



Medical Services and How They Contribute to the Cost of WC Claims

INTRODUCTION

It is clear that a more severe claim (e.g., a torn knee ligament) requires a greater number of more complex medical services than does a less severe claim (e.g., a minor contusion). Additionally, the most severe claims often require major surgery and a hospital stay after which costs generally shift toward palliative care. In other words, the mix of medical services for a claim varies by medical severity, or claim size, and by claim maturity.

Medical costs by service group¹ trend at different rates because they are influenced by different factors. An understanding of the composition of medical services by claim size and maturity, and payout rates by claim size and service group, may help us understand past cost changes and project future cost trends.

These issues were previously explored in NCCI research briefs, with the most recent published in 2011.² This paper provides updated estimates of shares of ultimate medical losses by service group and claim size range. Further, we derive medical payout rates and medical payment shares for selected relative service years.³

KEY FINDINGS

Key findings for lost-time claims are:

- The mix of medical services varies dramatically by claim size
 - ASC/Outpatient Hospital is the largest share of costs for claims less than \$500K
 - Inpatient Hospital is the largest share of costs for claims of at least \$500K
 - The Other service group's share of costs spikes for claims of at least \$1M
- Overall medical payout rates and service group payout rates tend to decrease with claim size
 - The Prescription Drugs payout rate is always slowest of all the service groups within a given size range

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¹ The 12 service groups in this study are Ambulatory Surgical Centers (ASC) and Outpatient Hospitals, Prescription Drugs, Inpatient Hospital, Major Surgery and Anesthesia, Physical Therapy, Evaluation and Management, Supplies, Other, Complex Imaging, Simple Imaging and Pathology, Emergency Services, and Minor Surgery.

² Barry Lipton, Katy Porter, Yair Bar-Chaim, John Robertson, "Medical Services by Size of Claim—2011 Update," NCCI, November 2011, available on ncci.com.

³ The first relative service year is for services provided during the calendar year of the injury. The second relative service year is for services provided during the calendar year following the year of injury, and so on.

- The mix of medical service group cost shares varies substantially by claim maturity
 - In the first five relative service years, ASC/Outpatient Hospital and Inpatient Hospital comprise the largest share of costs
 - Prescription Drugs are the largest share of costs for claims of less than \$1M past a fifth relative service year

BACKGROUND

NCCI has previously examined the mix of medical services by claim size and relative service year. The prior studies were based on sample data provided by carriers. For this study, we used a combination of Medical Data Call (MDC) and **Statistical Plan for Workers Compensation and Employers Liability (Statistical Plan)** data. It was necessary to use **Statistical Plan** data because the MDC does not contain information on indemnity losses, and claim size in this study is based on total (indemnity and medical) losses. These data sources are further described in Appendix B.

CLAIM SIZE DETERMINATION

Claim size in this study is the **Statistical Plan** total case-incurred value of a claim at 3rd report,⁴ trended to mid-year 2014. We trended data to a common point to remove the impact of claim inflation. Medical costs are trended using the Personal Healthcare Chain Weighted Deflator Series, while indemnity costs are trended using the Quarterly Census of Employment and Wages.⁵

The partitioning of MDC data into claim size ranges is a two-step process. We first assign **Statistical Plan** claims to size range based on the trended total case-incurred values of the claims at 3rd report. We then match MDC transactions by claim to the **Statistical Plan** claims. Now that the MDC transactions are slotted by size range, they are summarized by accident year, service group, and relative service year.

While individual claim sizes will generally continue to develop after 3rd report, defining claim size as we have has allowed us to establish cohorts of claims that we can then follow for up to 15 years of development. At 3rd report, a fair amount is usually known about a claim, so the incurred value at 3rd report is generally a good indication of whether the ultimate claim size will be small or large. **Statistical Plan** data at 3rd report is not due until 44 months after policy inception. When MDC data was extracted, not all of **Statistical Plan** Accident Year (AY) 2014 at 3rd report was due to have been reported. Therefore, the latest complete accident year included in this study is AY 2013. The most refined claim size ranges used are shown in Table 1 below and in Tables A.1 and A.2 of Appendix A.

ESTIMATING ULTIMATE SHARES

Many of the key results that we present are ultimate shares of given medical service groups for a size range. Ultimate shares by accident year are derived from a review of historical shares by accident year and relative service year, apparent trends in those shares, and payout patterns for size of claim ranges. Final share percentages are for the three AYs 2011 to 2013, estimated at their ultimate value after developing medical losses.

DISTRIBUTION OF LOST-TIME MEDICAL DOLLARS BY CLAIM SIZE

Table 1 shows the distribution of lost-time claim counts and medical losses by claim size range, as well as the estimated ultimate medical cost per lost-time claim. The overall estimated ultimate cost per claim is balanced to the average lost-time medical severity in NCCI's 2017 **Annual Statistical Bulletin**.

⁴ The 1st report consists of claims valued 18 months after policy inception, the 2nd report consists of claims valued 30 months after policy inception, and so on, with each report being 12 months after the previous report.

⁵ See Appendix B.

Size Range (\$)*	Distribution of Claims	Distribution of Losses	Estimated Ultimate Medical Cost per Lost-Time Claim
0 to <5K	25.8%	1.9%	2,000
5K to <10K	13.8%	2.8%	5,400
10K to <50K	37.9%	23.3%	16,400
50K to <100K	11.7%	17.7%	40,700
100K to <500K	10.2%	38.3%	100,000
500K to <1M	0.5%	7.0%	347,000
>=1M	0.1%	9.0%	1,606,000

*Size is total reported value (paid plus case reserve) at 3rd report

Table 1: Distributions of Lost-Time Claims and Medical Losses by Claim Size, AY 2011–2013

MEDICAL LOSS DISTRIBUTION BY SERVICE GROUP

Figure 1 shows the distribution of medical losses by service group for all claims and lost-time claims. There are only minor differences between the two distributions, in part because medical-only losses are a small share of total losses. Except for the appendices, in the remainder of this paper we combined the four smallest service groups into a “Miscellaneous” group. Figure 1 shows:

- The largest service group is ASC/Outpatient Hospital, which constitutes 22.3% of medical losses for lost-time claims
- The three largest service groups, ASC/Outpatient Hospital, Prescription Drugs, and Inpatient Hospital, collectively account for about 50% of medical losses for lost-time claims
- The four smallest service groups—Complex Imaging, Simple Imaging and Pathology, Emergency Services, and Minor Surgery—collectively account for less than 7% of medical losses for lost-time claims

As shown in Figure 1, the Evaluation and Management (E&M) service group represents a slightly lower percentage of medical losses for lost-time claims than it does for all claims. As we will see, E&M makes up a larger share of medical losses for smaller (i.e., less severe) claims, including most medical-only claims, than it does for larger claims.

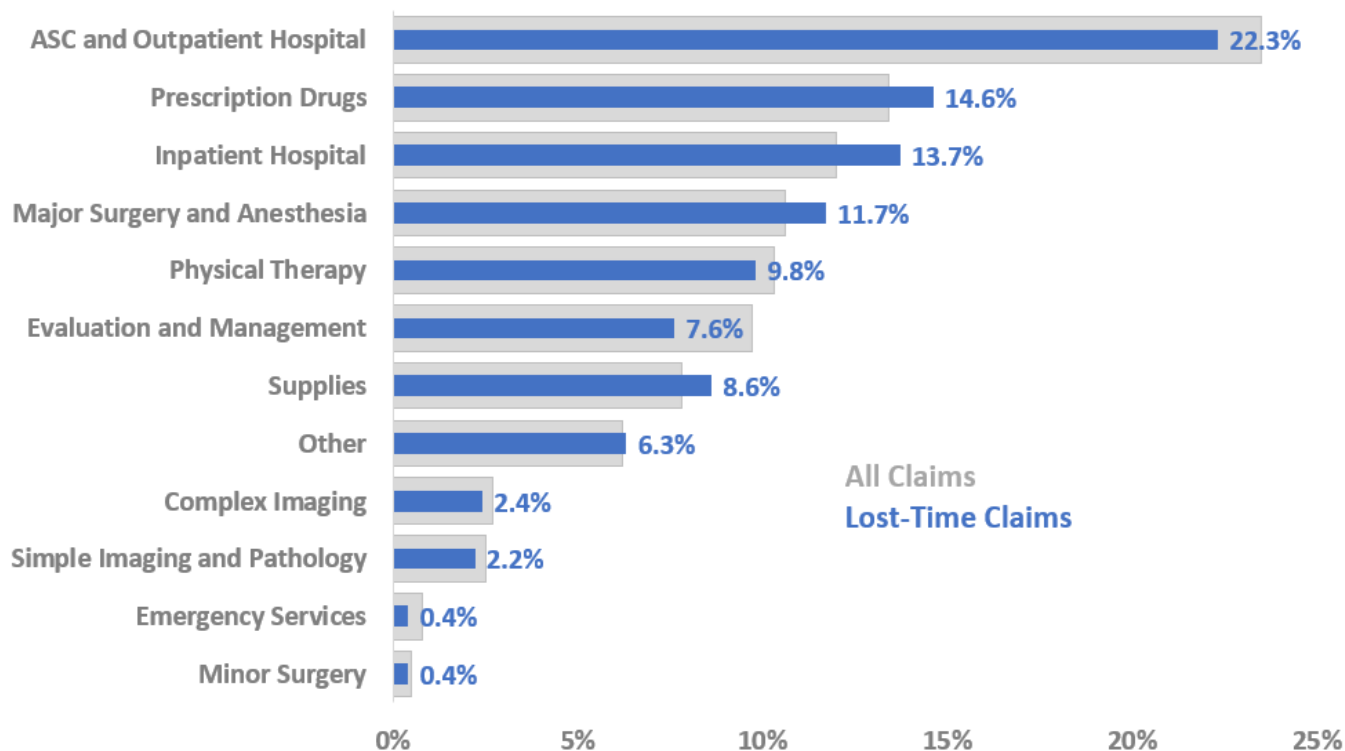
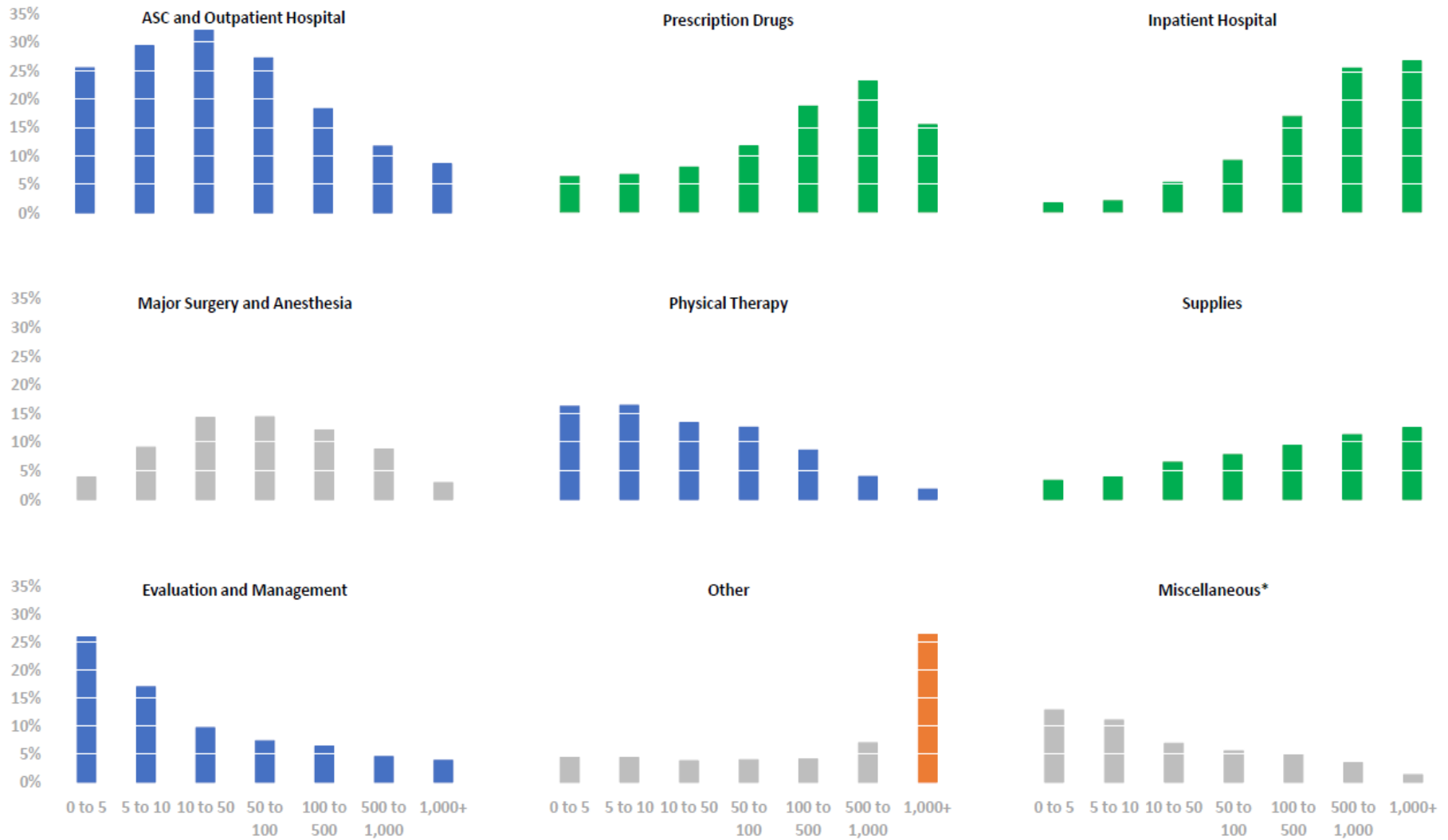


Figure 1: Ultimate Medical Loss Distributions by Service Group—AY 2011–2013



Claim size intervals in \$000s

*Miscellaneous category combines Complex Imaging, Emergency Services, Minor Surgery, and Simple Imaging and Pathology

Figure 2: Ultimate Medical Loss Distributions by Claim Size and Service Group for Lost-Time Claims—AY 2011–2013

SERVICE GROUP COST DISTRIBUTIONS BY CLAIM SIZE

Figure 2 shows the service group shares of costs by size range, with the charts ordered from largest to smallest service group (right to left and top to bottom) based on the medical loss distribution for lost-time claims shown in Figure 1. Each bar in the chart represents that service group’s share of the overall medical losses within the claim size range. The service shares by claim size underlying these charts are included in Table A.1 of Appendix A.

As the charts show, the mix of service group costs varies between small and large claims. Furthermore, certain service groups exhibit a clear pattern of increasing or decreasing shares by size range. For example, ASC and Outpatient Hospital, Physical Therapy, and E&M service groups tend to make up a larger proportion of medical losses for smaller claims than for larger claims. Conversely, Prescription Drugs, Inpatient Hospital, and Supplies are a larger proportion of medical losses for larger claims than for smaller claims.

The Other service group spikes for claims of at least \$1M. These more severe claims often require home healthcare/nursing or hospice services, which we estimate account for 57.9% of the costs for the Other service group for this size range. By contrast, these services account for only 25.5% of Other service group costs across all size ranges.

The combined shares of ASC/Outpatient Hospital and Inpatient Hospital increase with claim size range for the first three size ranges (Figure 3). Beginning with the \$10K to \$50K range, however, the average combined share of costs is steady, ranging from 35.4% to 37.4%. Further, as claim size increases, there is a clear shifting of services from ASC/Outpatient Hospital to Inpatient Hospital.

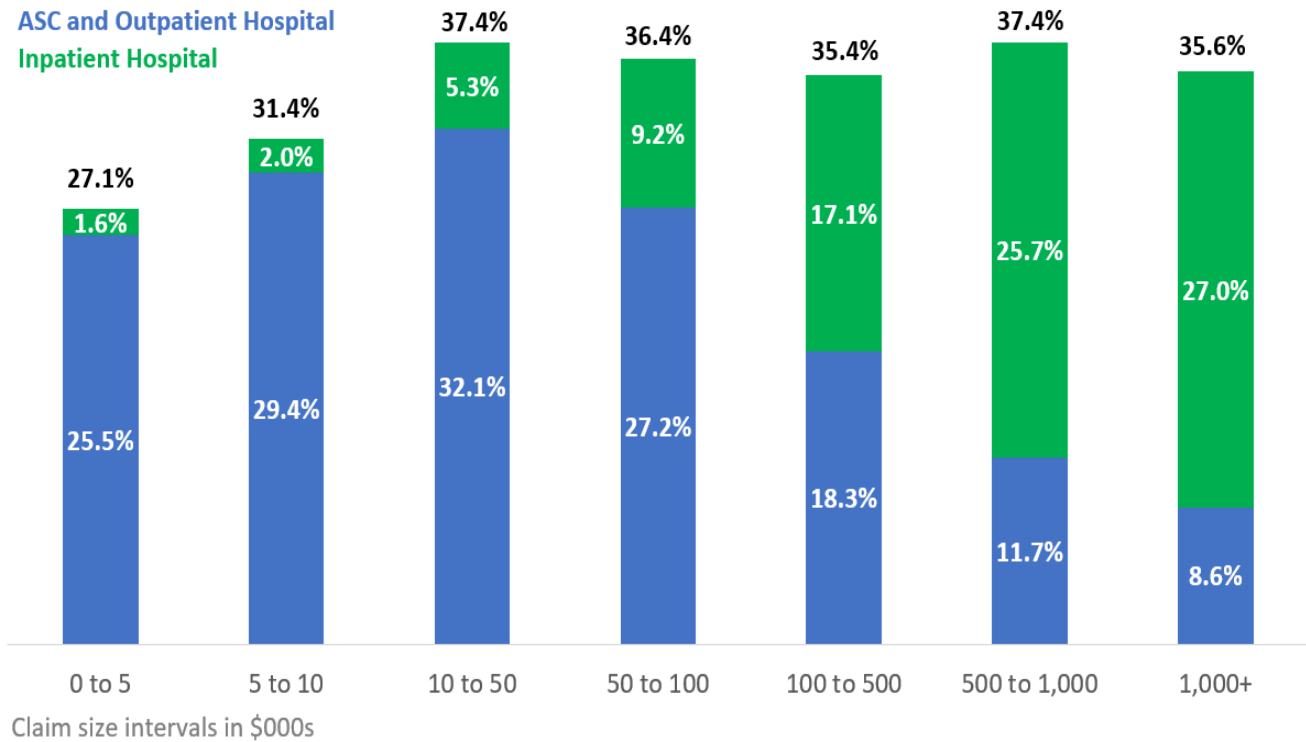


Figure 3: ASC/Outpatient Hospital and Inpatient Hospital Ultimate Medical Cost Shares by Claim Size for Lost-Time Claims—AY 2011–2013

PAYOUT PATTERNS

We now examine the relationships among payout patterns,⁶ claim sizes,⁷ and service groups. It is worth noting that the data source used in this study, MDC, does not include lump-sum claims. Therefore, the payout patterns shown will generally be slower than those that do include settlements.

Figure 4 shows payout patterns for selected claim size ranges. Unsurprisingly, larger claims tend to pay out more slowly than smaller claims. This makes intuitive sense because larger (i.e., more severe) claims are more likely to have a longer healing/treatment period. On average, 90% of ultimate medical costs are paid out by the fifth relative service year for claims of less than \$100K. By contrast, only 55% of ultimate medical costs are paid out by the tenth relative service year for claims of at least \$1M.

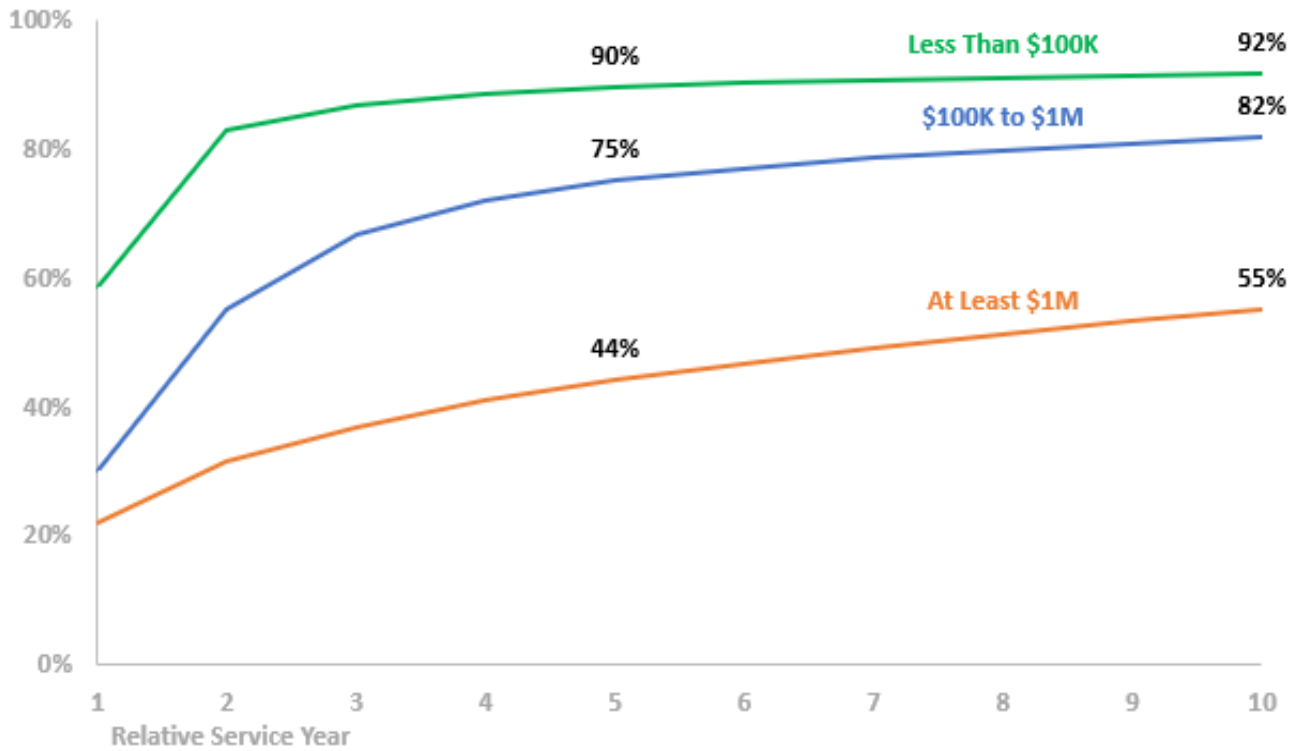


Figure 4: Medical Payout Patterns by Size Range for Lost-Time Claims—AY 2011–2013

Lost-Time Size of Claim	Relative Service Year									
	1	2	3	4	5	6	7	8	9	10
Less Than \$100K	58.8%	83.1%	87.0%	88.6%	89.6%	90.3%	90.8%	91.2%	91.6%	91.8%
\$100K to \$1M	30.3%	55.2%	66.7%	72.2%	75.2%	77.2%	78.7%	79.9%	81.0%	81.9%
At Least \$1M	22.1%	31.5%	37.0%	41.0%	44.2%	46.9%	49.3%	51.5%	53.5%	55.2%

Table 2: Medical Payout Patterns by Size Range for Lost-Time Claims—AY 2011–2013

⁶ “Payout patterns” are defined as the share of ultimate costs of services provided through given relative service years. Actual cash payments for provided services may lag the service date by some amount.

⁷ Claim size ranges have been combined to bolster credibility and more clearly display patterns.

Let’s now look at the service group payout patterns by claim size range. For claim sizes of less than \$100K, all service groups except Prescription Drugs have a similar payout pattern (Figure 5). Prescription Drugs have a markedly slower payout pattern. In fact, as we will show, the Prescription Drugs payout pattern is always slowest of all the service groups within a given size range. This observation is consistent with past analyses of medical claims by size.

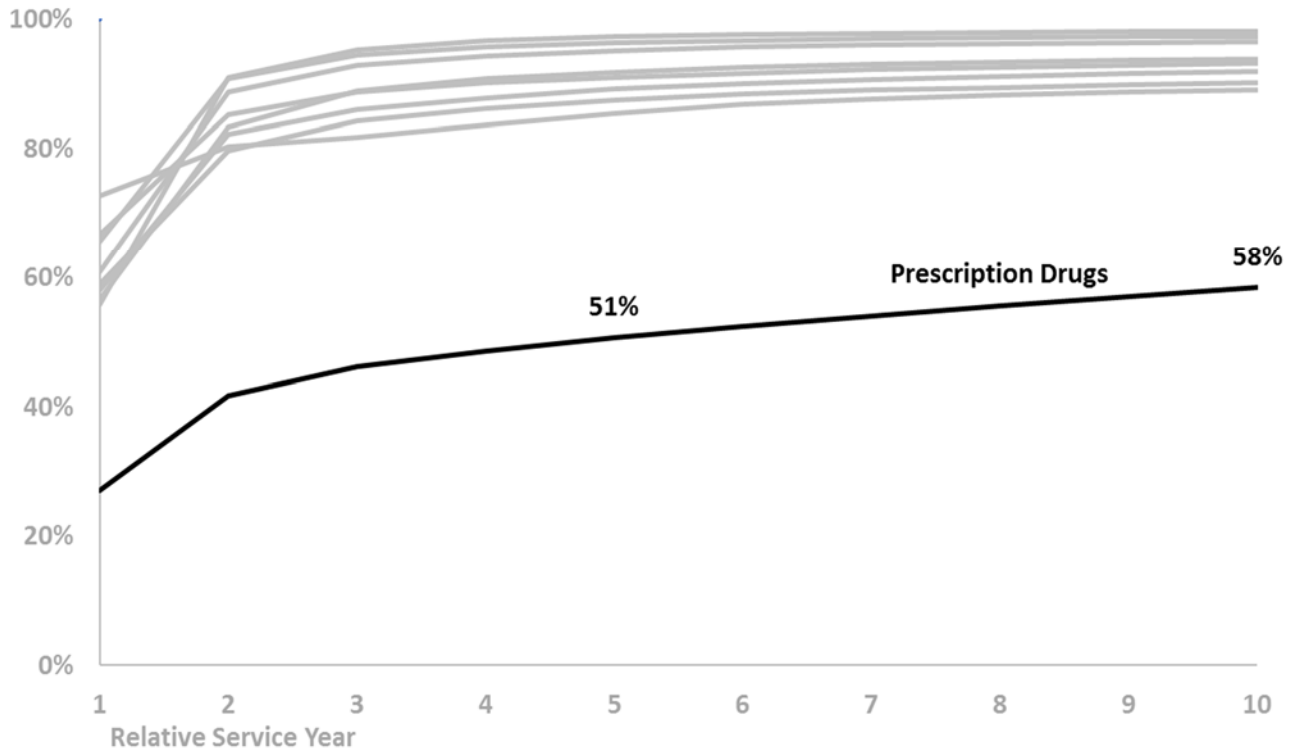


Figure 5: Medical Payout Patterns by Service Group for Lost-Time Claims, Less Than \$100K—AY 2011–2013

The service group payout patterns for claims of at least \$100K and less than \$1M (Figure 6) are slightly more dispersed than those shown in Figure 5. The Prescription Drugs service group’s payout pattern is again slowest of all the service groups, with only 49% of ultimate costs paid out by a tenth relative service year, compared to this size range’s average of 82%. After the first relative service year, the ASC/Outpatient Hospital, Inpatient Hospital, Major Surgery and Anesthesia, and Physical Therapy service groups have faster payout patterns than the E&M, Other, and Miscellaneous service groups.

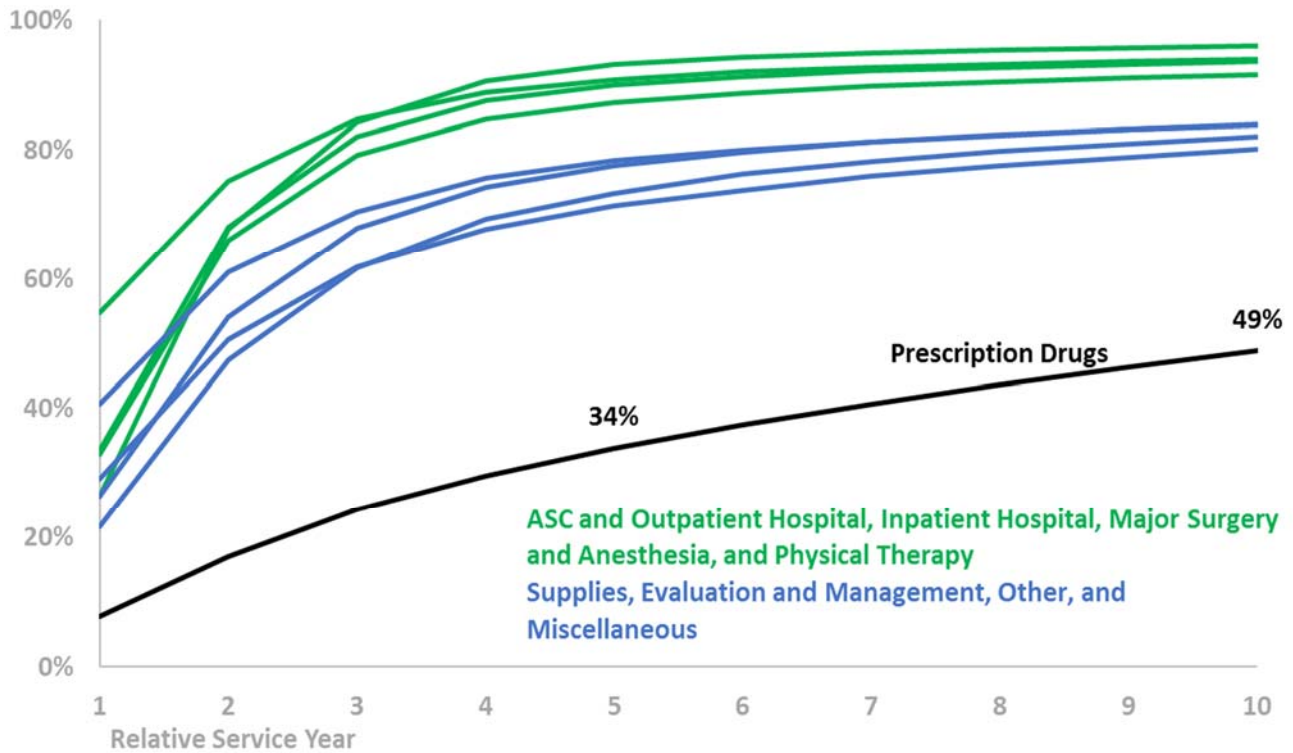


Figure 6: Medical Payout Patterns by Service Group for Lost-Time Claims, \$100K to \$1M—AY 2011–2013

For claims of at least \$1M, Inpatient Hospital, and Major Surgery and Anesthesia have the fastest payout patterns of all the service groups. Inpatient Hospital comprises the largest portion of this layer at 27%. On the opposite end of the spectrum are Prescription Drugs, Supplies, E&M, and Other, which pay out at the slowest rates. As has already been mentioned, the share of medical losses for the Other service group spikes for this claim size range. This is due to the concentration of home healthcare/nursing and hospice services associated with more severe claims.

In general, the combination of ASC/Outpatient Hospital and Inpatient Hospital service groups are the largest share of costs in the first five relative service years, regardless of claim size. Note, however, that for this size range the ASC/Outpatient Hospital payout pattern is much slower than the Inpatient Hospital payout pattern.

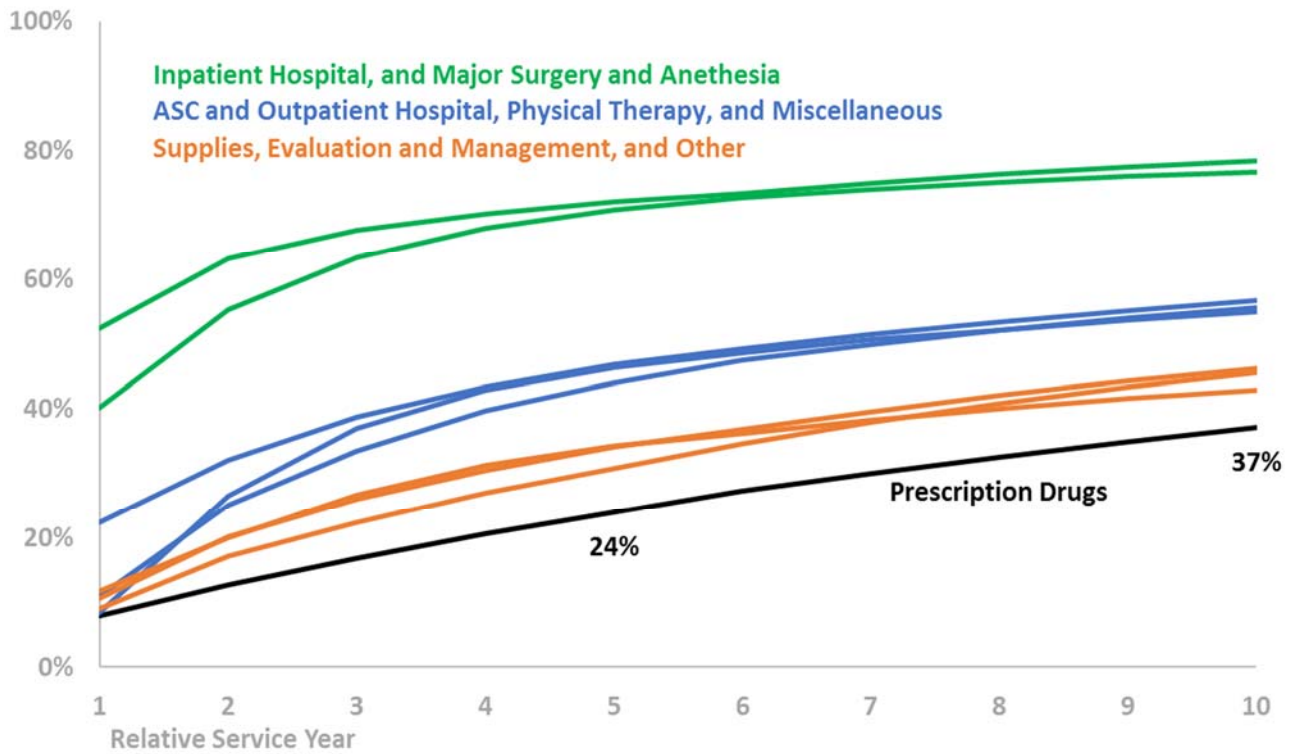


Figure 7: Medical Payout Patterns by Service Group for Lost-Time Claims, at Least \$1M—AY 2011–2013

COST SHARES BY PAYMENT PERIOD

The next three graphs contrast medical service cost distributions for an early relative service period (i.e., first through fifth relative service years) with a later relative service period (i.e., sixth through ultimate relative service years) by lost-time claim size range. For these graphs, we have combined the ASC/Outpatient Hospital and Inpatient Hospital service groups, and we will refer to this combined group as “Facilities.” We combined these service groups to illustrate how the split of Facilities into its component parts changes with claim size, and that Facilities are a sizable portion of medical claim costs in the earlier relative service years, regardless of claim size. Across all claim size ranges, these graphs show that the cost distributions are quite different between the two relative service year periods.

Figure 8 provides the distributions of medical costs by claim maturity for lost-time claims of less than \$100K. In the first five relative service years, Facilities are the largest share of costs, followed by Physical Therapy and Major Surgery and Anesthesia. Further, ASC/Outpatient Hospital constitutes the largest share of costs in the interval at 32%. We will see that this is not the case for other claim size ranges.

For the sixth through ultimate relative service years, while Facilities costs still represent a significant share of costs (20%), Prescription Drugs are the largest share of costs at 45%. Underlying this shift in costs between claim maturities is a shift in treatment from addressing the initial trauma to alleviating its lingering effects, such as pain. Similar patterns of costs by claim maturity have been observed in previous NCCI studies.⁸

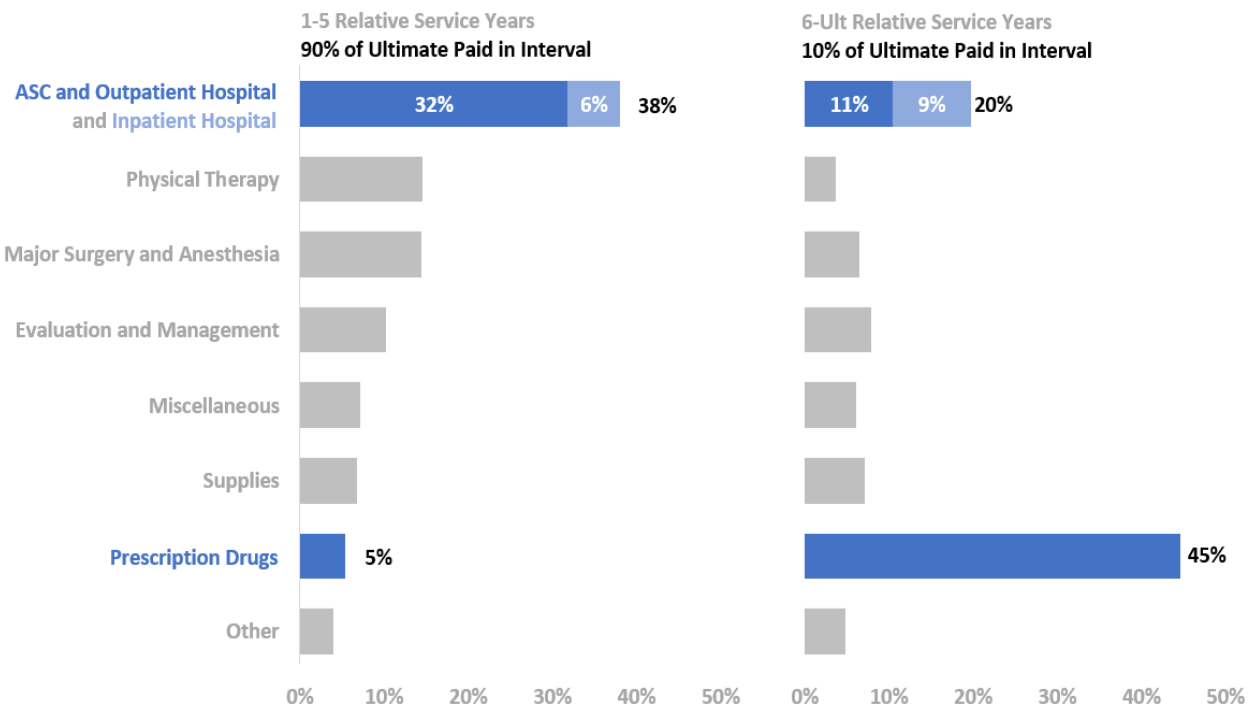


Figure 8: Medical Service Group Ultimate Cost Distributions by Claim Maturity for Lost-Time Claims, Less Than \$100K—AY 2011–2013

⁸ Barry Lipton and David Colon, “Workers Compensation and Prescription Drugs: 2016 Update,” NCCI, September 2016, available on ncci.com.

Figure 9 illustrates the distributions of medical costs by claim maturity for lost-time claims of at least \$100K but less than \$1M. The distribution of medical costs in the first five relative service years again shows Facilities as the largest share of costs. However, now Inpatient Hospital is a greater share of medical costs than ASC/Outpatient Hospital.

Figure 9 shows that Prescription Drugs costs are greater than 50% of all costs in the sixth to ultimate relative service years. For this size range, 25% of medical costs are paid in the sixth to ultimate relative service years.

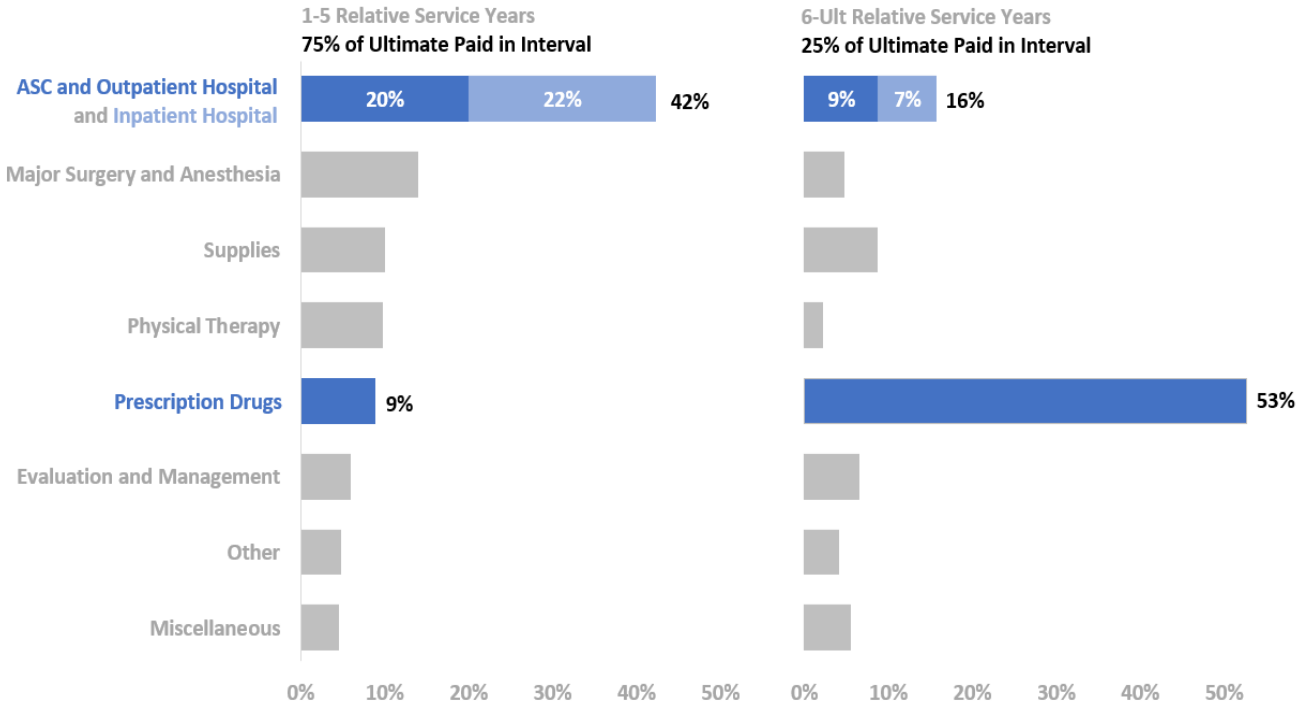


Figure 9: Medical Service Group Ultimate Cost Distributions by Claim Maturity for Lost-Time Claims, \$100K to \$1M—AY 2011–2013

Figure 10 shows the distributions of medical costs by claim maturity for lost-time claims of at least \$1M. For this size range, we have split the Other service group into Other Non-Home Health and Home Health.

For claims that are at least \$1M, Inpatient Hospital costs are a much smaller share of costs in the sixth relative service year and beyond than in the first five relative service years. As these most severe claims mature, costs shift from Inpatient Hospital to Home Health Care, Supplies, and Drugs, as shown in Figure 10.

For claims of at least \$1M, Facilities costs dominate the first five relative service years, but now Inpatient Hospital costs are the majority at 44%. This makes sense because these more serious injuries would likely require more Inpatient Hospital involvement. Even in the sixth to ultimate relative service years, Facilities costs are a significant share of total costs at 22%.

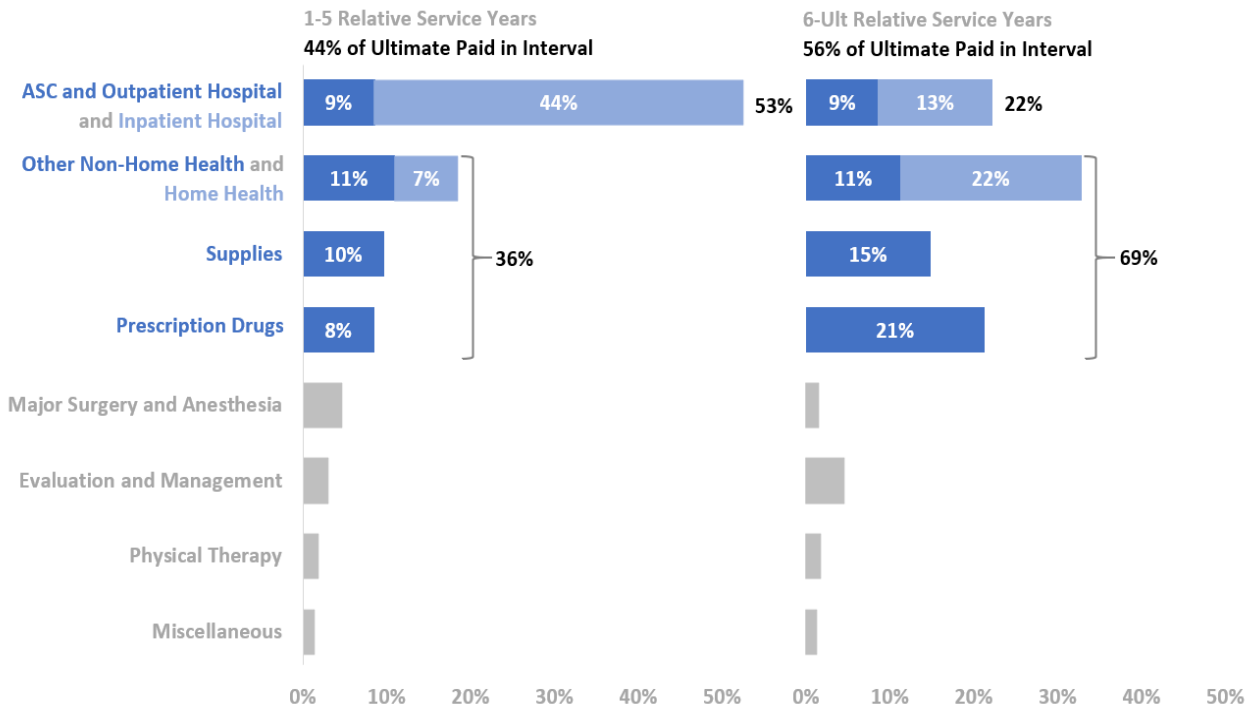


Figure 10: Medical Service Group Ultimate Cost Distributions by Claim Maturity for Lost-Time Claims, at Least \$1M—AY 2011–2013

CLOSING COMMENTS

We have shown that the mix of medical services varies substantially by claim size and maturity, and that payout rates vary by claim size and service group. This information may help us understand past cost changes and project future cost trends.

ACKNOWLEDGEMENTS

We thank Nedzad Arnautovic, Coni Giordano, and Tom Sheppard for their valuable contributions to this analysis.

Appendix A — Distribution Tables

Table A.1: Shares of Medical Losses by Medical Service Group and Size of Claim
 Shares are for Lost-time Claims, except for the All Claims and Medical Only Groups

Average for Accident Years 2011 to 2013

Medical Service Group	All Claims	Med Only	Lost-Time Size of Claim							
			Claims	<5K	5K to 10K	10K to 50K	50K to 100K	100K to 500K	500K to 1M	≥1M
ASC and Outpatient Hospital	23.5%	30.3%	22.3%	25.5%	29.4%	32.1%	27.2%	18.3%	11.7%	8.6%
Prescription Drugs	13.4%	7.1%	14.6%	6.3%	6.7%	8.0%	11.8%	18.9%	23.4%	15.6%
Inpatient Hospital	12.0%	2.9%	13.7%	1.6%	2.0%	5.3%	9.2%	17.1%	25.7%	27.0%
Major Surgery and Anesthesia	10.6%	4.4%	11.7%	3.9%	9.1%	14.3%	14.4%	12.1%	8.8%	2.9%
Physical Therapy	10.3%	12.7%	9.8%	16.2%	16.4%	13.4%	12.6%	8.6%	4.0%	1.8%
Evaluation and Management	9.7%	20.6%	7.6%	25.9%	17.0%	9.7%	7.4%	6.4%	4.6%	3.9%
Supplies	7.8%	3.4%	8.6%	3.3%	3.9%	6.5%	7.8%	9.4%	11.3%	12.5%
Other	6.2%	6.1%	6.3%	4.4%	4.4%	3.8%	4.0%	4.1%	7.0%	26.4%
Complex Imaging	2.7%	4.1%	2.4%	4.8%	6.0%	3.8%	2.7%	1.9%	1.0%	0.3%
Simple Imaging and Pathology	2.5%	4.1%	2.2%	4.4%	3.1%	2.1%	2.1%	2.6%	2.0%	0.7%
Emergency Services	0.8%	3.3%	0.4%	3.1%	1.6%	0.6%	0.3%	0.2%	0.1%	0.1%
Minor Surgery	0.5%	1.0%	0.4%	0.6%	0.4%	0.4%	0.5%	0.4%	0.4%	0.2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

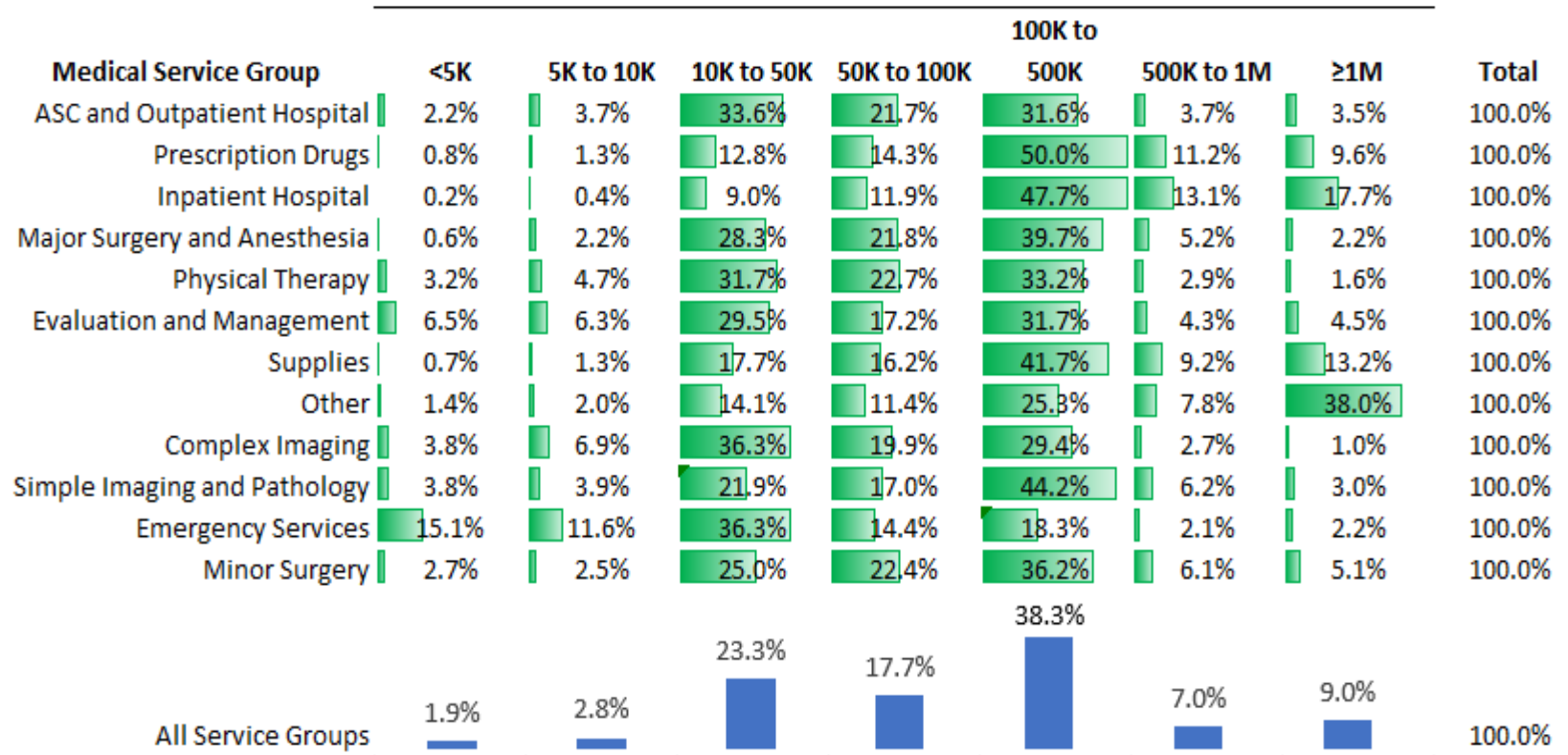
Size is the reported total (indemnity and medical) case-incurred value at 36 months, and shares are at estimated ultimate value.

Appendix A — Distribution Tables (cont'd)

Table A.2: Distribution of Medical Costs on Lost-Time Claims for Given Medical Services Across Size Ranges

Average for Accident Years 2011 to 2013

Size of Claim



Size is the reported total (indemnity and medical) case-incurred value at 36 months, and shares are at estimated ultimate value.

Appendix B

Detailed Description of Data Sources Used in This Study

MEDICAL DATA CALL (MDC)

The primary data source used in this study is NCCI's Medical Data Call (MDC). The MDC captures transaction-level detail on Workers Compensation medical bills processed on or after July 1, 2010, including dates of service, charges, payments, procedure codes, and diagnosis codes.

For this study, we used experience reported through June 2017 for:

- Claims occurring prior to 1/1/2014.⁹
- All claims with at least one medical service reported in the MDC, and where the claim could be matched to **Statistical Plan** data. This includes lost-time and medical-only claims.
- Data for the following states has been included: AK, AL, AR, AZ, CO, CT, DC, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, NE, NH, NJ, NM, NV, OK, OR, RI, SC, SD, TN, UT, VA, VT, WI, and WV.

STATISTICAL PLAN

Statistical Plan data is the audited exposure, premium, and loss information for each state on the policy. This data is reported in accordance with the **Statistical Plan for Workers Compensation and Employers Liability Insurance**. Unit Statistical data contains up to 10 reporting levels. The initial unit report contains exposure, premium, and losses, valued 18 months after the policy effective date—reported within two months later. Nine additional subsequent unit reports for open, reopened, and newly arising claims are valued in 12-month intervals and due within two months thereafter.

As previously described, **Statistical Plan** data is used to assign MDC data to an appropriate size range.

QUARTERLY CENSUS OF EMPLOYMENT AND WAGES (QCEW)

The QCEW program publishes a quarterly count of employment and wages reported by employers covering more than 95% of US jobs, available at the county, metropolitan statistical area, state, and national levels by industry.

The QCEW wages included in this study are historical values for the United States produced with Moody's data released on 4/11/2018. Changes in annual QCEW wages are used to index historical indemnity Statistical Plan losses by claim to a common loss level.

PERSONAL HEALTHCARE CHAIN WEIGHTED DEFLATOR SERIES

The PHC deflator (or CW-PHC) is calculated as a chain-weighted price index for the various goods and services that account for PHC spending.

We obtained the detailed historical values of the CW-PHC from the Office of the Actuary at the Centers for Medicare & Medicaid Services. Changes in the annual CW-PHC deflator are used to index historical medical **Statistical Plan** losses by claim to a common loss level.

⁹ **Statistical Plan** data at 3rd report is not due until 44 months after policy inception. At the time MDC data was extracted, **Statistical Plan** AY 2014 was incomplete.