



How Do Medical Networks Impact Workers Compensation Claim Costs?

Medical provider networks (MPNs) for workers compensation (WC) have become increasingly popular over the last two decades.¹ In conjunction with increased market penetration, some MPNs have broadened their services: As a way to improve outcomes, they do not just provide medical care, they manage the medical services on a claim, including interacting with the patient.

In this report, we look at the impact of MPNs on workers compensation claim costs for 10 common WC injuries. We identify claims managed in-network and out-of-network and compare both medical and indemnity costs between the two groups of claims. In particular, the study looks at differences in the use of physician and hospital services.

FINDINGS

Comparing claims managed in-network to claims managed out-of-network across states and for 10 common injuries:

- Average paid medical costs are higher in-network for the more costly back and shoulder injuries and lower for several less costly injuries
- Except for the more costly back injuries, in-network claims (as compared with out-of-network):
 - Are less likely to be admitted to a hospital
 - Cost less for hospital outpatient services
 - Cost more for physician services
- For all 10 injuries and for both permanent partial and temporary total claims, the average total incurred cost per claim for in-network claims is lower than, or about the same as, that for out-of-network claims
- In-network claims are more likely to have permanent injury awards than out-of-network claims; selection bias may play a role here

Differences at a state level may be considered in a follow-up study performed later.

¹"The Use of Networks to Care for Injured Workers—What's Been the Impact?" **NCCI**, January 2020, available at ncci.com.

BACKGROUND

Medical Provider Networks and Physician Services

What is an MPN?

A medical provider network (MPN) is a group of healthcare providers that treat workers injured on the job:

- An MPN can be set up by an insurer or employer or an independent entity
- The use of MPNs has grown steadily, and they account for 80% of payments for medical services in WC
- Their focus has evolved to improving outcomes² along with price reduction

MPNs may often set prices at amounts that are not subject to fee schedules. This is seen in the case of state physician fee schedules (PFSs) that specify a maximum allowable reimbursement (MAR) for specific medical procedures. MPN prices are typically discounted below the PFS; however, an MPN may negotiate prices higher than the PFS to induce some specialists to join the network. We note several findings on prices and utilization of physician services from prior NCCI studies of physician services:

- Payments for 87% of in-network services are at an amount that is less than the MAR and 10% are paid at the MAR¹
- By contrast, only 34% of out-of-network services are paid at an amount that is less than the MAR with 62% paid at the MAR¹
- In-network cases have more and higher-level office visits, as well as more physical therapy modalities, than comparable out-of-network cases¹
- Although not distinguishing between WC claims managed in-network or out-of-network, a study found that WC medical costs for physician services are higher than comparable Group Health (GH) costs. The main driver of this difference is higher utilization of services to treat WC cases³

Comparing physician services by state:

- There are significant differences among states in the relative cost of WC to other payors such as GH and Medicare. Differences in state PFSs contribute to cost differences by state and these differences should be recognized when evaluating in-network price departures from the PFS
- For all but a few injuries with comparatively small numbers of cases, greater MPN penetration in a state is associated with greater MPN utilization of physician services in the state

This study differs from prior NCCI studies on the use of MPNs. This study:

- Shifts the focus from reimbursements to claims management to the relationship between total cost outcomes and the management of medical care
- Looks at all paid medical costs, not just for physician services
- Looks at both medical and indemnity incurred costs

For the first difference, here we look specifically at evaluation and management services (other than emergency room) and use that information to determine what claims are designated as managed in-network or out-of-network. Prior studies looked at the share of payments for all physician services on a claim, noting which were reimbursed at in-network prices. Here we focus on the share of services to manage the medical services on the claim.

²We base this observation on how MPNs promote their services in the trade press. For example, Coventry Workers' Comp Services has been expanding its Outcomes-based Network into more states (workcompwire.com/2013/09/coventry-workers-comp-services-outcomes-based-network-expands-to-21-states).

³"Comparing the Quantity and Prices of Physician Services Between Workers Compensation and Group Health," NCCI, February 2020, available at ncci.com.

DATA AND METHODOLOGY

The experience for this study is from two NCCI data calls: The Medical Data Call (MDC) and The Workers Compensation Statistical Plan (WCSP). The MDC captures transaction-level details on medical bills processed on or after July 1, 2010. The details include dates of service, charges, payments, procedure codes, diagnosis codes, and an indicator for whether the payment was to an in-network provider. The WCSP is not reported on a transaction basis. Rather, the WCSP is collected on an annual reporting schedule based on the policy effective date. The WCSP captures both individual claim level and policy level data, including payrolls and premiums as well as medical and indemnity paid amounts and case reserves. The two data calls share a unique claim identifier that enables information to be merged at the claim level. This study includes data from 37 jurisdictions.⁴

The MDC data are for Accident Years 2011 through 2018. WCSP claim data is matched to a subset of the MDC data using the unique claim identifier. This is done for Accident Years 2014 and 2015 to include valuations through five reports in the WCSP data.

The goal of the study is to compare costs between claims that are managed within a network and those that are not. There is no standard way to make that distinction. In this study, we consider evaluation and management (E&M) medical services delivered within a 360-day window post-injury and exclude emergency room (ER) visits.

Using a countrywide fee schedule for E&M services that applies by specific procedure code,⁵ we compare the amount payable for those E&M services that are in-network and the corresponding amount out-of-network. A claim is categorized as *in-network* if at least 60% of E&M services was paid to in-network providers and is *out-of-network* if no more than 40% was paid in-network. Claims that are neither in-network nor out-of-network are not included in the comparisons.

The specific countrywide fee schedule used to calculate the paid percentages can affect the in-network and out-of-network criteria; however, what is key for the analysis is that the schedule is a reasonable measure of the relative intensity of E&M services and that the criteria be the same for all states. Looking at other windows and thresholds produced similar findings (see Appendix A).

We study 10 common WC injuries that capture about a third of all medical services and a broad spectrum of claim severities. They are selected so that treatment options within each injury are sufficiently homogeneous for meaningful comparisons between in-network and out-of-network care:

- Ankle/Foot: Minor Injury
- Hand/Wrist: Minor Injury
- Knee: Meniscus Injury
- Knee: Minor Injury
- Lumbar: Lumbar Spine Degeneration
- Lumbar: Lumbosacral Disc
- Lumbar: Low Back Pain
- Neck: Pain
- Shoulder: Minor Injury
- Shoulder: Rotator Cuff Tear

The study looks at six broad types of medical care itemized by provider:

- Physician
- Hospital Inpatient
- Hospital Outpatient
- Ambulatory Surgical Center (ASC)
- Drugs
- Other (supplies, transport, durable medical equipment, etc.)

⁴Jurisdictions included in this study are AK, AL, AR, AZ, CO, CT, DC, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MD, ME, MO, MS, MT, NC, NE, NH, NM, NV, OK, OR, RI, SC, SD, TN, UT, VA, VT, and WV. More information on the MDC and WCSP can be found at ncci.com.

⁵NCCI's Workers Compensation Relative Price Index (WCRPI) is resource-based, applies by procedure code (CPT) and place of service, and does not vary by state or time. The WCRPI measures the relative intensity of medical services and is useful as a measure of the utilization of medical services.

To make the comparisons between in-network and out-of-network claims as meaningful as possible, we construct a market basket of MDC claims, both in-network and out-of-network. Each claim is assigned a frequency weight. For all combinations of the following five claim characteristics, both the in-network and out-of-network claims have an aggregate weight equal to the (unweighted combined) number of MDC claims with that combination:

- Accident Year
- State
- Age Group
- Gender
- Injury

This assures that when making comparisons by injury, the weighted average costs for in-network and for out-of-network claims both reflect the same mix of claim frequencies by accident year, age, gender, and state.

A second weighted market basket is constructed by matching a subset of claims from the first basket to WCSP claim data. More specifically, matching to temporary total disability (TTD) and permanent partial disability (PPD) claims from AYs 2014 and 2015. This WCSP-weighted market basket uses the same frequency weights by claim used in the MDC-weighted market basket.

EXHIBITS

The exhibits compare in-network with out-of-network claim costs for Medical Paid, Indemnity Incurred, and Total Incurred. All comparisons control for claim mix.

Like prior studies on physician services, the Medical Paid section exhibits are produced from the MDC weighted market basket and reflect paid costs for a 360-day post-injury window.

In a departure from earlier studies, the exhibits in the Indemnity Incurred and Total Incurred sections:

- Are produced from the WCSP weighted market basket of TTD and PPD claims
- Show incurred costs at a 5th report basis (i.e., maturity of up to 66 months)

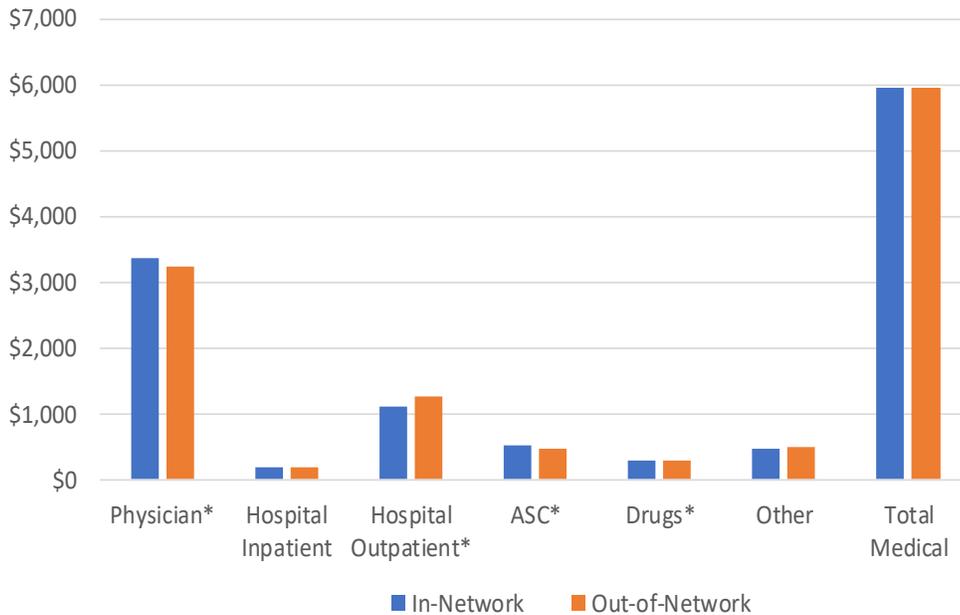
Many of the exhibits compare the weighted mean cost per claim between in-network and out-of-network claims. Statistical significance of their difference is indicated with an asterisk and is assigned based on a t-test at the 95% level.⁶

⁶More precisely, we apply two-sided t-tests for the difference of weighted means and require p-values to be less than 0.05 under both the assumptions of equal and unequal variances.

Medical Paid

Exhibit 1 compares the first-year average paid medical for in-network to that for out-of-network claims. The averages are over the entire MDC market basket and are itemized by type of provider:

Exhibit 1: In-Network vs. Out-of-Network Average Paid Medical by Provider Type

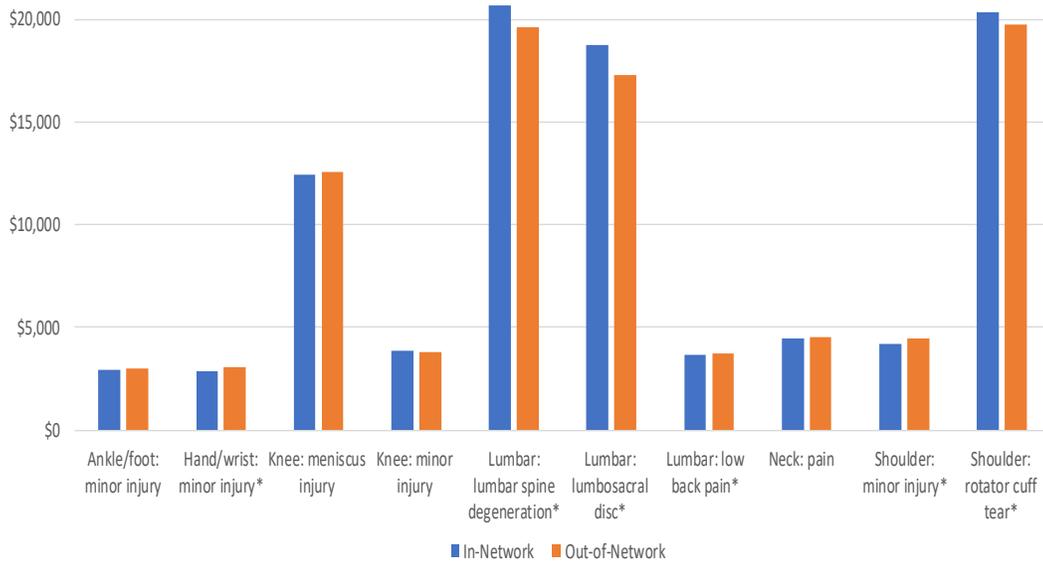


* Difference is significant at the 95% confidence level

- The Total Medical average paid per claim to all providers is very similar for in-network and out-of-network claims; the difference is very small and not statistically significant
- The average paid for physician services is higher for in-network claims and that difference is statistically significant
- The average paid medical for hospital outpatient services is higher for out-of-network claims and that difference is statistically significant
- Physician services account for more than half of total paid medical for both in-network and out-of-network claims
- Differences between the in-network and out-of-network paid for Physician and Hospital Outpatient services offset one another, resulting in the very small difference in the Total Medical average paid per claim

In-network and out-of-network average costs per claim also show similar relativities when organized by the 10 common injuries, as in Exhibit 2.

Exhibit 2: In-Network vs. Out-of-Network Average Paid Medical by Injury Type



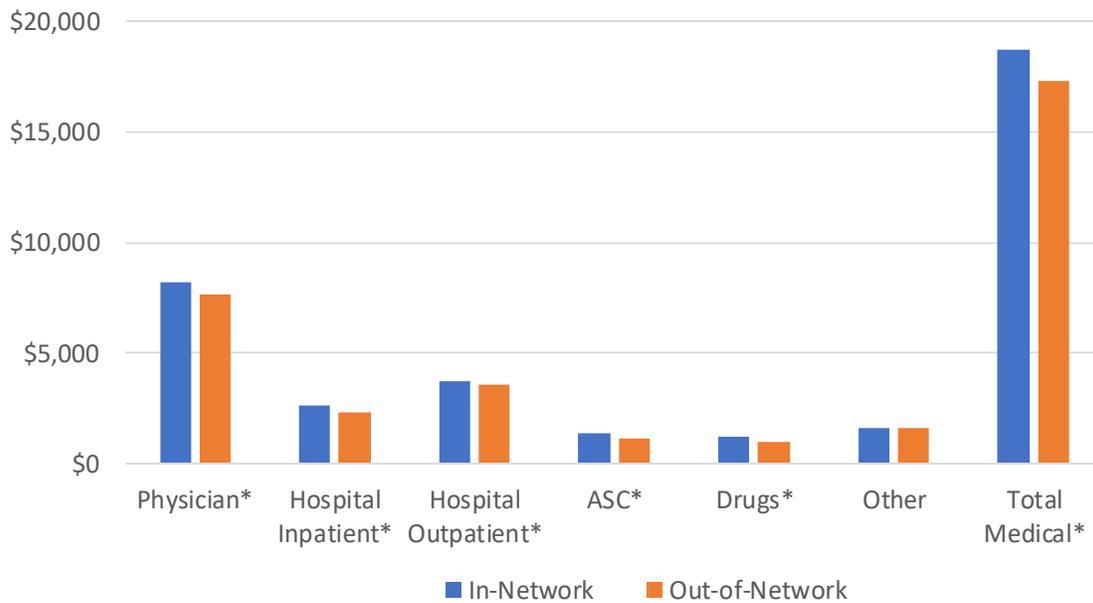
* Difference is significant at the 95% confidence level

- Claim severity, as measured by the average paid medical per claim, varies greatly among the injuries
- As expected, the type of injury dictates the medical care and we see a strong correlation by injury in the average paid medical per claim between in-network and out-of-network claims (correlation coefficient = 0.999)
- For the three lumbar back and two shoulder injuries:
 - More severe cases (lumbar spine degeneration, lumbosacral disc, and rotator cuff tear) show higher costs for the in-network claims than for the out-of-network claims
 - Less severe cases (low back pain and minor shoulder injury) show lower costs for the in-network claims than for the out-of-network claims
 - All five differences are statistically significant
- Differences for the other five injuries are comparatively small, with only the hand/wrist injuries showing a statistically significant difference

The third observation suggests the possibility that more severe cases are being referred to in-network providers. While diagnosis and procedure coding captured in the MDC typically allows us to categorize the part of body and often the nature of the injury, it need not classify the underlying severity of an injury—a task which can challenge even an expert clinician with access to the patient’s full medical chart and history. The presence of such selection bias would make cost comparisons more difficult to interpret and findings less definitive. We will show more evidence of potential selection bias by using the WCSP market basket. Those comparisons relate in-network to out-of-network differences in severity with determinations from independent medical exams (IMEs).

When each of the 10 common injuries are examined in isolation, the patterns for the average costs per claim by provider type typically resemble the pattern for them pooled together in Exhibit 1. The most important exceptions arise with the two more serious back injuries (lumbar spine degeneration and lumbosacral disc). Those injuries are exceptional because their average paid amounts for hospital outpatient services are higher for in-network claims than for out-of-network claims. And the differences are statistically significant. This is consistent with their higher in-network average costs per claim in Exhibit 2. Exhibit 3 illustrates this for lumbosacral disc injuries (see Appendix C for charts by provider type for the other nine injuries).

Exhibit 3: In-Network vs. Out-of-Network Average Paid Medical for Lumbosacral Disc Injuries

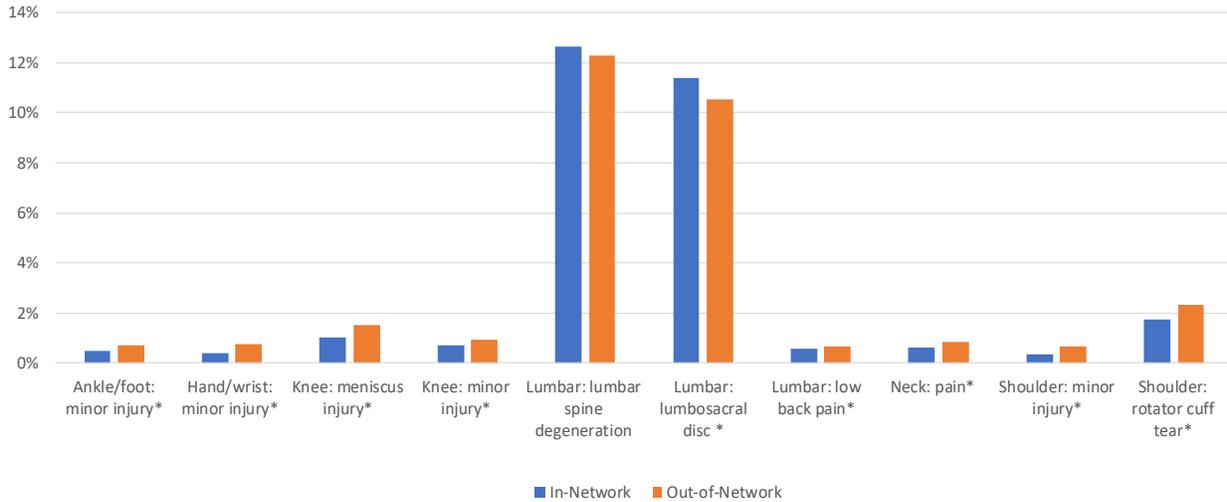


* Difference is significant at the 95% confidence level

- For lumbosacral disc injuries, the total average paid is higher for in-network claims than for out-of-network claims
- By provider, the average paid is higher for in-network claims than for out-of-network claims for all provider types except Other (where the difference is only \$9)
- Unlike for the 10 injuries combined (Exhibit 1), for lumbosacral disk injuries:
 - The average paid for Hospital Inpatient services is greater than for ASC
 - The average paid for Hospital Outpatient services is higher for in-network claims
 - Physician services account for less than half of medical payments

The share of claims admitted to a hospital may provide some insight into differences in how medical services are managed between in-network and out-of-network claims. Hospital admission rates by injury type are shown in Exhibit 4:

Exhibit 4: In-Network vs. Out-of-Network Hospital Admission Rates by Injury Type



* Difference is significant at the 95% confidence level

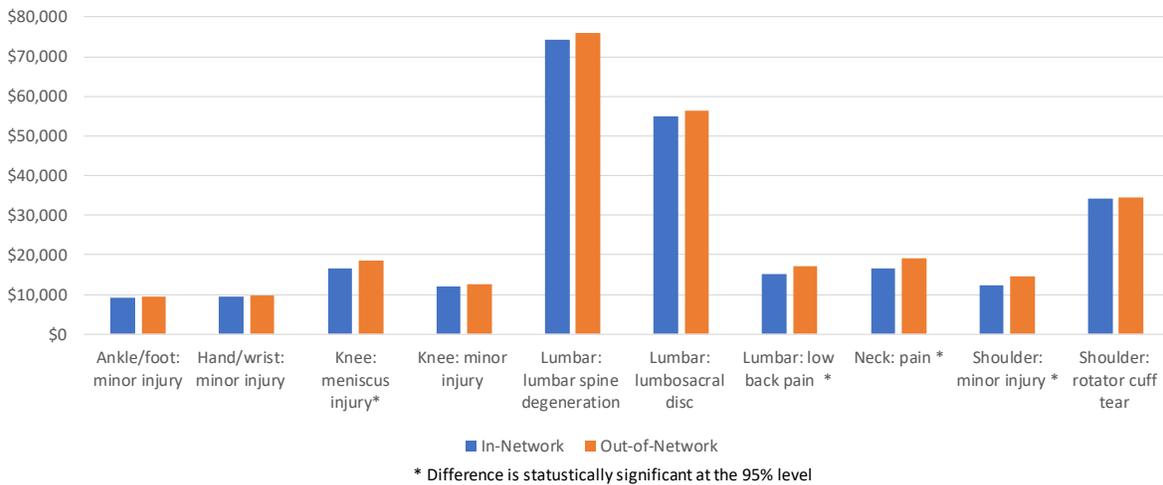
- Both in- and out-of-network claims have much higher admission rates for the two more serious back injuries
- Higher in-network admission rates for the two more serious back injuries is consistent with their higher average costs for in-network claims in Exhibit 2
- For the other eight types of injury, the in-network admission rate is significantly lower for in-network claims than for out-of-network claims

Higher in-network admission rates for the two more serious back injuries and lower in-network admission rates for the less serious injuries suggests that costs for in-network medical claim management may vary more by the type of injury than out-of-network medical claim management. This again suggests that more severe cases are being referred to MPNs.

Indemnity Incurred

This section is based on the WCSP market basket consisting of only PPD and TTD claims. The incurred amounts combine payments with case reserves. Exhibit 5 compares the average indemnity incurred cost per claim between the in-network and out-of-network claims for each of 10 common WC injuries at a 5th report.

Exhibit 5: In-Network vs. Out-of-Network Indemnity Incurred Cost per Claim by Injury Type



- For all 10 injuries, the average indemnity incurred cost per claim for the out-of-network claims is greater than or essentially the same that for the in-network claims
- For four of the 10 injuries, the higher average indemnity cost per claim for in-network than for out-of-network claims is statistically significant (meniscus, low back pain, neck pain, and minor shoulder injury)
- Among the 10 injuries, relativities in the average indemnity incurred cost per claim are similar for the out-of-network and in-network claims (correlation coefficient = 0.999)

Exhibit 5 consistently associates MPNs with lower indemnity incurred costs; moreover, the association is more consistent than that shown for medical payments in the previous section.

While not a perfect measure of outcomes, indemnity costs are sensitive to results like return-to-work. The back pain and neck pain cases are among the less severe injuries. Each has an in-network average indemnity cost per claim that is significantly lower than the out-of-network average. Being pain based, those claims may be particularly sensitive to treatment approaches that shorten the time to heal and return to work, thereby lowering indemnity costs.

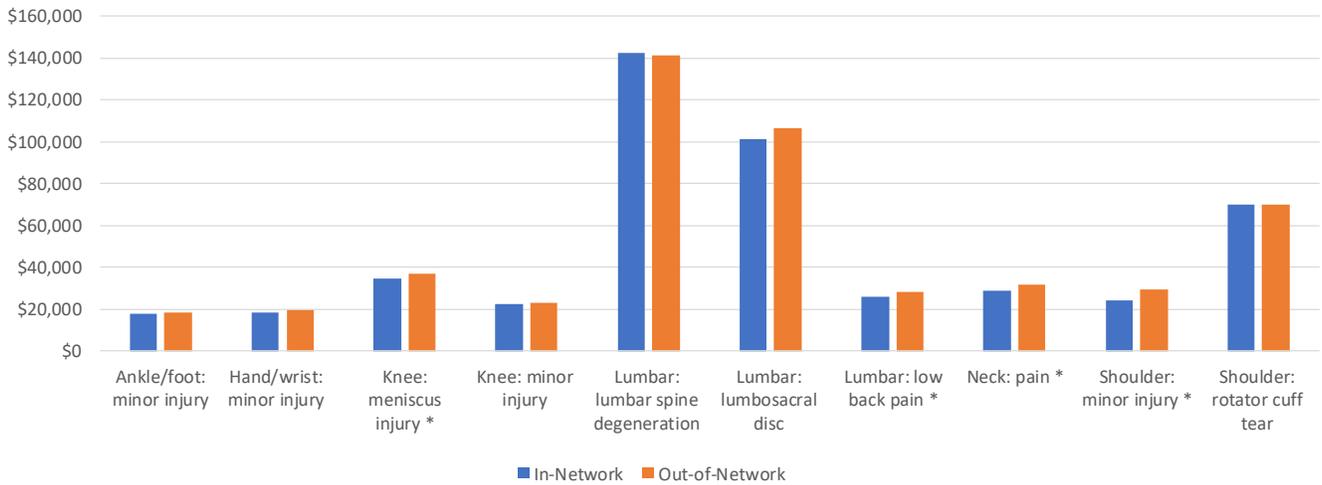
While the evidence from indemnity costs is indirect, the lower costs observed for in-network claims for all 10 injuries suggests MPN claims management has better outcomes.

With the growth of accountable care organizations, contract pricing for medical care is moving from fee for service toward outcomes-based reimbursement. This is happening both in healthcare coverage generally and for WC and should result in medical payments that track better with outcomes.

Total Incurred—Combining Medical and Indemnity

As with the previous section, this section is based on the WCSP market basket that consists of PPD and TTD claims. Here we combine medical and indemnity and look at the total incurred cost per claim. Exhibit 6 shows the average total incurred cost per claim for the 10 types of injuries.

Exhibit 6: In-Network vs. Out-of-Network Total Incurred Cost per Claim by Injury Type



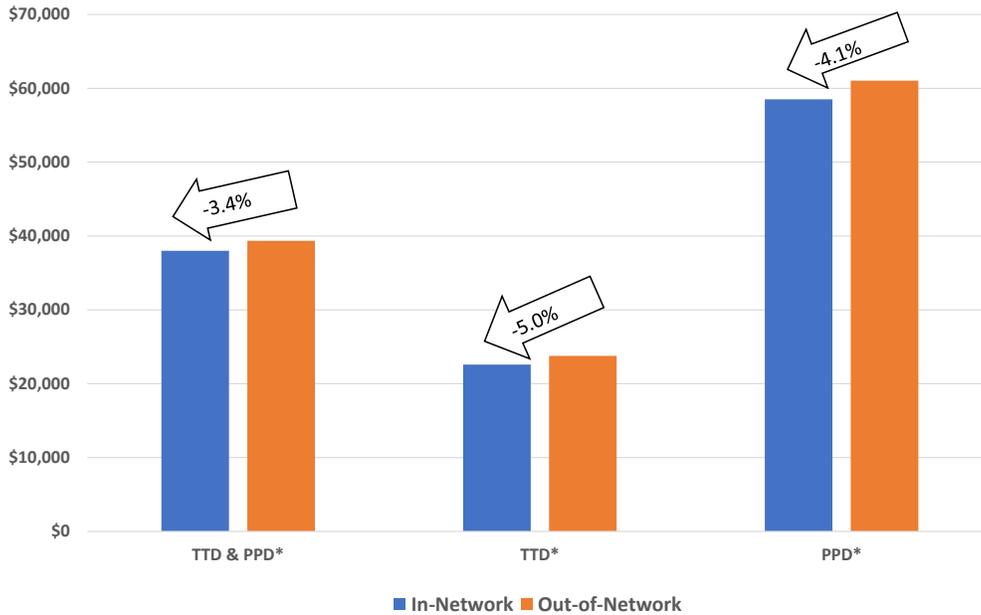
* Difference is statistically significant at the 95% level

- We find that for all 10 injuries, the average total cost per claim for out-of-network claims is greater than or not significantly different from that for in-network claims
- As expected, the injury dictates the medical care and lost time benefits. We see a strong correlation among the 10 injuries between the cost per claim for the out-of-network and in-network claims (correlation coefficient = 0.999)
- For six of the 10 injuries, that strong correlation combines with relatively small differences to produce average total costs per claim that are essentially the same for in-network as for out-of-network claims

Comparing Exhibit 6 for total cost per claim with Exhibit 5 for indemnity, both show costs per claim that are typically higher for out-of-network claims than for in-network claims; however, the pattern is clearer and more consistent for indemnity. Although MPNs are directly involved in delivering medical care, we find the evidence associating MPNs with lower indemnity costs to be the more compelling.

Exhibit 7 shows the average total incurred cost per claim for the TTD and PPD award-type claims, as well as for the two combined.

Exhibit 7: In-Network vs. Out-of-Network Total Incurred Cost per Claim by Award Type

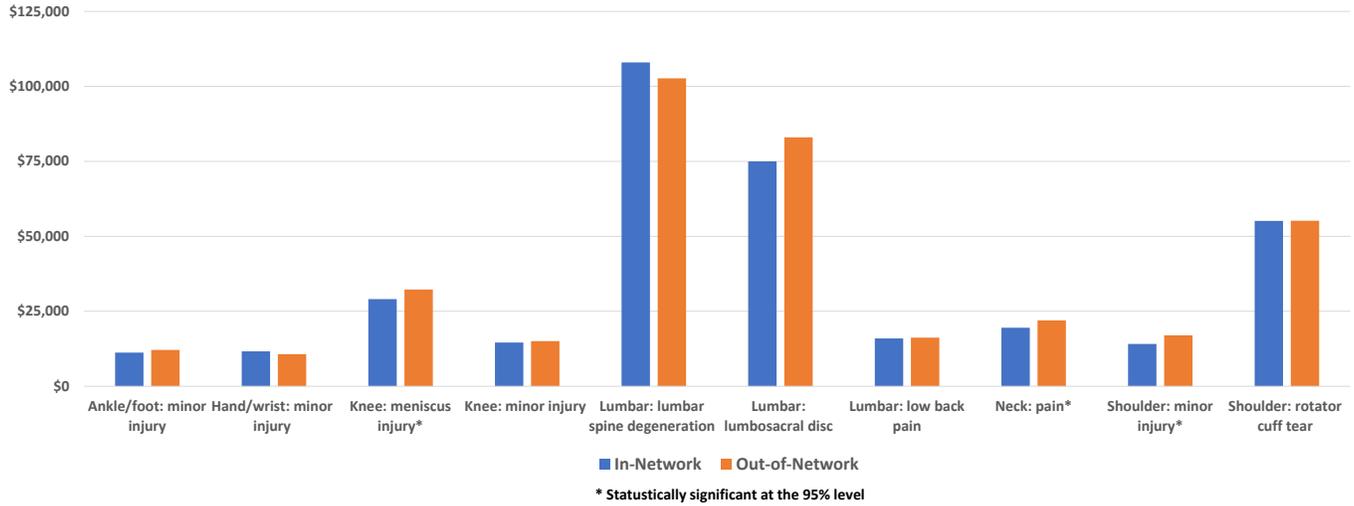


* Difference is statistically significant at the 95% confidence level

For TTD and PPD claims together, the total incurred cost per claim for in-network claims is 3.4% below that for out-of-network claims. That percentage is not between the -5.0% and the -4.1% for the PPD and TTD subsets of claims, respectively. This is due to in-network and out-of-network claims having a different mix between temporary and permanent awards (the WCSP market basket does not control for award type). As shown on Exhibit 10, PPD cases account for a greater share of in-network claims than for out-of-network claims. So, when the two are pooled together, the in-network claims get a greater share of the more costly PPD claims than the out-of-network claims. This increases the in-network average cost per claim relative to the out-of-network cost per claim, bringing the two averages closer to one another when TTD and PPD are combined.

The total incurred cost for temporary total disability claims is sensitive to outcomes, particularly to how soon the worker returns to work, which affects both indemnity and medical costs. Exhibit 8 compares the average cost per claim between in-network and out-of-network TTD claims by type of injury.

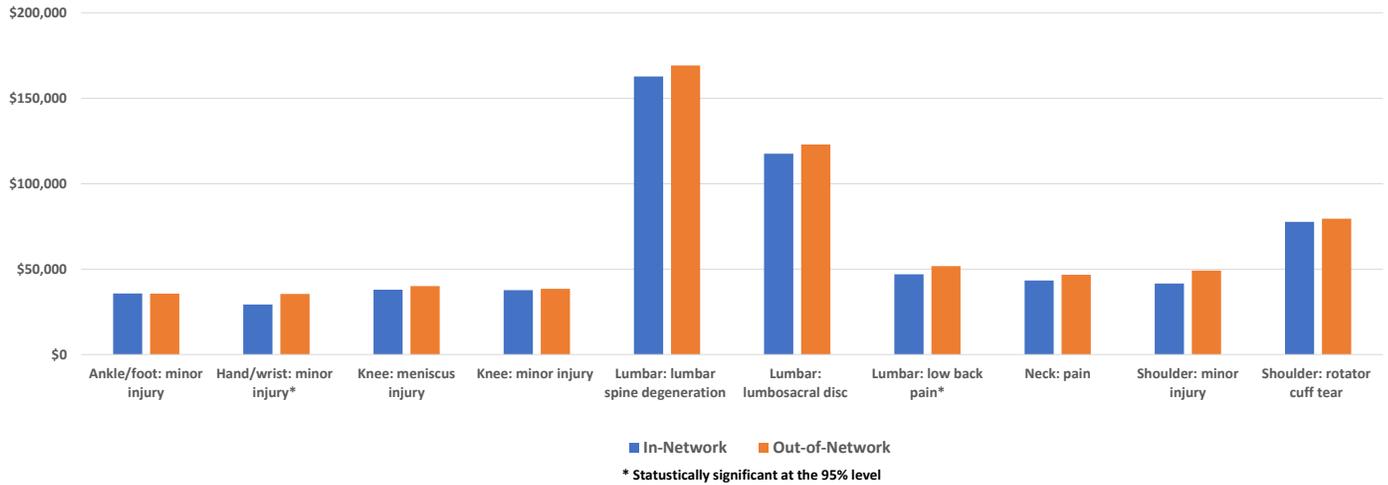
Exhibit 8: In-Network vs. Out-of-Network Total Incurred Cost per Temporary Total Claim by Injury Type



- Among the 10 injuries, the total incurred cost per claim is correlated between the out-of-network and in-network TTD claims (correlation coefficient = 0.995)
- With that correlation and relatively small differences, the difference in the average total incurred costs per claim for the in-network and the out-of-network TTD claims is statistically significant for only three of the 10 injuries
- For the three injuries with significant differences, the average total cost per claim for the out-of-network TTD claims is greater than that for the in-network claims

The incurred cost for permanent partial disability claims is also sensitive to outcomes, such as the degree of chronic physical impairment or loss of earnings capacity. Exhibit 9 compares the average cost per claim between in-network and out-of-network PPD claims for the 10 types of injuries.

Exhibit 9: In-Network vs. Out-of-Network Total Incurred Cost per Permanent Partial Claim by Injury Type

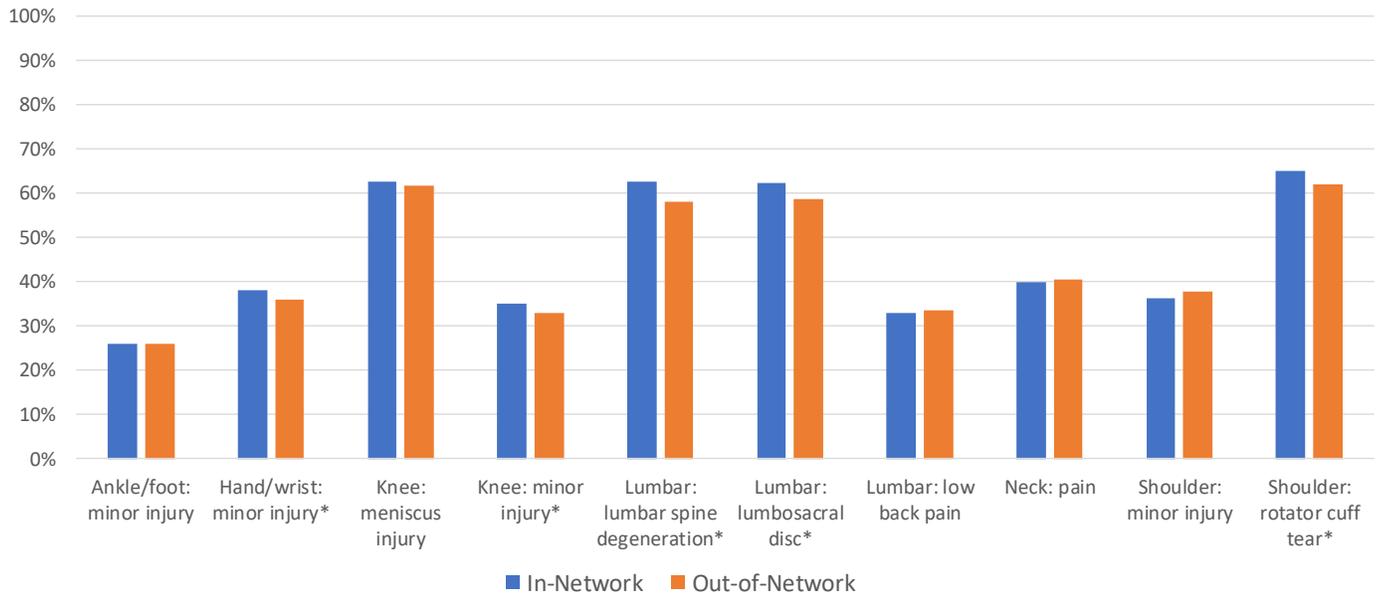


- Among the 10 injuries, the total incurred cost per claim is correlated between the out-of-network and in-network PPD claims (correlation coefficient = 0.999)
- With that correlation and relatively small differences, the difference in average total incurred costs per claim for the in-network and the out-of-network PPD claims is statistically significant for only two of the 10 injuries
- For the two injuries with statistically significant differences, the average total cost per claim for the out-of-network PPD claims is greater than that for the in-network claims

From the discussion following Exhibit 7, it is important to consider the type of award when comparing costs for TTD and PPD claims. A major consideration is simply the large cost differential between PPD and TTD claims.

Another consideration is that the award often depends on what is found on an independent medical exam (IME). Those findings may reflect an injury assessment that is independent of diagnostic information gathered from the billings of treating physician(s). This provides another perspective on whether there is selection bias from more serious injury cases being shifted into a provider network. For each of the 10 injuries, Exhibit 10 compares the proportion that are PPD cases between in-network and out-of-network claims for TTD and PPD cases.

Exhibit 10: In-Network vs. Out-of-Network Permanency Award Share by Injury Type

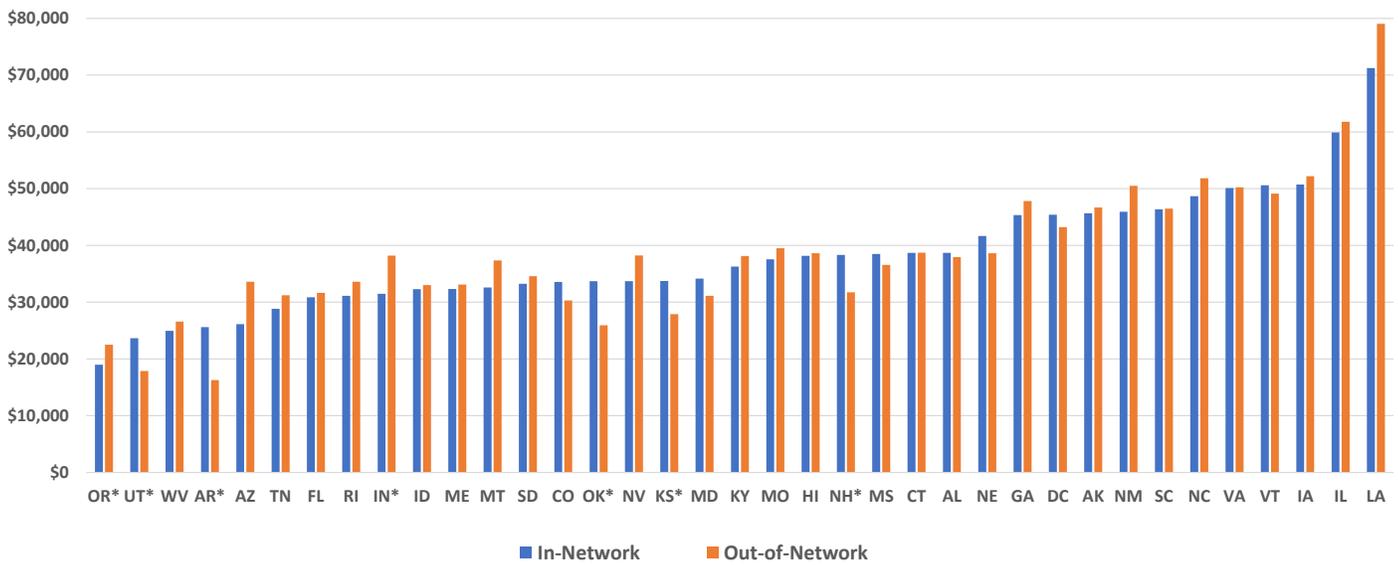


* Difference is statistically significant at the 95% level

- Among the 10 injuries, the permanency shares are correlated between the out-of-network and in-network claims (correlation coefficient = 0.994)
- The difference in the average permanency share between the in-network and the out-of-network claims is statistically significant for half of the 10 injuries
 - For the five having statistically significant differences, which include the more severe back and shoulder injuries, the permanency share for the in-network claims is greater than that for the out-of-network claims.
 - Higher in-network shares of permanent injury awards for the more serious back and shoulder injuries suggests the possibility of some referral bias, i.e., more serious injuries are more likely to be referred into an MPN. Also, MPN doctors may be better acquainted with the processing of WC claims and may be more likely to call for an IME.

Our cost comparisons between in-network and out-of-network claims have primarily been by injury, combined with provider type for medical paid and combined with award type for total incurred. By state, there are differences such as compensability standards, choosing or changing medical providers, benefit provisions, and in medical fee schedules. While within a state such items are the same in or out of an MPN, the two cost impacts may vary and act to offset one another. These are some of the considerations that make state comparisons more challenging. In-network and out-of-network claims at the state level may be the subject of a future study. To illustrate some of the complexity and challenges, Exhibit 11 compares average total costs by state between in-network and out-of-network claims.

Exhibit 11: In-Network vs. Out-of-Network Total Incurred Cost per Claim by State



* Difference is statistically significant at the 95% level

- Differences in average total incurred costs per claim between in-network and out-of-network claims are not statistically significant for most states, and the significant and nonsignificant differences go in both directions.
- The largest out-of-network average is more than four-and-a-half times the smallest, while for in-network averages, the factor is three-and-a-half times. The smaller in-network ratio may be partly due to MPNs that operate nationwide.
- Despite the wide range in the average cost per claim by state, the strong correlation across states (coefficient = 0.94) obscures any consistent pattern in the cost differences between the in-network claims and the out-of-network claims.
- Among the 10 states with the highest average costs (the 11 rightmost states excluding the District of Columbia), the out-of-network claims have higher average costs than the in-network claims. This holds for all but one state (Vermont), but none of the differences is statistically significant.
- Among the other 27 states (including the District of Columbia), 11 have a higher average total incurred cost per claim for in-network claims than for out-of-network claims, including five of the seven states with statistically significant differences.

Such mixed results confound the ability to draw general conclusions at a state level, without further and more detailed examination.

CONCLUSION

When comparisons are done by injury type, there is generally a strong correlation and relatively small differences in average costs—both medical and indemnity—between in-network and out-of-network claims. This suggests that the cost impact of MPNs is largely constrained by the medical condition. However, when differences were statistically significant, the in-network claims exhibited the lower average incurred cost per claim.

Comparing claims managed in-network to those managed out-of-network for 10 common WC injuries (all states combined):

- Average paid medical costs are higher in-network for the more costly back and shoulder injuries and lower for several less serious injuries (Exhibit 2)
- For most injuries, in-network claims have a lower rate of admission to a hospital than out-of-network claims (Exhibit 4)

Moving from medical payments to incurred costs for temporary total (TTD) and permanent partial (PPD) cases:

- For all injuries, the indemnity incurred cost per claim for in-network claims is lower than that for out-of-network claims (Exhibit 5)
- For the 10 injuries combined, the total incurred cost per claim for in-network claims is 4% lower for PPD and 5% lower for TTD claims than for out-of-network claims (Exhibit 7)
- For the 10 injuries and for both PPD and TTD claims, the in-network total incurred cost per claim is lower than or essentially the same as the out-of-network cost per claim (Exhibits 8 and 9)
- For some injuries, in-network claims are more likely to have permanent injury awards than out-of-network claims (Exhibit 10)

Among the 10 injury types, costs were more consistently lower in-network for indemnity incurred than for medical paid. Since indemnity costs are sensitive to outcomes like return to work, this aligns with an evolving MPN focus of improving outcomes along with reducing prices.

One plausible explanation why in-network claims were not found to cost less for the more costly cases is the possibility of referral bias, i.e., more serious injuries being more likely to be directed into MPNs. We found some indirect evidence for such bias:

- Higher hospital in-network admission rates for the more severe back injuries, yet lower in-network admission rates for the other injuries (Exhibit 4)
- Higher shares of permanent injury awards going to in-network claims than to out-of-network claims for the more serious back and shoulder injuries (Exhibit 10)

It is also plausible that some MPN providers, possibly being better acquainted with how WC cases are administered, may alter their care for extra-medical reasons. For example, they may be more likely to refer a patient for an impairment rating.

To summarize, we relate MPN management of medical care with a total cost savings on a nationwide basis, with indemnity savings outweighing extra medical—but state results vary.

APPENDICES

A. Sensitivity of Assumptions on Window and Thresholds

Exhibit A.1 and Exhibit A.2 are analogs of Exhibits 1 and 2, respectively. Exhibit A.1 and Exhibit A.2 are produced under four alternative assumptions to the 60%/40% in/out-of-network claim E&M threshold and 360-day window used in the study exhibits:

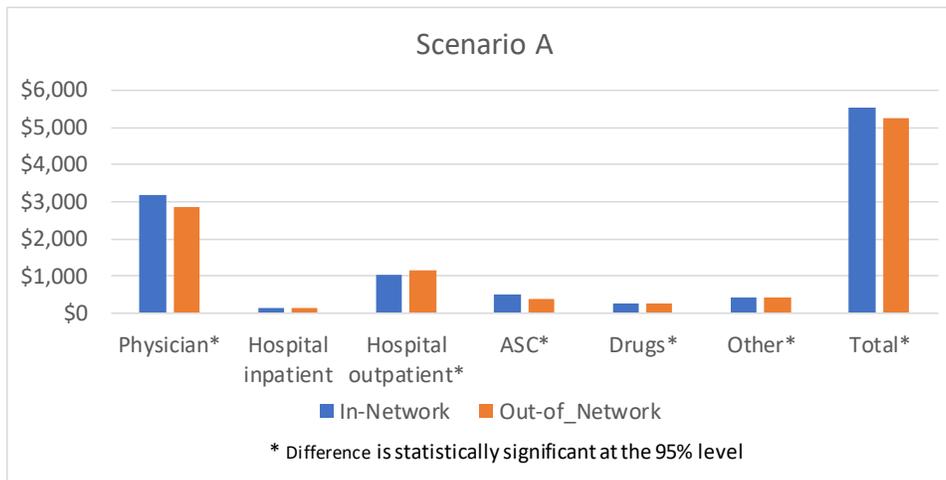
- Scenario A: 80%/20% and 360-day window
- Scenario B: 60%/40% and 90-day window
- Scenario C: 60%/40% and 720-day window
- Scenario D: 95%/05% and 360-day window

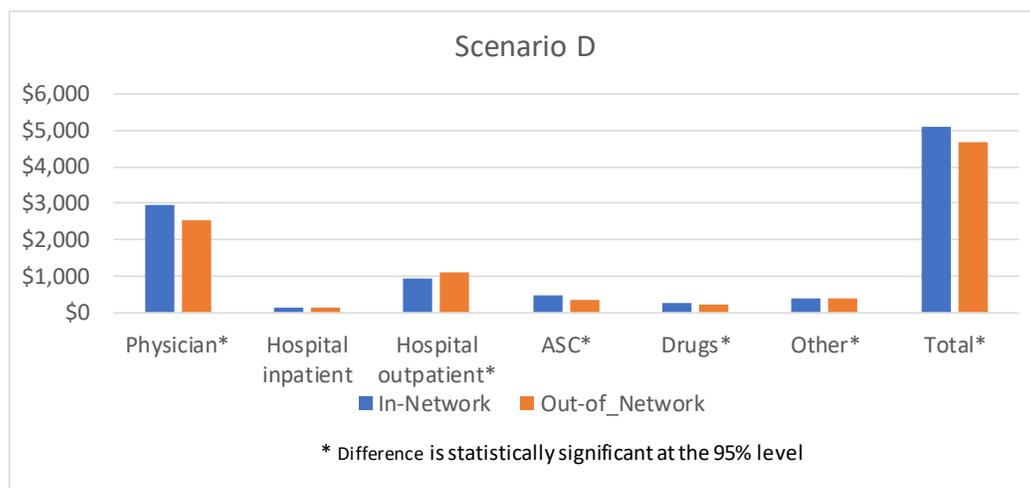
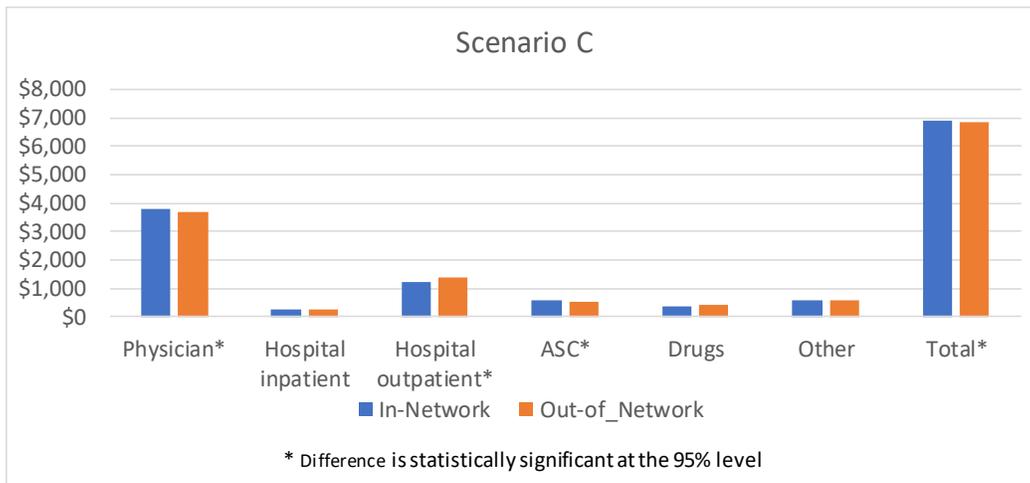
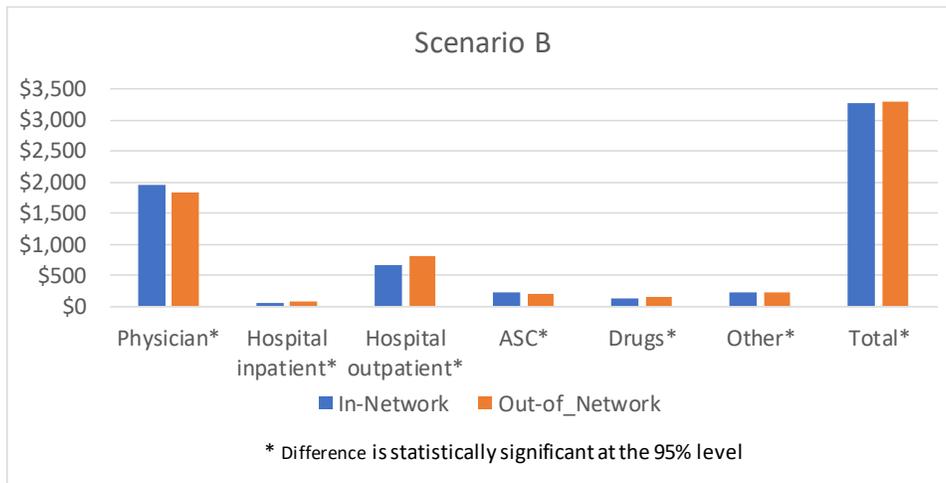
The patterns are like those in Exhibits 1 and 2 and support essentially the same observations.

In Exhibit 1 and for all four alternative scenarios (Exhibit A.1), the average medical paid per claim for physician services is significantly higher for the in-network claims than for the out-of-network claims. For all five scenarios, the average for hospital outpatient services is significantly higher for the out-of-network claims than for the in-network claims.

For Scenario A and more so for Scenario D, the differences in average paid per claim between the in-network and the out-of-network claims are more pronounced than in Exhibits 1 and 2. This is because the 80%/20% and 95%/05% threshold criteria require more separation between the in-network and out-of-network claims than the 60%/40% threshold.

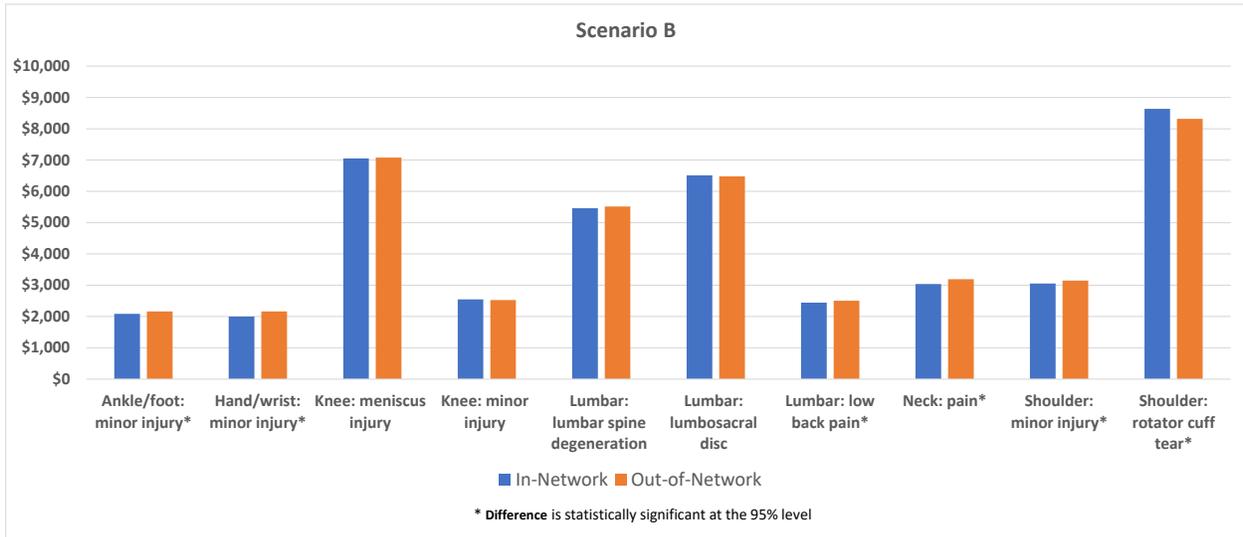
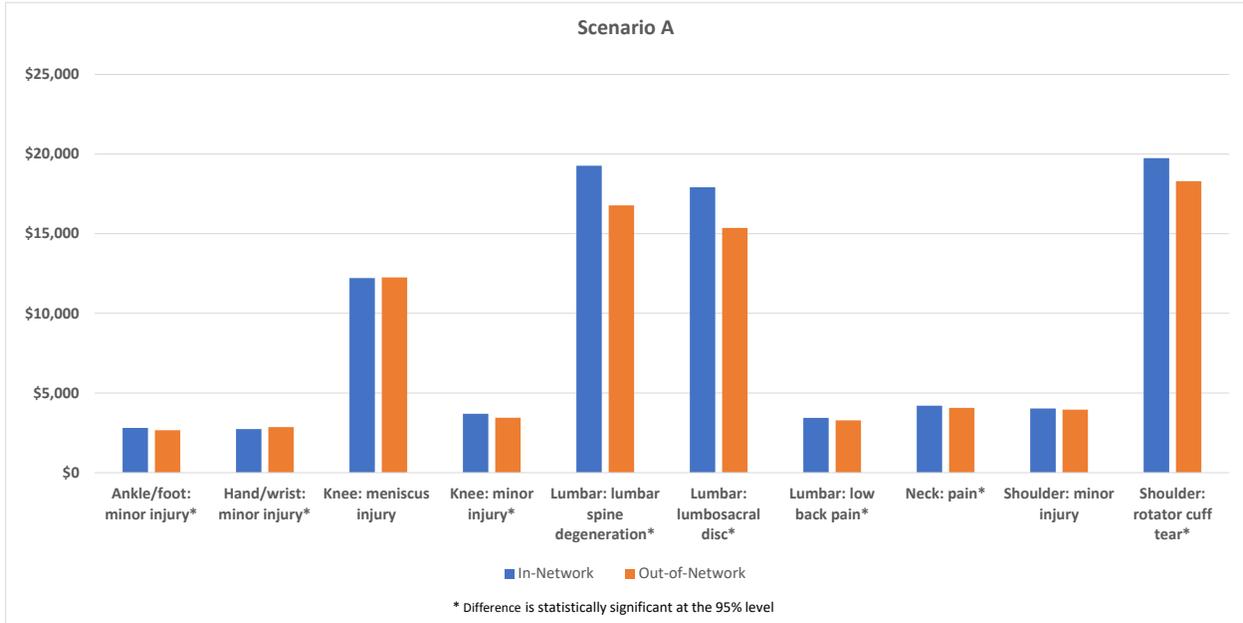
Exhibit A.1: In-Network vs. Out-of-Network Average Paid Medical by Scenario and Provider Type

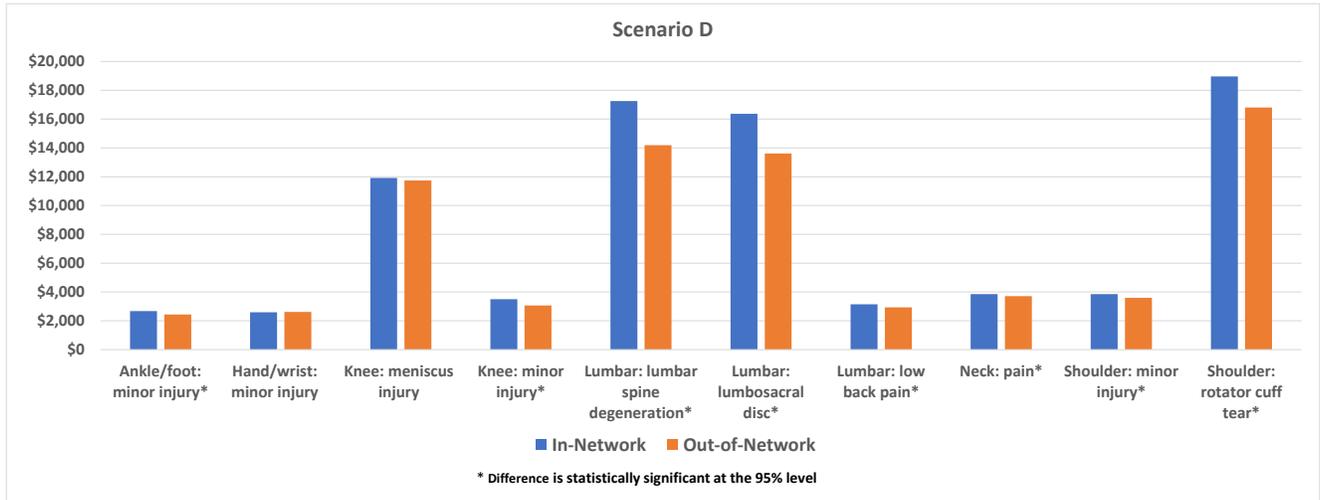
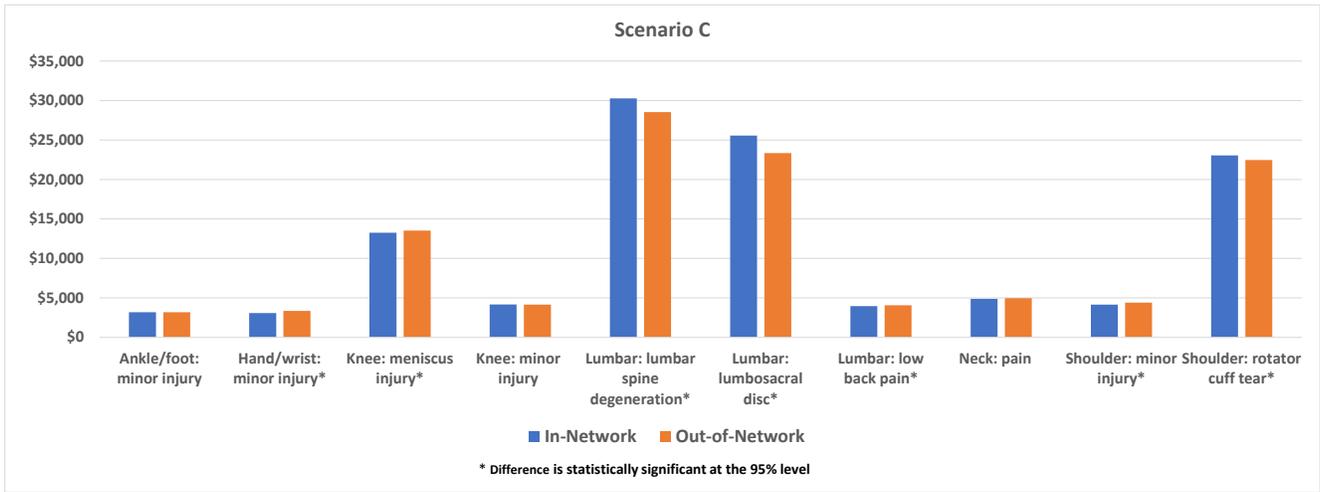




In Exhibit 2, the average paid medical for the more severe back and shoulder injuries are significantly higher for the in-network claims than for the out-of-network claims; this holds for all but Scenario B (Exhibit A.2). Those differences in the more costly claims do not emerge for the shorter 90-day window of Scenario B.

Exhibit A.2: In-Network vs. Out-of-Network Average Paid Medical by Scenario and Injury Type

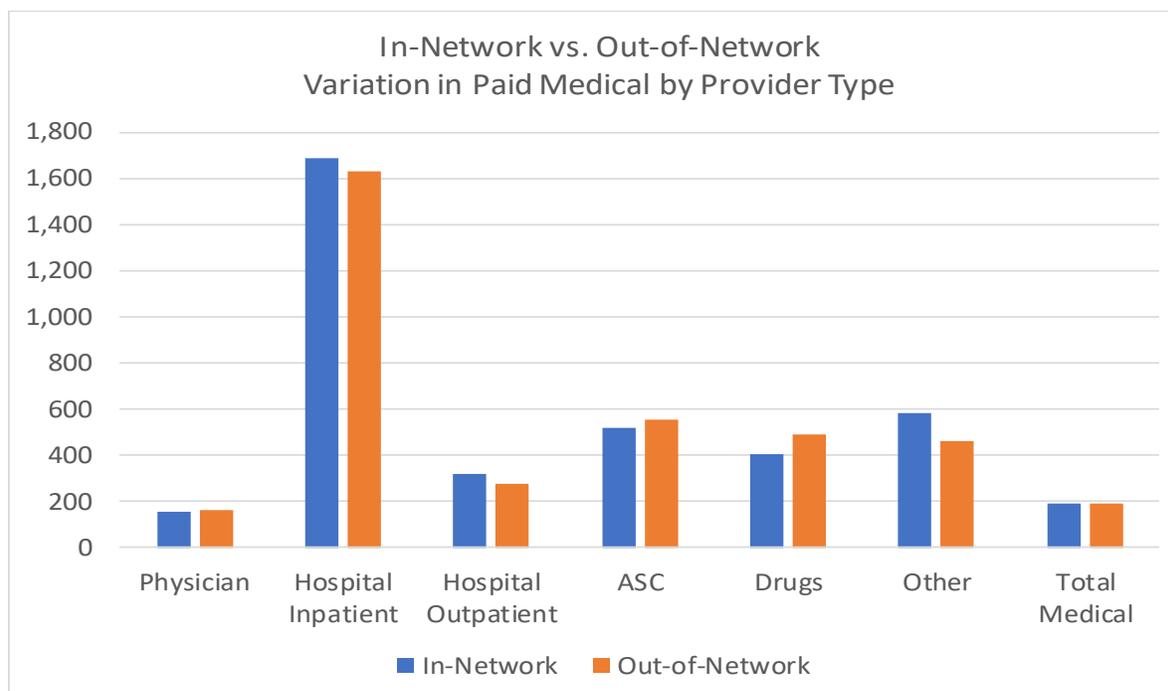




B. Cost Variation

A useful measure of the variability of claim costs is the coefficient of variation (CV), which equals the standard deviation divided by the mean cost per claim (and here multiplied by 100). All else equal, the greater the CV, the more variable the cost. Exhibit B.1 plots the CV to compare the variation in paid medical costs by provider type between comparable in-network and out-of-network claims. Exhibit B.1 is a companion exhibit to Exhibit 1 of the article, which plots the corresponding mean cost per claim:

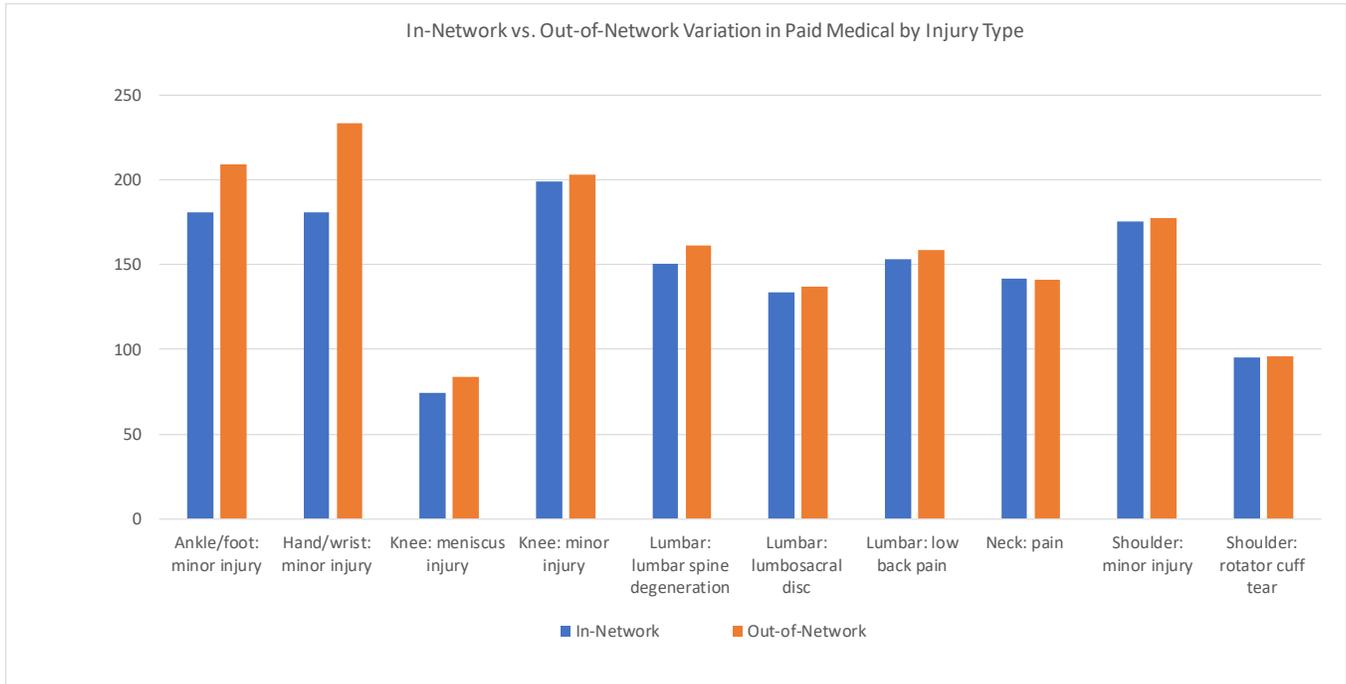
Exhibit B.1: In-Network vs. Out-of-Network Variation in Paid Medical by Provider Type



- Most claimants are not admitted to a hospital and for those claims, the hospital inpatient cost is zero. But when a claimant is admitted, the costs for the admission can be very large. Accordingly, inpatient costs are, by far, the most variable for both in-network and out-of-network claims.
- Physician services are the least variable for both in-network and out-of-network claims.
- In-network variation in cost per claim is less than out-of-network for some types of providers and greater for others.
- The overall variation is similar for in-network and out of network claims, with differences by provider type offsetting one another (reminiscent of what was observed in the article for average costs by provider type in Exhibit 1).

For each of 10 common WC types of injury, Exhibit B.2 again uses the CV (the standard deviation divided by the mean cost per claim and here multiplied by 100) to compare the variability of costs types between comparable in-network and out-of-network claims. Exhibit B.2 is a companion exhibit to Exhibit 2, which plots the corresponding mean cost per claim.

Exhibit B.2: In-Network vs. Out-of-Network Variation in Paid Medical by Injury Type

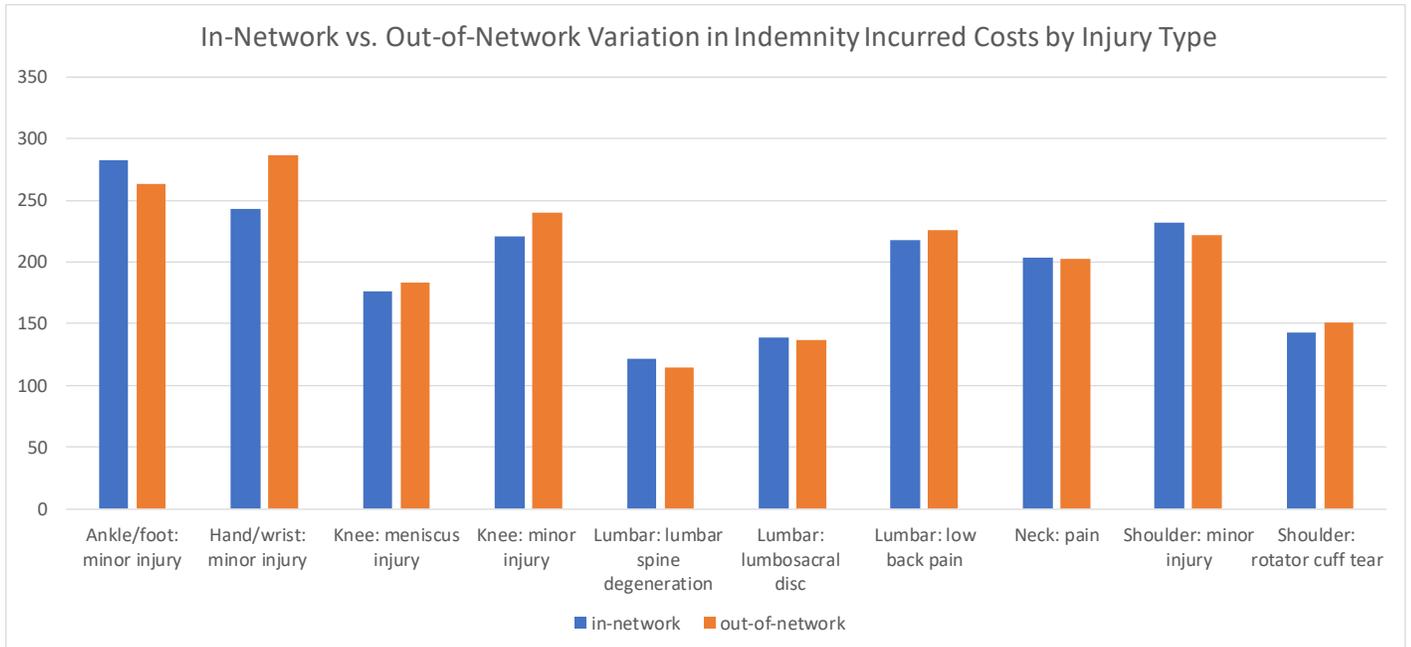


- There is correlation in the CV among the 10 injuries (correlation coefficient = 0.947)
- By injury, the out-of-network claims show higher variation than the in-network claims except for neck and shoulder injuries where the differences are small
- While Exhibit 2 shows that the Injuries to the hand or foot have the smallest average cost per claim among the 10 injuries, they have comparatively high CVs and larger differences, with the CVs for the out-of-network claims greater than for the in-network claims

The last observation suggests that MPNs may provide more consistent treatment of cases involving the extremities.

For each of 10 common WC injuries, Exhibit B.3 uses the CV to compare the variation in indemnity costs between the in-network and out-of-network claims. While not a perfect measure of outcomes, indemnity costs are sensitive to outcomes, like return to work and chronic impairment. Exhibit B.3 is a companion exhibit to Exhibit 5 for the corresponding mean cost per claim:

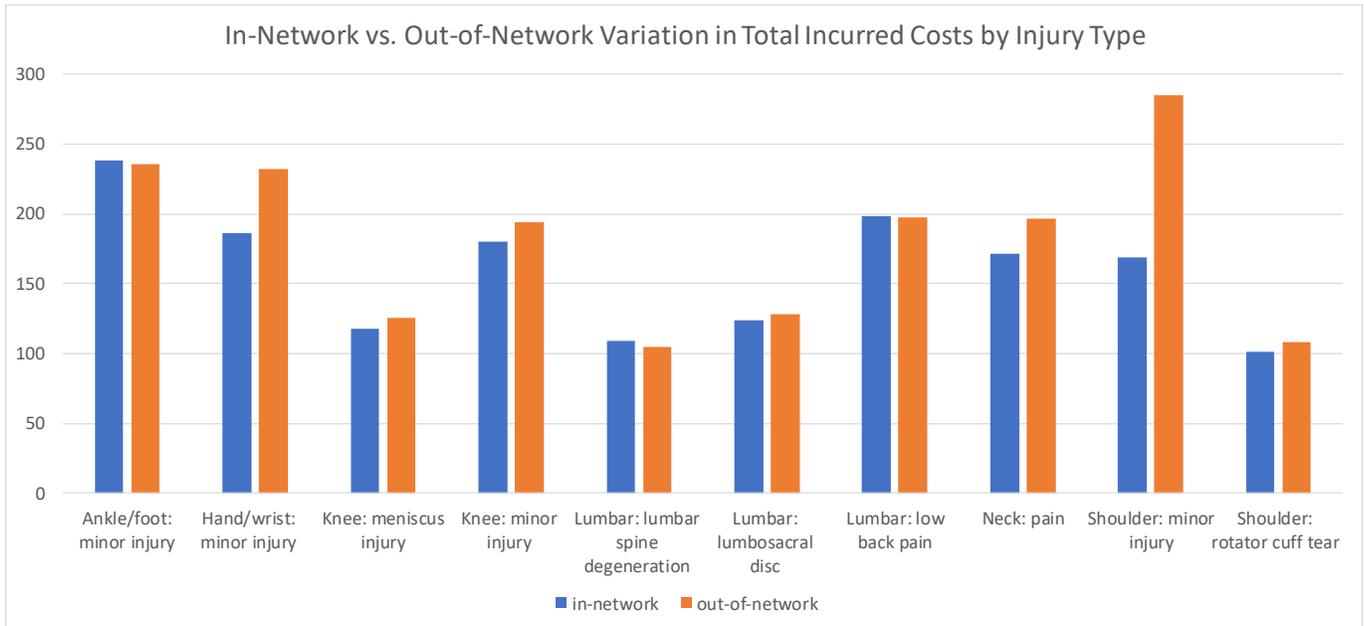
Exhibit B.3: In-Network vs. Out-of-Network Variation in Indemnity Incurred Costs by Injury Type



- The relative magnitudes of variation among the 10 injuries are similar between the out-of-network and in-network claims
- For half of the injuries, the out-of-network claims show somewhat greater variation in indemnity costs than the in-network claims, and less variation for the other five injuries
- Although the average indemnity incurred cost per claim for the out-of-network claims is greater than that for the in-network claims for all 10 injuries (Exhibit 5), there is no evidence that networks have a consistent impact on the variation of indemnity costs by injury type

For each of 10 common WC injuries, Exhibit B.4 uses the CV to compare the variation in total incurred cost per claim between the in-network and out-of-network claims. Exhibit B.4 is a companion exhibit to Exhibit 6 for the corresponding mean cost per claim:

Exhibit B.4: In-Network vs. Out-of-Network Variation in Total Incurred Cost per Claim by Injury Type



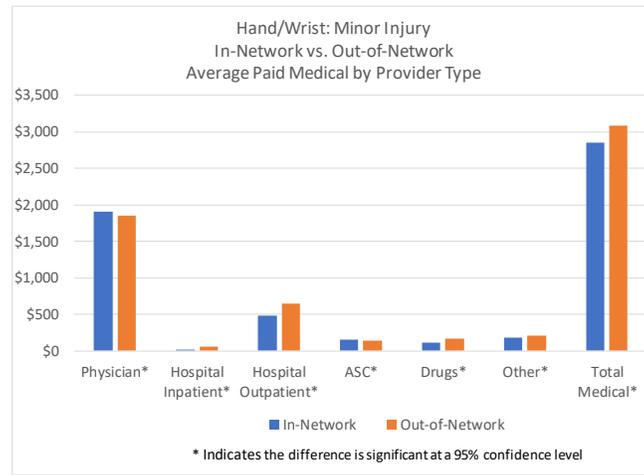
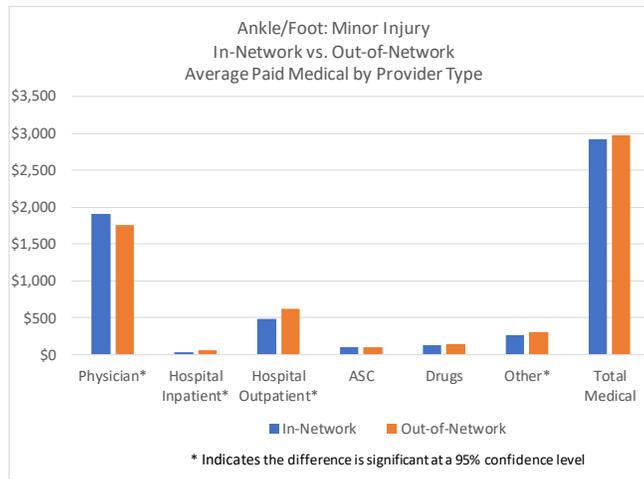
- For seven of the injuries, the out-of-network claims show a greater variation in total incurred costs than the in-network claims, and only a slightly less variation for the other three injuries
- Although the average total incurred cost per claim for the out-of-network claims (in the denominator of the CV) is greater or similar to that for the in-network claims for all 10 injuries (Exhibit 7), the CV for the out-of-network claims is greater or similar to that for the in-network claims

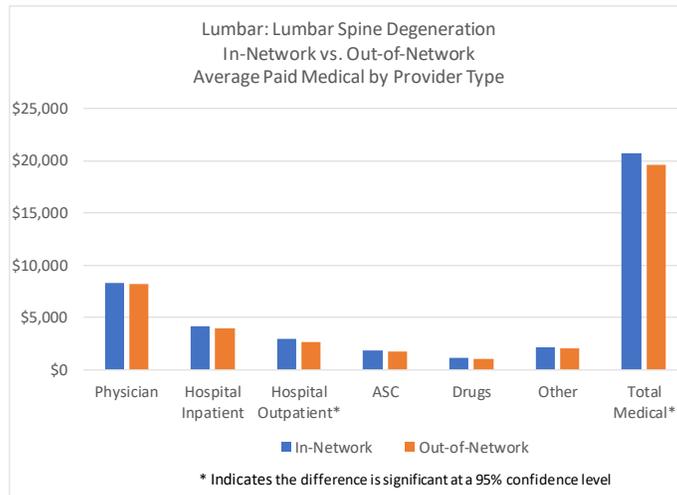
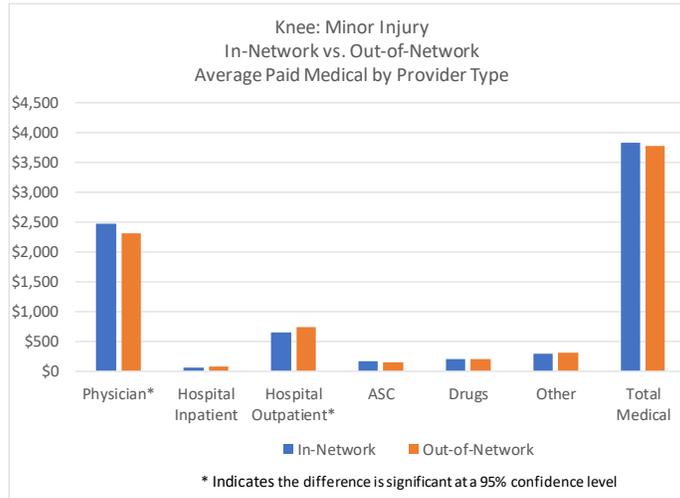
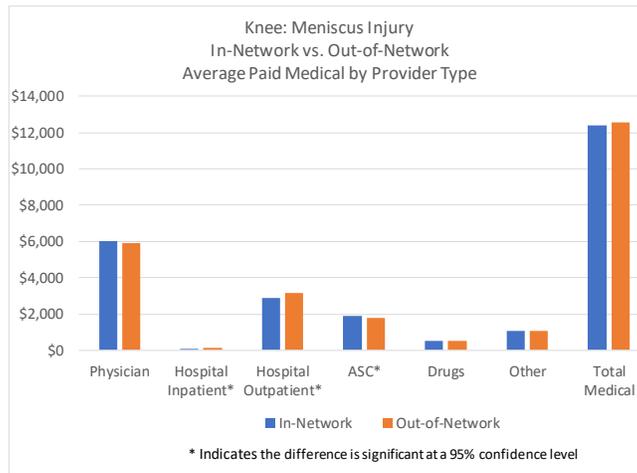
Often having no outward sign of injury, shoulder cases may be hard to diagnose. Diagnostic expertise may help explain the higher variation and higher average cost for out-of-network shoulder claims than for in-network claims. In-network physicians may have more experience treating occupational shoulder injuries.

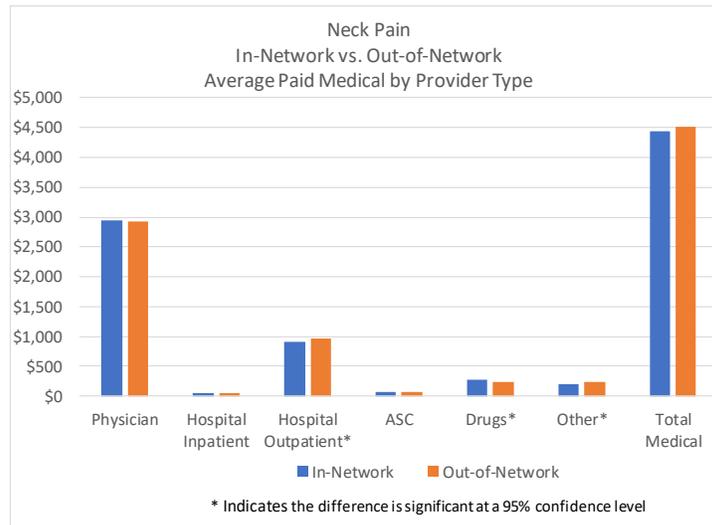
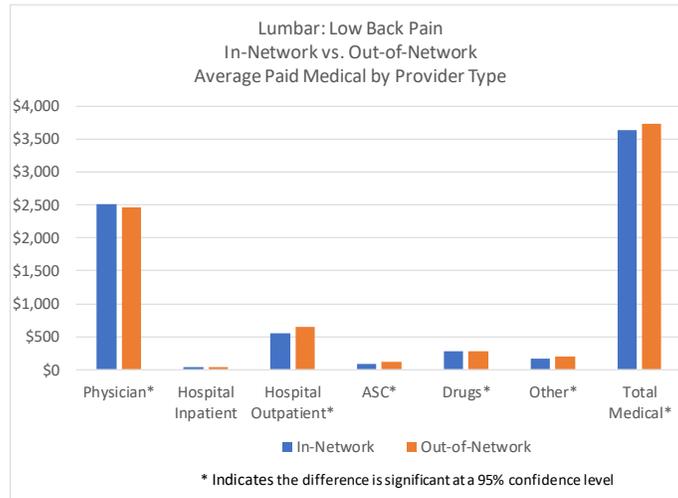
C. Average Cost per Claim Comparison by Type of Injury and Provider Type

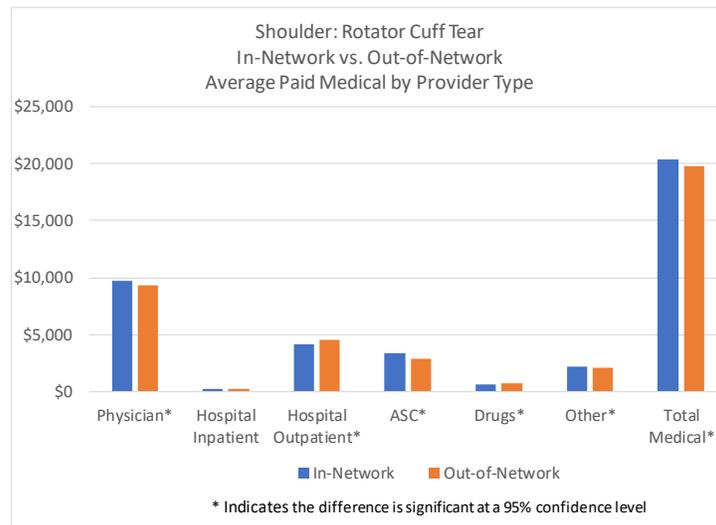
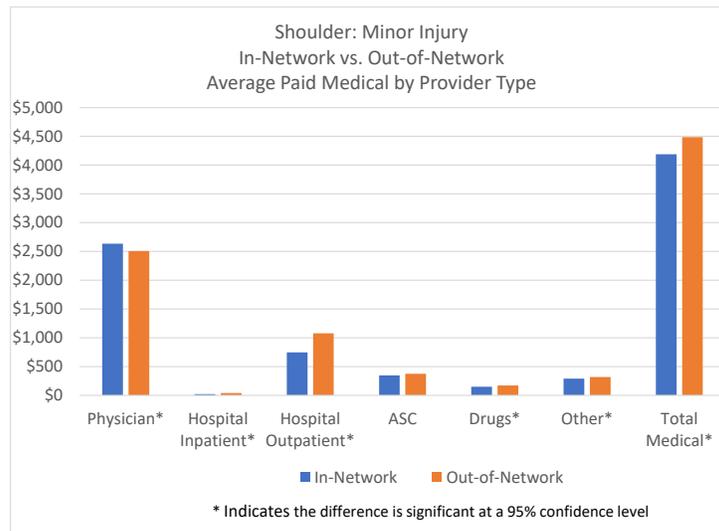
Exhibit 2 compares average medical paid by provider type between in-network and out-of-network claims. Exhibit 3 specializes the comparisons to lumbosacral disc injuries. Exhibit C.1 provides that specialization for each of the other nine injuries.

Exhibit C.1: In-Network vs. Out-of-Network Average Paid Medical by Type of Injury and Provider Type









Combining Exhibit 3 with Exhibit C.1:

- Physician costs are higher for in-network claims than for out-of-network claims for all 10 injuries and significantly higher for all but three, where the average costs per claim for physician services are too close for the differences to be meaningful (meniscus injury, spine degeneration, and neck pain).
- For eight of the 10 injuries, Hospital Outpatient costs are higher for out-of-network claims than for in-network claims. Differences for all 10 injuries are statistically significant.
- Hospital Outpatient costs are higher for in-network claims than for out-of-network claims for the two more serious back injuries (lumbar spine degeneration and lumbosacral disk), the two injuries for which Hospital Inpatient costs make the largest contribution to Total Medical.