



The Relationship Between Medical Utilization and Indemnity Claim Severity

Comparing the Factors Driving Medical and Indemnity Severity

Introduction

An NCCI study published in July 2010¹ examined the factors driving medical severity over two time periods. A simple “model” of claim costs was used to identify and quantify the factors that explained that overall increase. The model of claim costs is defined as follows:

$$\text{Cost} = \text{Price} \times \text{Utilization}$$

Where utilization consists of both quantity and mix. We examined the impacts of:

- **Mix**—Differences in diagnosis mix
- **Quantity**—Differences in the average number of treatments per claim
- **Price**—Differences in the average price of treatments

This is an extension of that study. This study examines the factors driving the increases in indemnity severity and compares them to the factors driving medical severity.² In terms of indemnity severity, we examine the impacts of:

- **Mix**—Differences in diagnosis mix
- **Quantity**—Differences in duration of temporary benefits
- **Price**—Differences in the average cost per day

As in the previous study, this study also splits the analysis into two time periods and compares the results for 1996/97 to 2000/01 with the results for 2001/02 to 2005/06.³ As before, the calculations are based on lost-time claims closed within 24 months of date of injury for NCCI states, but this study focuses on claims with temporary indemnity payments.⁴ All claims receiving temporary benefits are included in the analysis. However, for those claims that also received permanent benefits, only the individual temporary payments⁵ are used to calculate severity and duration for each claim.

¹ See *Significant Changes in the Factors Driving Medical Severity 1996–2001 vs. 2001–2006* on ncci.com.

² The medical results in this study differ slightly from those published in *Significant Changes in the Factors Driving Medical Severity 1996–2001 vs. 2001–2006*. The analysis in this study is based on lost-time claims with temporary payments, so the factors driving indemnity and medical severity can be compared using a consistent set of claims. The previous study is based on medical severity for all lost-time claims. Both studies focus on claims closed within 24 months of date of injury.

³ In this report, averages of the start and end periods are used. For example, 1996/97 refers to an average of 1996 and 1997. The accident year period 1996/97 includes data on claims for injuries that occurred from 1/1/1996 to 12/31/1997. This is the fourth in a series of research studies on factors that underlie the increases in severity observed in ratemaking. For that reason, two-year averages of accident year data were used for the beginning and ending of the time period because that approximates policy years. The analysis reported here primarily looks at the components on an accident year basis.

⁴ This study is based on data licensed to NCCI by insurers for purposes of this study for the 11 accident years from 1996 to 2006.

⁵ Both temporary total and temporary partial payments are included.

Key Findings

One of the key challenges in ratemaking is understanding the changes that underlie lost cost trends. In particular, analysts have observed marked differences in the very high rates of increase in medical and indemnity severity in the last half of the 1990s and the more gradual increases in the first half of the current decade. The analysis reported in this study provides the following insights:

- As expected, price for both medical and indemnity moved consistently with their respective leading indicators (medical inflation and average weekly wages)
- Utilization (measured as duration and treatments per claim) went from being a major driver of severity increases in the first period (1996/97 to 2000/01) to actually decreasing in absolute terms in the second period (2001/02 to 2005/06)
- The impact of changes in diagnosis mix was significant in the first period and eased off in the second period
- When comparing the number of medical treatments per claim and duration, they move fairly closely together over time for both claims with and without surgery. Correlations over time vary at the diagnosis level, but are generally strongly positive

Data

For this analysis, the data is limited to all claims receiving temporary benefit payments (whether or not they also receive permanent benefits) that are closed within 24 months of the date of injury because these are the payments for which duration (the measure of the quantity portion of utilization for indemnity) can be calculated. Exhibits 1 and 2 compare indemnity severity for all lost-time claims closed within 24 months of date of injury versus temporary indemnity severity for lost-time claims closed within 24 months of date of injury. As expected, temporary indemnity severity is lower than total indemnity severity each year.⁶ Nevertheless, the annual rates of change are closely related as seen in Exhibit 2.

⁶ Claims with permanent injuries are more expensive than those with temporary injuries.

Total Versus Temporary Indemnity Severity

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

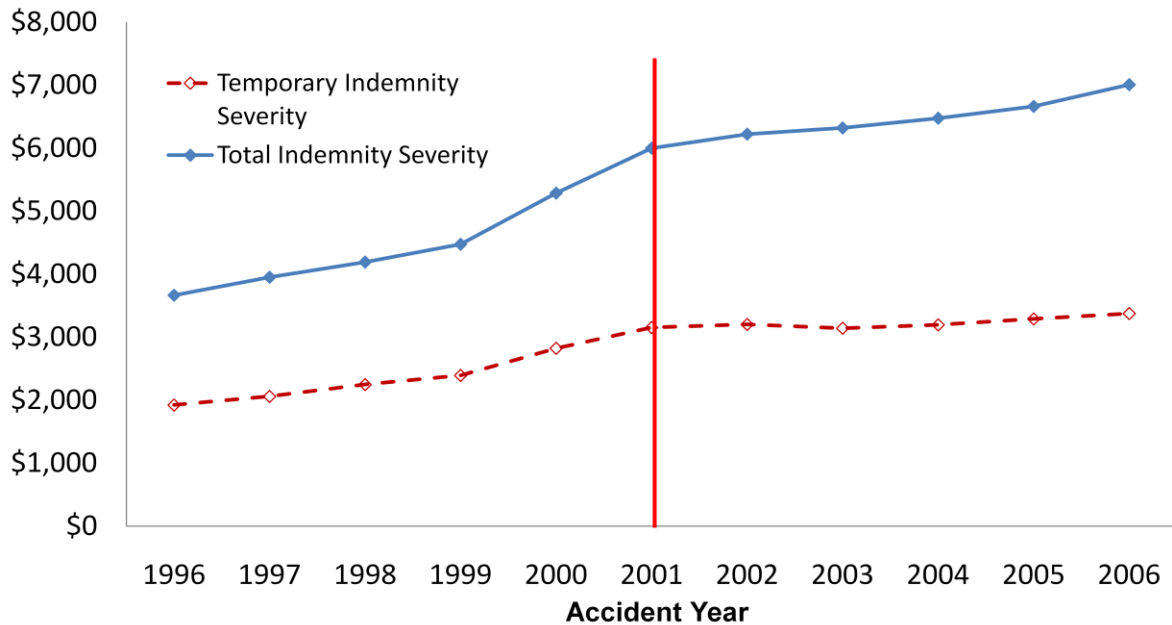


Exhibit 1

Comparing Changes in Total and Temporary Indemnity Severity

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

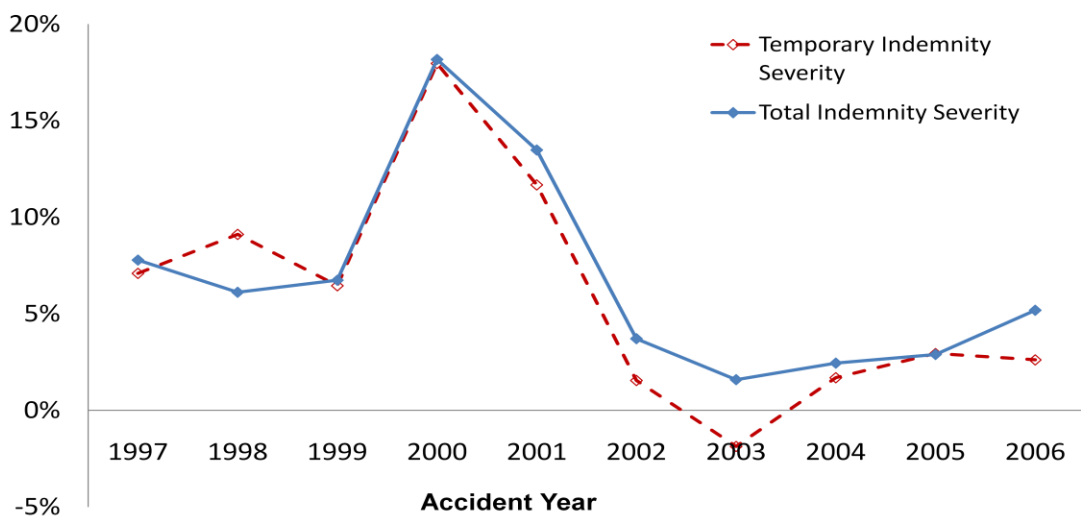


Exhibit 2

Examining the Factors Driving Temporary Indemnity Severity 1996/97–2000/01

Exhibit 3 shows that from 1996/97 to 2000/01, paid indemnity severity for lost-time claims closed within 24 months of date of injury increased by 50%.⁷ As in the previous study, that 50% increase will be decomposed using the simple model of claim costs described above.

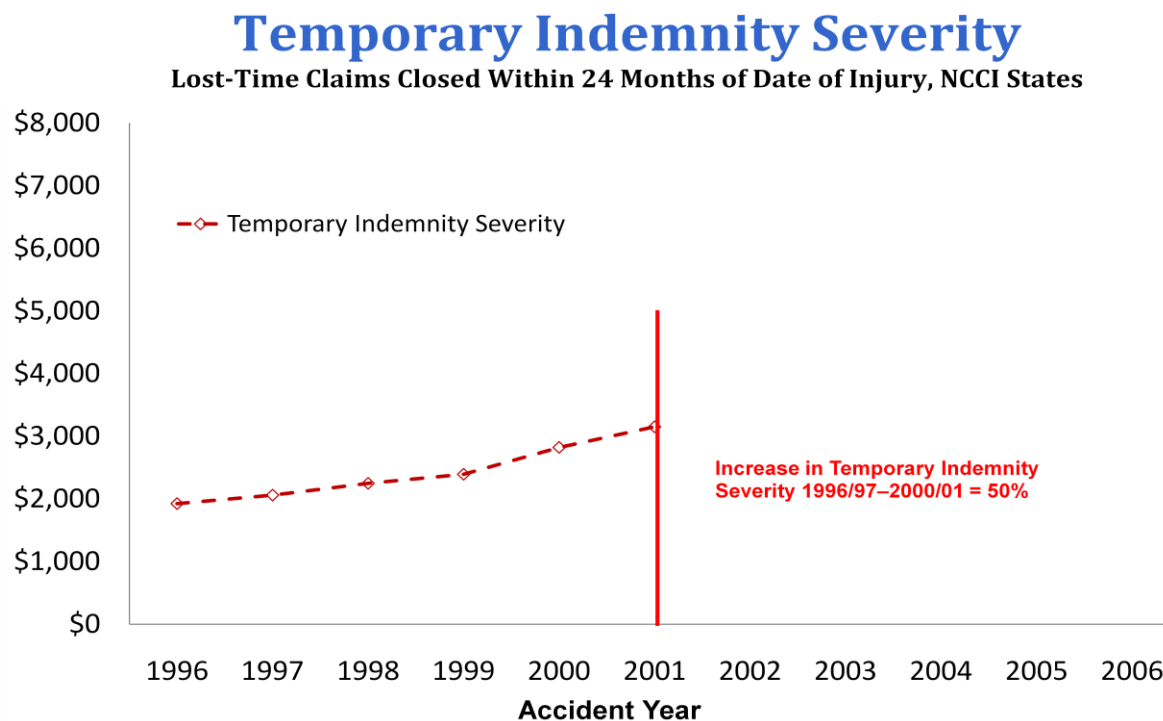


Exhibit 3

⁷ The 50% increase is calculated from the average temporary indemnity severity for 1996 and 1997 to the average temporary indemnity severity for 2000 and 2001. Severity was \$1,923 in 1996 and \$2,060 in 1997 for an average of \$1,992 for 1996/97. Severity was \$2,823 in 2000 and \$3,152 in 2001 for an average of \$2,987. (\$2,987/\$1,992 = 50% increase).

The first step is to control for the change in the mix of injuries. Exhibit 4 shows that of the 50% increase in paid temporary indemnity severity, 10% or almost a fifth (a 19% share) can be attributed to the shift to more severe injuries from 1996/97 to 2000/01.⁸

Share of Temporary Indemnity Severity Increase Due to Mix, Quantity, and Price

Paid Temporary Indemnity Severities on Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

	1996/97–2000/01		2001/02–2005/06	
	Change	Share	Change	Share
Total	50%	100%		
Share Due to Diagnosis Mix	10%	19%		
Share Due to Duration				
Share Due to Price and Other Factors				

Exhibit 4

Exhibit 5 illustrates this shift to more severe injuries. It contains the top 10 diagnoses for lost-time claims with temporary payments in terms of the number of claims.⁹ The left column contains the top 10 injury diagnoses in 1996/97. The right column contains the top 10 injury diagnoses in 2000/01. Seven of the top 10 diagnoses are present in both time periods, but three changed (highlighted in red). Sprain of lumbosacral, lumbago, and sprain of neck were in the top 10 in 1996/97, but were replaced by tear of medial cartilage/meniscus of knee, sprain of rotator cuff, and lumbosacral neuritis, not otherwise specified in 2000/01.¹⁰ As shown by the severity index,¹¹ the three diagnoses that dropped out of the top 10 for the later period were diagnoses with below-average severity (severity indexes of 0.44, 0.70, and 0.67, respectively) and they were replaced with three injuries with above-average severity (1.47, 2.06, and 1.84, respectively).¹² This shift to a more severe mix of injuries contributed to about a fifth of the increase in temporary indemnity severity from 1996/97 to 2000/01.

⁸ The contribution of the change in diagnosis mix is estimated by calculating what severity would have been in 2000/01 if the mix of injuries was the same as in 1996/97 and what severity would have been in 1996/97 if the mix of injuries was the same as in 2000/01. When holding mix constant, severity increased by 40%. Therefore, the 10% due to changes in diagnosis mix is calculated by subtracting the 40% increase in severity after controlling for changes in mix from the 50% increase without controlling for change in mix.

⁹ Exhibit 5 is slightly different from a similar table that appeared in the study *Significant Changes in the Factors Driving Medical Severity 1996–2001 vs. 2001–2006*, published on ncci.com in July 2010. This table is based on lost-time claims with temporary payments since that is what is being used in this study. The similar exhibit in the previous study is based on all lost-time claims.

¹⁰ Several of the diagnoses in the top 10 involve the same general region of the back but reflect different kinds of medical problems. The lumbosacral is just below the lumbar region of the back. The lumbar region is the part of the lower back that is defined by the five lumbar vertebrae. The lumbosacral joint joins the fifth lumbar vertebra with the sacrum (which is the bone at the base of the spine and at the back of the pelvis). Lumbago is low-back pain categorized under diseases of the musculoskeletal system and connective tissue. Sprain lumbar region is a sprain or strain of the low back categorized under injuries. Neuritis involves inflammation of nerves. For more information, see <http://icd9cm.chrisendres.com/index.php?action=contents>.

¹¹ The severity index is the ratio of paid temporary indemnity severity for that diagnosis to average paid temporary indemnity severity for all claims for the relevant experience period.

¹² This shift could reflect the aging of the workforce as higher cost claims involving rotator cuff sprains and tears of knee cartilage tend to be more common with older workers. This idea will be examined in a planned 2011 update to *Thinking About an Aging Workforce—Potential Impact on Workers Compensation*, published in May 2005 and *Age as a Driver of Frequency and Severity*, published in December 2006 on ncci.com.

Changes in the Mix of Diagnoses for Claims with Temporary Payments

Top 10 Claim Diagnoses by Accident Year for Lost-Time Claims with Temporary Payments That Closed Within 24 Months of Date of Injury, NCCI States

Accident Years 1996/1997			Accident Years 2000/2001		
Diagnosis and Severity Index			Diagnosis and Severity Index		
1	Sprain Lumbar Region	0.55	Sprain Lumbar Region		0.50
2	Lower Leg Injury, not otherwise specified	0.94	Lower Leg Injury, not otherwise specified		0.89
3	Unilateral Inguinal Hernia	0.92	Carpal Tunnel Syndrome		1.31
4	Carpal Tunnel Syndrome	1.36	Unilateral Inguinal Hernia		0.77
5	Sprain Lumbosacral	0.44	Cervicalgia		1.48
6	Lumbar Disc Displacement	2.15	Lumbar Disc Displacement		2.11
7	Cervicalgia	1.53	Tear Medial Cartilage/Meniscus of Knee		1.47
8	Sprain of Ankle, not otherwise specified	0.42	Sprain Rotator Cuff		2.06
9	Lumbago	0.70	Sprain of Ankle, not otherwise specified		0.41
10	Sprain of Neck	0.67	Lumbosacral Neuritis, not otherwise specified		1.84

The severity index is the ratio of paid temporary indemnity severity for that diagnosis to average paid temporary indemnity severity for all claims for the relevant experience period.

Exhibit 5

The next piece of the model is the portion due to changes in duration, the quantity portion of utilization. Average duration can increase (decrease) over time for at least two reasons: an increase (decrease) in the share of more severe diagnoses in the mix of injuries and a general lengthening of the duration of claims. Exhibit 6 shows that after accounting for the shift to more severe injuries (which tend to have longer than average durations), 18% (or a 36% share) of the 50% increase in paid temporary indemnity severity from 1996/97 to 2000/01 can be attributed to a broadly based increase in duration.¹³ Exhibit 7 reflects a 23% increase from an average duration of 53 days in 1996/97 to an average of 65 days in 2001/02.¹⁴ Exhibit 7 illustrates the accident year trend in duration. Therefore, unlike Exhibit 6, it does not eliminate the portion of the change in duration due to the change in diagnosis mix. The 18% increase in severity due to the change in duration in Exhibit 6 is after controlling for the change in diagnosis mix. See footnote 13 for the details on this somewhat complicated calculation.

¹³ The portion due to the change in duration and the change in price is calculated using the average duration and the average cost per day after controlling for the change in diagnosis mix. The increase in severity after controlling for diagnosis mix is allocated using the formula: (change in price times quantity) plus (change in quantity times price) plus (change in price times change in quantity) where price is the average cost per day and quantity is the duration. The portion due to the change in price times the change in quantity is then allocated to the individual pieces (price and quantity) based on the shares of each. The calculation is done two ways (ending period minus beginning period and beginning period minus ending period), and the final result is the geometric average of the two.

¹⁴ NCCI has examined duration in detail in the study *Workers Compensation Temporary Total Disability Indemnity Benefit Duration*, published on ncci.com in January 2010 and in a soon-to-be-released update. The current study uses a similar methodology and gets similar patterns in duration over time. However, the studies are not directly comparable because of differences in some of the details. For example, the current study is limited to claims closed within 24 months of date of injury, whereas the other study uses a broader definition.

Share of Temporary Indemnity Severity Increase Due to Mix, Quantity, and Price

Paid Temporary Indemnity Severities on Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

	1996/97–2000/01		2001/02–2005/06	
	Change	Share	Change	Share
Total	50%	100%		
Share Due to Diagnosis Mix	10%	19%		
Share Due to Duration	18%	36%		
Share Due to Price and Other Factors				

Exhibit 6

Utilization—Duration for Temporary Payments

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

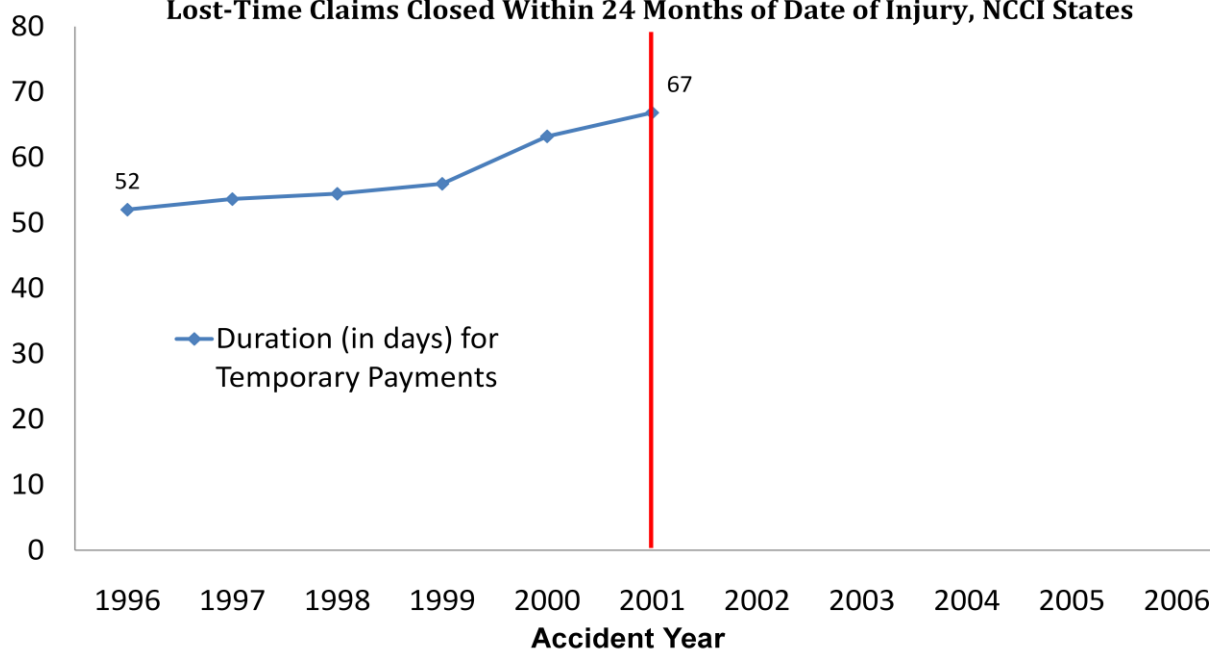


Exhibit 7

Exhibit 8 shows that 22% or just under half of the increase can be attributed to changes in the average cost per day. This is the primary driver of increases in temporary indemnity severity over this period. The 22% increase compares with changes in average weekly wages of 20% over the same period.

Share of Temporary Indemnity Severity Increase Due to Mix, Quantity, and Price

Paid Temporary Indemnity Severities on Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

	1996/97–2000/01		2001/02–2005/06	
	Change	Share	Change	Share
Total	50%	100%		
Share Due to Diagnosis Mix	10%	19%		
Share Due to Duration	18%	36%		
Share Due to Price and Other Factors	22%	45%		

Exhibit 8

Examining the Factors Driving Temporary Indemnity Severity 2001/02–2005/06

Exhibit 9 shows that from 2001/02 to 2005/06, paid temporary indemnity severity for lost-time claims closed within 24 months of date of injury increased by only 5%. This is a very small increase compared to the 50% increase observed over the prior period (1996/97 to 2000/01). Exhibit 10 shows the portions of the 5% increase due to diagnosis mix, changes in duration, and price and other factors.

Temporary Indemnity Severity

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

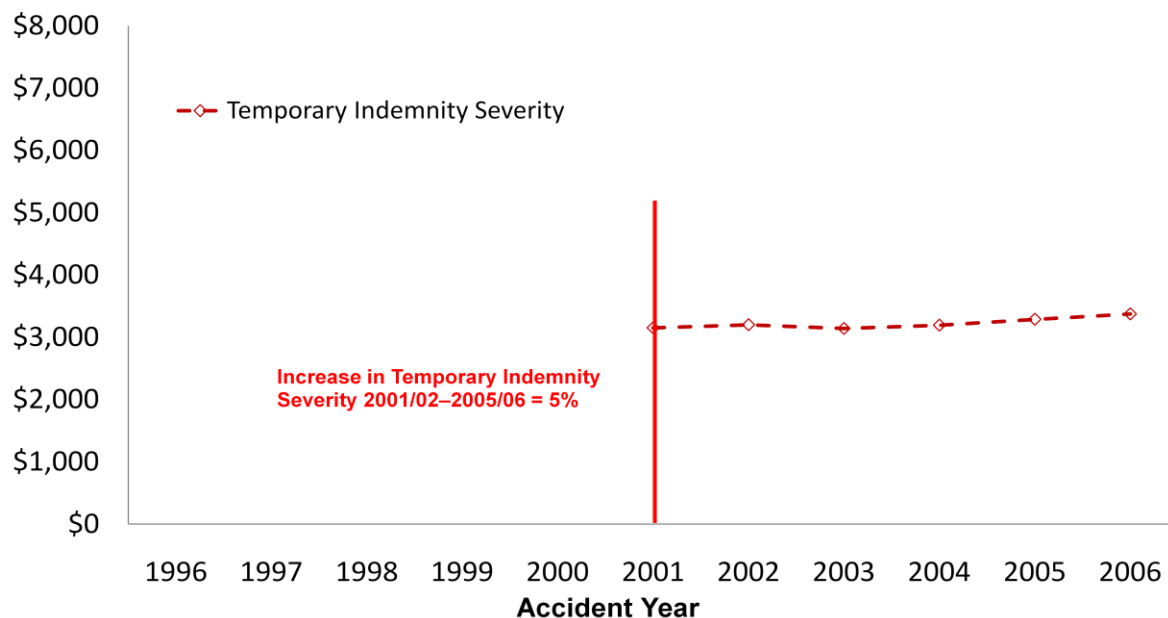


Exhibit 9

Share of Temporary Indemnity Severity Increase Due to Mix, Quantity, and Price

Paid Temporary Indemnity Severities on Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

	1996/97–2000/01		2001/02–2005/06	
	Change	Share	Change	Share
Total	50%	100%	5%	100%
Share Due to Diagnosis Mix	10%	19%	3%	52%
Share Due to Duration	18%	36%	–9%	–194%
Share Due to Price and Other Factors	22%	45%	12%	246%

Exhibit 10

The shift to more severe injuries continues to account for a portion of the increase in temporary indemnity severity from 2001/02–2005/06, contributing 3% (or a 52% share¹⁵) of the 5% increase. This compares to a contribution of 10% due to changes in the mix of injuries in the earlier period. Exhibit 11¹⁶ is similar to Exhibit 5 but shows the top 10 diagnosis codes in terms of the number of claims for 2001/02¹⁷ on the left side and 2005/06 on the right. Over this period, nine of the top 10 are represented in both periods, but the relative shift to more severe injuries continued. For example, sprain of ankle, a below-average severity injury with a temporary indemnity severity index of 0.40, dropped out of the top 10 and was replaced by rotator cuff syndrome, an above-average severity injury with a severity index of 1.78.

Changes in the Mix of Diagnoses for Claims with Temporary Payments

Top 10 Claim Diagnoses by Accident Year for Lost-Time Claims with Temporary Payments That Closed Within 24 Months of Date of Injury, NCCI States

	Accident Years 2001/2002		Accident Years 2005/2006	
	Diagnosis and Severity Index		Diagnosis and Severity Index	
1	Sprain Lumbar Region	0.49	Lower Leg Injury, not otherwise specified	0.88
2	Lower Leg Injury, not otherwise specified	0.87	Sprain Lumbar Region	0.44
3	Carpal Tunnel Syndrome	1.33	Unilateral Inguinal Hernia	0.72
4	Unilateral Inguinal Hernia	0.70	Cervicalgia	1.33
5	Cervicalgia	1.47	Sprain Rotator Cuff	2.11
6	Lumbar Disc Displacement	2.11	Tear Medial Cartilage/Meniscus of Knee	1.46
7	Tear Medial Cartilage/Meniscus of Knee	1.43	Carpal Tunnel Syndrome	1.18
8	Sprain Rotator Cuff	2.03	Lumbar Disc Displacement	1.98
9	Sprain of Ankle, not otherwise specified	0.40	Rotator Cuff Syndrome, not otherwise specified	1.78
10	Lumbosacral Neuritis, not otherwise specified	1.82	Lumbosacral Neuritis, not otherwise specified	1.57

The severity index is the ratio of paid temporary indemnity severity for that diagnosis to average paid temporary indemnity severity for all claims for the relevant experience period.

Exhibit 11

A significant difference in the drivers of the increase in temporary indemnity severity between the earlier and later periods is the impact of the change in duration. This contributed 18% to the increase in temporary indemnity severity from 1996/97 to 2000/01. But from 2001/02 to 2005/06, the change in duration, after accounting for the shift to more severe injuries, is actually putting downward pressure on the increase in severity, as seen in Exhibit 10. Exhibit 12¹⁸ illustrates that after increasing from 1996 to 2001, duration fell over the 2001 to 2006 period.

¹⁵ The share column in Exhibit 10 is not terribly meaningful given the relatively small total change in indemnity severity from 2001/02 to 2005/06.

¹⁶ As in Exhibit 5, Exhibit 11 is slightly different from a similar table that appeared in the study *Significant Changes in the Factors Driving Medical Severity 1996–2001 vs. 2001–2006*, published on ncci.com in July 2010. This table is based on lost-time claims with temporary payments since that is what is being used in this study. The similar exhibit in the previous study is based on all lost-time claims.

¹⁷ The numbers in the left column of Exhibit 11 do not exactly match those in the right column of Exhibit 5 because the time period in Exhibit 11 is 2001/2002 versus 2000/2001 in Exhibit 5.

¹⁸ As with Exhibit 7, Exhibit 12 is meant to illustrate the trend in duration, but does not control for the change in diagnosis mix. The portion of the temporary indemnity severity increase due to the change in duration in Exhibit 10 is after controlling for the change in diagnosis mix. See footnote 13 for more details on that calculation. Also see footnote 14, referring to a detailed study on duration published on ncci.com. This study uses a similar methodology to calculate duration, but since it focuses on claims closed within 24 months of date of injury, the resulting durations are shorter than those published in the detailed study on duration. However, the changes in duration over time are similar.

Utilization—Duration for Temporary Payments

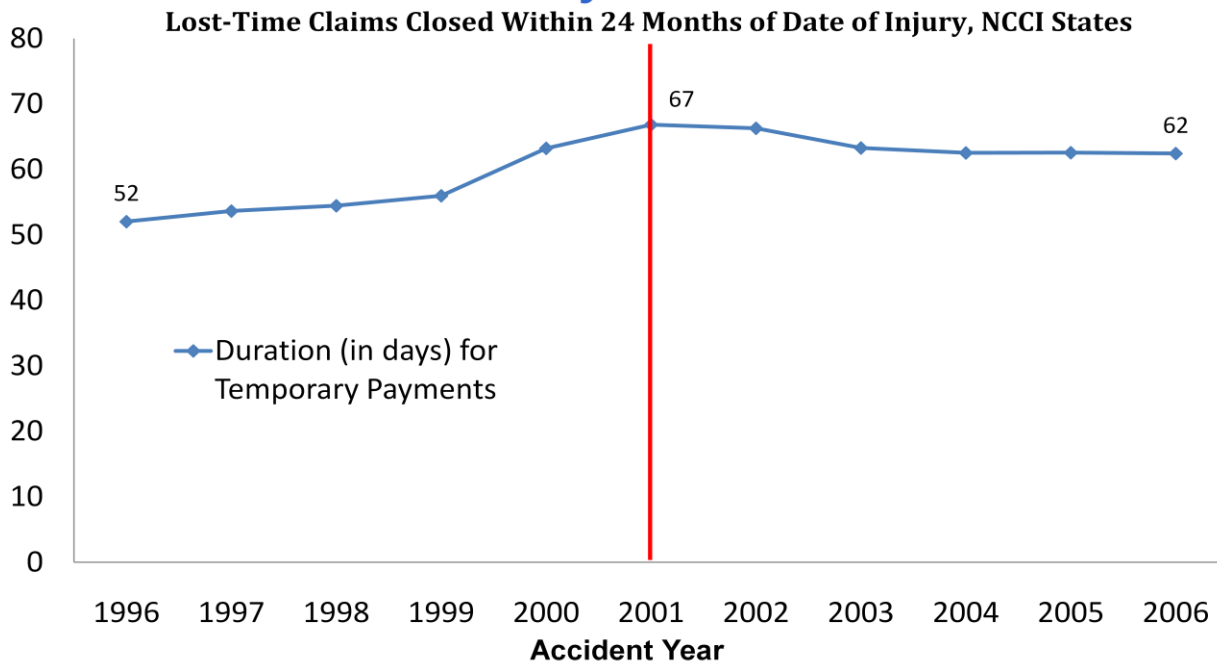


Exhibit 12

Over the 2001/02 to 2005/06 period, the primary driver of the change in paid temporary indemnity severity continues to be the change in the average cost per day. As seen in Exhibit 10, this accounts for a 12% increase, more than the 5% total increase in temporary indemnity severity since it is being offset by the downward pressure due to duration. This 12% increase due to price and other factors is similar to what would be expected due to changes in average weekly wages, which increased 11% over the same time period.

Comparing the Factors Driving Indemnity and Medical Severity for Claims With Temporary Payments

One observation of this study of indemnity severity is the remarkable similarity of the role of utilization change—as measured by duration—to the role of utilization change in medical severity—as measured by the number of treatments per claim. And similarly, the impact of changes in mix also appears to be comparable. This section follows up on these observations by directly comparing the factors driving changes in medical severity for claims with temporary payments due to mix, quantity, and price with their counterparts of changes in temporary indemnity severity.¹⁹ Exhibit 13 contains the factors from 1996/97 to 2000/01.

The increases due to changes in the mix of injuries are roughly the same for both medical and indemnity, contributing about 10% to the increase in severity. For medical, the primary driver of the increase was an increase in the number of treatments per claim, while for indemnity, the change in duration also contributed a significant portion, but was not the primary driver. The primary driver for indemnity was changes in price (cost per day) driven primarily by changes in wages. Changes in the price per treatment contributed 13% of the increase for medical. The 13% change due to price for medical is comparable to the 15% increase in the medical consumer price index over this period.

Share of Indemnity and Medical Severity Increase Due to Mix, Quantity, and Price

Paid Temporary Indemnity Severities and Paid Medical Severities on Claims with Temporary Payments Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

	Medical 1996/97–2000/01		Indemnity 1996/97–2000/01	
	Change	Share	Change	Share
Total	55%	100%	50%	100%
Share Due to Diagnosis Mix	11%	20%	10%	19%
Share Due to Number of Treatments or Duration	31%	57%	18%	36%
Share Due to Price and Other Factors	13%	23%	22%	45%

Exhibit 13

¹⁹ The shares of the medical severity increase shown in Exhibits 13 and 14 differ slightly from similar exhibits contained in the study *Significant Changes in the Factors Driving Medical Severity 1996–2001 vs. 2001–2006* published on ncci.com in July 2010. The medical breakdown here is based on lost-time claims with temporary payments, so the factors driving indemnity and medical severity can be compared using a consistent set of claims. The similar exhibits in the previous study are based on medical severity for all lost-time claims.

Exhibit 14 contains the drivers from 2001/02 to 2005/06 for both medical and indemnity severity. Changes in treatments per claim and duration put downward pressure on both medical and indemnity severity over this period, and price was the primary driver for both. For medical, the 23% increase due to price compares with an increase of 18% in the medical consumer price index over the same period. As noted earlier, the indemnity increase due to price closely tracked the change in average weekly wage.

Share of Indemnity and Medical Severity Increase Due to Mix, Quantity, and Price

**Paid Temporary Indemnity Severities and Paid Medical Severities
on Claims with Temporary Payments
Lost-Time Claims Closed Within 24 Months of Date of Injury,
NCCI States**

	Medical 2001/02–2005/06		Indemnity 2001/02–2005/06	
	Change	Share	Change	Share
Total	22%	100%	5%	100%
Share Due to Diagnosis Mix	4%	20%	3%	52%
Share Due to Number of Treatments or Duration	–5%	–22%	–9%	–194%
Share Due to Price and Other Factors	23%	102%	12%	246%

Exhibit 14

Comparison of the Two Measures of Utilization: Treatments per Claim and Duration

The two measures of utilization used in this study are treatments per claim for medical and duration for indemnity. They are both shown in Exhibit 15 over the period from 1996 to 2006.²⁰ There appears to be a link because the two measures of utilization move closely together over time. The correlation between the two yearly accident year averages over this 11-year time period is 0.95. As the number of treatments per claim increases, duration also tends to increase. Not only do the levels of treatments per claim and duration move closely together, but the annual rates of change do so as well, as seen in Exhibit 16. The changes have a correlation of 0.91.²¹

²⁰ The observation that the number of billed treatments and the number of days duration are of similar magnitudes is largely coincidental. A soon-to-be-released NCCI study titled *How Obesity Increases the Risk of Disabling Workplace Injuries* looks at the timing and treatment patterns of individual claims. It is not uncommon for there to be multiple medical treatments on any given day with several days between treatments.

²¹ This is important because in time series analysis the relationships between annual rates of change are typically more meaningful than the corresponding levels.

Duration and Treatments per Claim

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

Correlation = 0.95

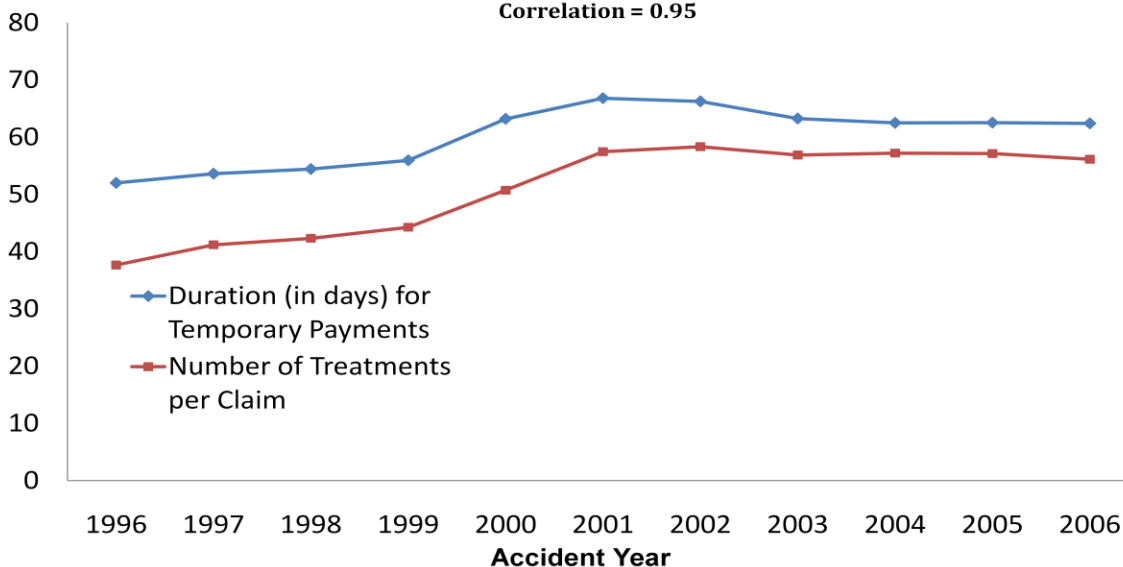


Exhibit 15

Change in Duration and Treatments per Claim

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

Correlation = 0.91

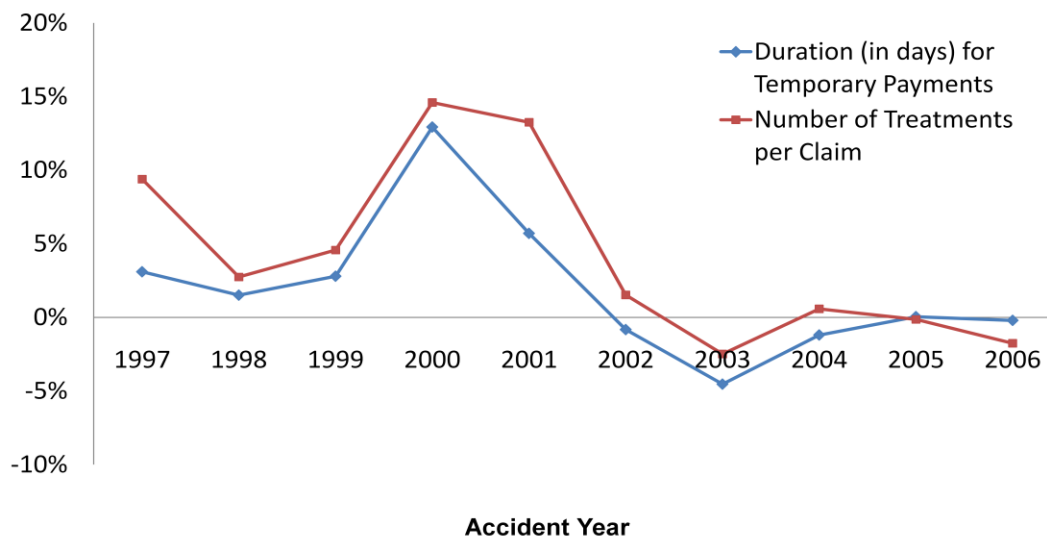


Exhibit 16

Does Surgery Make a Difference?

Exhibits 17 and 18 contain the number of treatments per claim and duration for surgical and non-surgical claims, respectively.²² While they still generally move together, the correlation between the two measures of utilization for surgical claims is 0.66, lower than the 0.95 correlation for all claims with temporary payments. In 2001, 2002, and 2004, the number of treatments per claim for surgical claims increased while duration fell. (See Exhibit 17.)

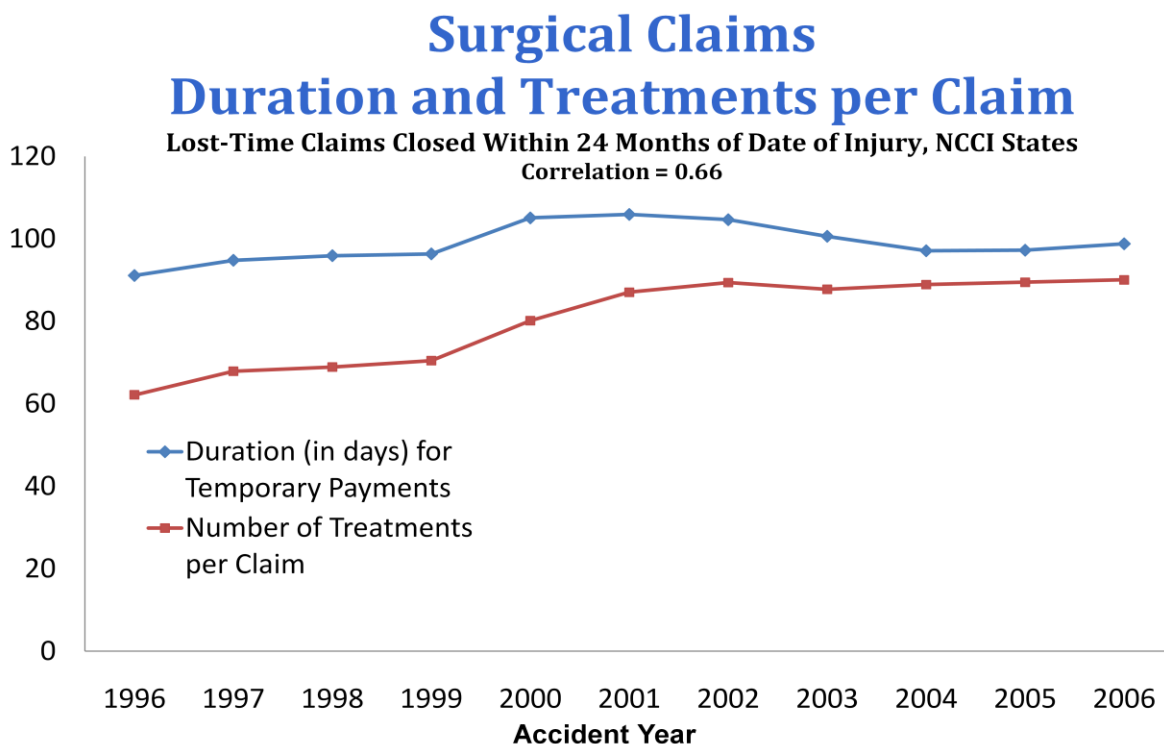


Exhibit 17

²² Overall, the share of claims with temporary payments that had surgery increased from 22% in 1996 to 31% in 2006 with an average of 27% over the entire period. In an earlier NCCI research paper, this increase in the share of claims with surgery was observed for virtually all leading diagnoses. For more information, see *Factors Influencing the Growth in Treatments per Claim* published on ncci.com in September 2008.

Exhibit 18 shows that the correlation between the two measures of utilization (i.e., temporary payment duration and number of treatments per claim) for nonsurgical claims is 0.95 with the two moving very closely together over the 1996 to 2006 period.

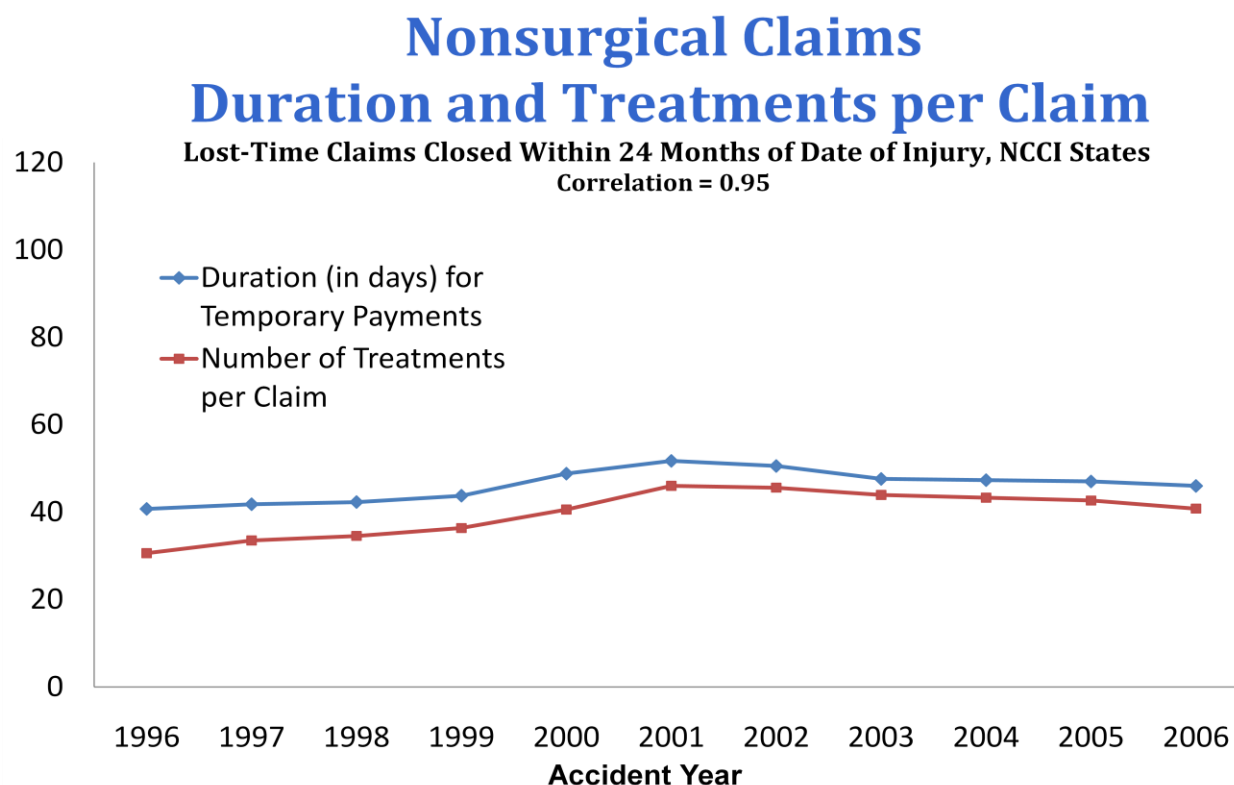


Exhibit 18

By Diagnosis Over Time

The 14 diagnosis codes that appeared in the top 10 in terms of the number of claims from 1996 to 2006 were examined individually. Exhibit 19 contains the correlation over time between treatments per claim and duration for 1996 to 2006 for these 14 diagnoses. Correlations over time vary at the diagnosis level, but are generally strongly positive, again suggesting a link between treatments per claim and duration for most diagnoses. For these 14 diagnoses, the correlations ranged from -0.05 to 0.96, with 10 of the 14 having correlations of greater than 0.70.

The share of surgical claims for each of these diagnoses appears to have some impact on the correlation between treatments per claim and duration. Exhibit 19 also contains the share of claims with surgery for each diagnosis. Some of the diagnoses rarely have surgery (shares of claims with surgery of 2% or 3%), but for the ones that do, the diagnoses with higher correlations generally tend to have a lower share of surgical claims (25% or less). Diagnoses with lower correlations generally tend to have higher shares of surgical claims (greater than 65%).

Correlation Between Treatments per Claim and Duration 1996–2006

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States

Rank	Diagnosis	Correlation	Share With Surgery (%)
1	Lumbosacral Neuritis not otherwise specified	0.96	14
2	Cervicalgia (pain in neck)	0.91	15
3	Lumbar Disc Displacement	0.90	25
4	Sprain of Ankle not otherwise specified	0.89	2
5	Sprain Lumbosacral	0.87	2
6	Rotator Cuff Syndrome not otherwise specified	0.87	54
7	Sprain of Neck	0.86	2
8	Lower Leg Injury not otherwise specified	0.85	23
9	Tear Medial Cartilage Meniscus on Knee	0.76	86
10	Lumbago	0.72	3
11	Sprain Lumbar Region	0.65	2
12	Carpal Tunnel Syndrome	0.52	76
13	Sprain Rotator Cuff	0.47	68
14	Unilateral Inguinal Hernia	−0.05	93

Exhibit 19

The next four exhibits contain graphs for selected diagnoses highlighted above. They are ordered from the diagnosis selected with the highest correlation to the one selected with the lowest correlation.

Exhibit 20 shows that the correlation from 1996 to 2006 between treatments per claim and duration for claims diagnosed as lumbar disc displacement was 0.90. This is a diagnosis with a relatively high correlation between the two measures of utilization and a quarter of all claims having surgery.

Exhibit 21 contains data for rotator cuff syndrome. The correlation is still high at 0.87 and a little more than half of claims have surgery.

Exhibit 22 shows the movement over time for carpal tunnel syndrome. For this diagnosis, the correlation between the number of treatments per claim and duration is 0.52 and more than three-quarters of claims have surgery.

Finally, Exhibit 23 contains the data for unilateral inguinal hernia. With a correlation of −0.05, there is essentially no relationship between the number of treatments per claim and duration over time. But as seen in Exhibit 23, the two have basically remained the same over that time period with very little movement in either. This is a diagnosis where almost all claims (93%) receive surgery. Anecdotal data suggests that medical advances often have an impact on medical utilization. For example, improved arthroscopic methods for dealing with shoulder injuries likely was a factor in the increase from 1996/97 to 2002/03 in the share of shoulder injuries receiving complex surgery. Surgery typically involves more and a broader range of medical treatments resulting in an increase in our measure of medical utilization.²³ Also, surgery typically results in longer healing periods leading to longer claim durations, a measure of indemnity utilization. In contrast, the basic approach to dealing with unilateral inguinal hernia seems to have remained unchanged over this time period. Thus, there has been little meaningful trend in either medical or indemnity utilization for claims with this diagnosis.

²³ For more information, see the study *Factors Influencing the Growth in Treatments per Claim*, published on ncci.com in 2008.

Lumbar Disc Displacement Duration and Treatments per Claim

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States
Correlation = 0.90

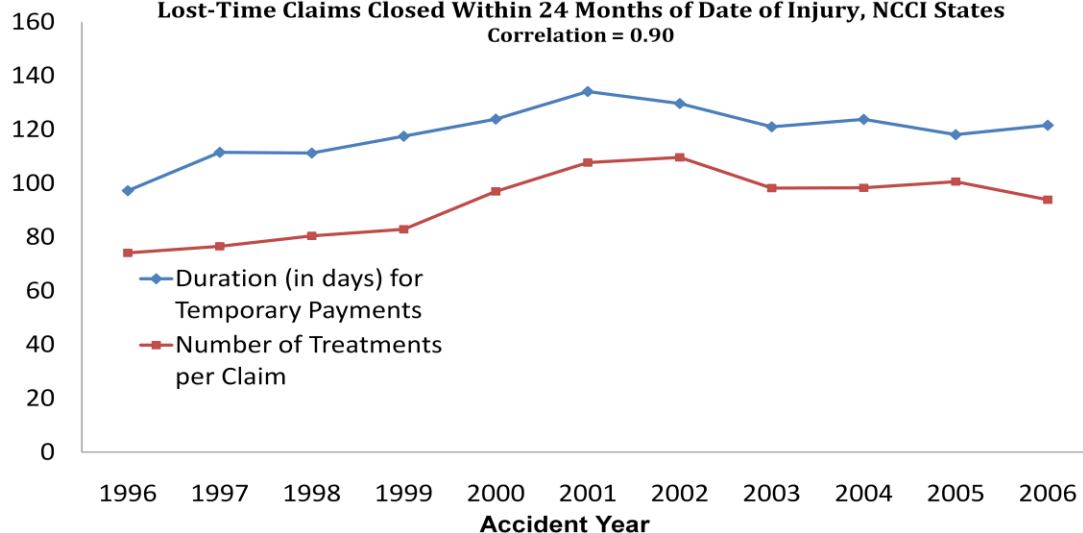


Exhibit 20

Rotator Cuff Syndrome Duration and Treatments per Claim

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States
Correlation = 0.87

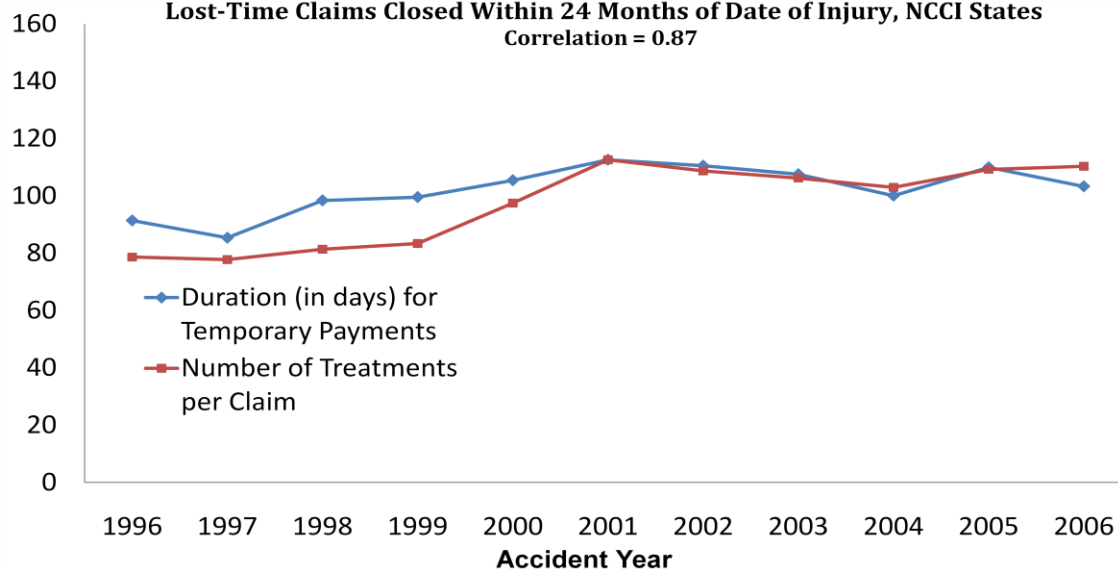


Exhibit 21

Carpal Tunnel Syndrome Duration and Treatments per Claim

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States
Correlation = 0.52

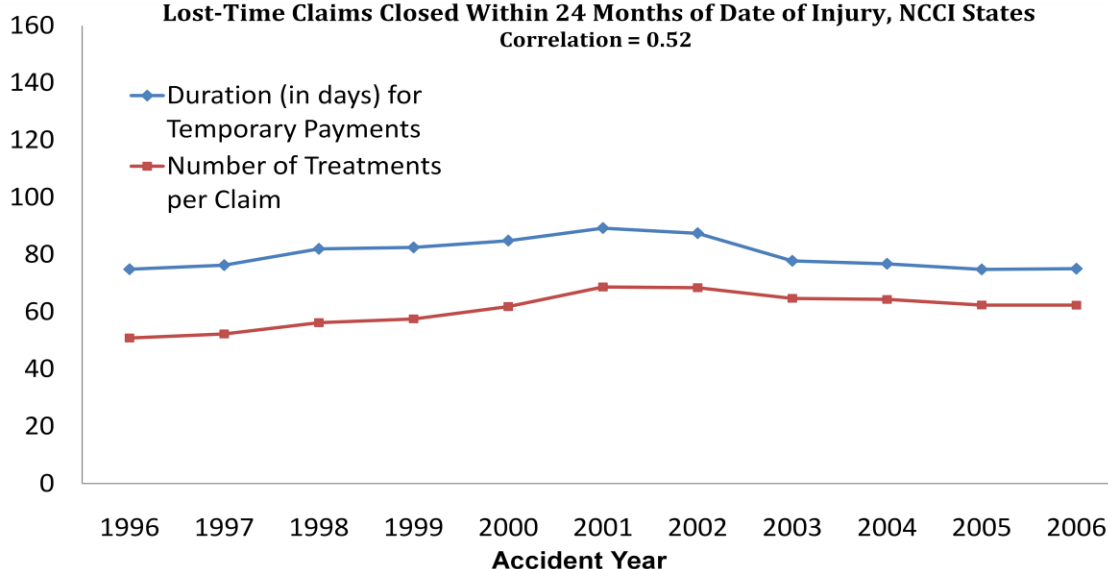


Exhibit 22

Unilateral Inguinal Hernia Duration and Treatments per Claim

Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States
Correlation = -0.05

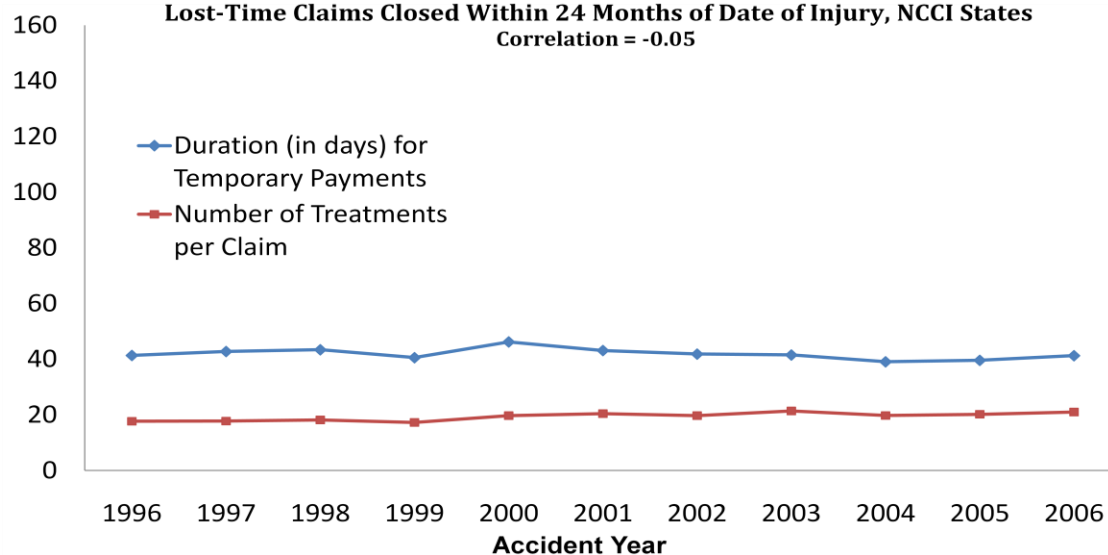


Exhibit 23

How Does This Help Us Understand Changes in Severity Trends?

This study has helped to explain the drivers of the very high rates of increase in medical and indemnity severity in the last half of the 1990s and the more gradual increases in the first half of the current decade. The analysis reported in this study provides the following insights:

- As expected, price for both medical and indemnity moved consistently with their respective leading indicators (medical inflation and average weekly wages)
- Utilization (measured as duration and treatments per claim) went from being a major driver of severity increases in the first period (1996/97 to 2000/01) to actually decreasing in absolute terms in the second period (2001/02 to 2005/06)
- The impact of changes in diagnosis mix was significant in the first period and eased off in the second period

When comparing the number of medical treatments per claim and duration, they move fairly closely together over time for both claims with and without surgery. Correlations over time vary at the diagnosis level, but are generally strongly positive. It is not surprising that the two are correlated because it intuitively makes sense that more medical treatments are likely related to longer recovery periods. However, no attempt has been made in this study to directly examine the nature of causality.

Questions for Future Research

There are some puzzles that remain to be explored, such as why duration increased markedly on claims for injuries that occurred just prior to or during the 2001 recession? The fact that difficult economic situations often reduce return-to-work opportunities could well be a factor. What is unclear is why medical utilization increased in this period. Similarly, the observed change in mix is consistent with an aging workforce, which presents the opportunity for additional research.

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