total three-year claims costs	Average three-year cost per claim	Average Comagine Outpatient surgery review UR cost per claim*	Total Outpatient surgery Review Comagine UR costs
No UR requests for fusion	12,325	99%	--	66,523,350	5397	--	
All UR requests denied	26	0.21%	24%	1,052,157	40,468	228	5,928
At least one UR approval for fusion (All approved/Mixed approval)	82	0.66%	76%	7,872,317	96,004	233	19,064
Total	12,433						

These cost figures also show a positive return on investment (ROI) for the UR services provided by Comagine Health. ROI for lumbar fusion review of back injuries was calculated as $1,443,936 - $24,992= $1,418,944. With $24,992 in UR costs, there was a savings of $1,443,936 from lumbar fusion denials for a net savings of $1,418,944. This is the net amount saved for one year of claims with three years of follow-up costs per claim. Put another way, for every dollar spent on lumbar fusion UR, L&I saved $57.78. Thus, if L&I spent $10,000 on Comagine Health UR for lumbar fusion requests, we estimate it would save $577,800 in medical costs for back injury claims.

Table 3 compares the return on investment for the lumbar fusion UR program among 2017 back claims. This table compares claims that had UR fusion requests all-approved versus all-denied and claims that had at least one UR fusion requests approved versus all requests denied.

Table 3. Return on investment for lumbar fusion among 2017 back claims.

	All-approved vs. all-denied UR requests	At-least-one-approved vs. all-denied UR requests
Average per claim savings from UR denial for lumbar fusion	$ 53,395	$55,536
Aggregate cost savings for claims with lumbar fusion denials	$1,388,270	$1,443,936
Comagine Health UR program cost for lumbar fusion	$22,632	$24,992
ROI	$1,365,638	$1,418,944
Per $ savings from UR	$61.34	$57.78

Limitations

This analysis of lumbar fusion UR among back claims had several limitations. Analyses were restricted to back claims; therefore, lumbar fusions and UR requests which occurred among non-back claims were omitted from the rate, cost, and direct cost savings calculations. Claims classified for injuries to other parts of the body may have also made UR requests for lumbar fusion; however, these requests were not included in the claims or UR data analyzed. Thus, the cost of the UR program for lumbar fusion calculated in this study is likely underestimated as this analysis does not include all denied lumbar fusions for any type of LNI claim. Furthermore, associating a Comagine Health UR bill in the medical bill data with a UR request for lumbar fusion is challenging. The cost of UR for lumbar fusion was likely captured in the outpatient surgical review bills, but other non-fusion surgical procedures may have been included in this calculation of the lumbar fusion review program. However, this would have little effect on the ROI for lumbar fusion UR due to the high savings from UR denial for lumbar fusion.

Due to data availability, we were only able to calculate rates, costs, and UR decisions for three years since the injury date. A longer follow-up would capture more lumbar fusions, so claims may be missing from these analyses which had lumbar fusion requested and approved after three years. Also, it is feasible that lumbar fusion could occur despite UR denial. This would potentially overestimate the cost savings from a UR denial for lumbar fusion by increasing the average cost of a claim categorized as "all UR requests denied" and reducing the average per claim savings from UR denials. However, the likelihood that this would substantially influence the ROI is low.

Lastly, the direct cost savings analysis was restricted to claims only in 2017. Thus, the UR decisions made reflect the effect of the 2016 lumbar fusion guideline and costs accrued for the 2017 back claims cohort represent the post-lumbar fusion guideline period. However, it is difficult to estimate the effect of exogenous influences on the rates of lumbar fusion (e.g., surgical trends in lumbar fusion). There was a steady decline in lumbar fusions over the study period from 2010-2014 with a potential leveling off of fusion rates 2015 and after. The association between UR guidelines and this rate decrease is uncertain. Without UR approval information prior to the 2016 lumbar fusion guideline, we cannot assess the full effect of the guideline (i.e., indirect cost savings due to avoided requests for lumbar fusion by physicians familiar with the guideline). Nevertheless, UR denials for lumbar fusion in the post-guideline period resulted in a positive ROI to L&I for lumbar fusion UR.

Conclusion

The rate of back claims with a lumbar fusion within 3 years since injury decreased between 2010 and 2019 from approximately 1.2% to 0.5% of back claims undergoing a lumbar fusion. The greatest decrease in this rate occurred prior to the implementation of the lumbar fusion guideline in March 2016 with the rate leveling off around 2015.

In general, lumbar fusion was an uncommon procedure among back claims. However, workers with back claims who had a lumbar fusion within three years after injury had much costlier claims than workers that did not have a fusion. In 2017, there were 108 back claims with UR requests for lumbar fusion over a three-year follow-up period. These 108 claims with fusion requests accounted for less than 1% of all back claims in 2017. In total, the cost of UR for lumbar fusion accrued in the three-year follow-up period for this 2017 cohort of back claims was $25,000. This was the cost of the lumbar fusion UR program for L&I. For this 2017 back claims cohort, 24% of claims with UR requests for lumbar fusion within three

years since injury were denied lumbar fusion, and the cost differential was approximately $56,000 between back claims with at least one lumbar fusion approved (~$96,000 average per claim) versus denied for lumbar fusion (~$40,000 average per claim) in the three years since injury.

This substantial cost differential between back claims denied rather than approved for lumbar fusion, along with the high denial rate of lumbar fusion requests among back claims (24%) and the relatively low cost of the lumbar fusion UR program ($25,000) for a year's worth of claims due to the rarity of fusion requests among back claims, resulted in a high return on investment to L&I for lumbar fusion UR. For every $1 L&I invested in UR for the 2017 cohort of back injury claims, L&I saved approximately $60 in medical costs due to denied lumbar fusion. For a high-cost procedure like lumbar fusion, the relatively low cost of the UR program suggests that UR performed by Comagine Health led to great cost savings to L&I and, like the UR program for knee arthroscopy, contributed to greater efficiency in care provided to workers with back injury claims.