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## **Comparing the Factors Driving Medical and Indemnity Severity**

**Presented by  
Tanya Restrepo**

CAS Ratemaking and Product Management Seminar  
WC-5: Trends in Workers Compensation Medical Costs  
March 16, 2009  
Chicago, IL

## Comparing the Factors Driving Medical and Indemnity Severity

- Factors driving the increases in medical severity for claims with temporary indemnity payments
- Factors driving the increases in indemnity severity for claims with temporary payments
- Compare medical utilization (treatments per claim) and indemnity utilization (duration)
  - In aggregate
    - Over time
    - With and without surgery
  - By diagnosis
    - Over time
    - By claim

## Key Findings

- The share of the increase in medical severity due to increases in the number of treatments per claim has diminished.
- The share of the increase in indemnity severity due to increases in duration has also diminished.
- In the aggregate, the number of medical treatments per claim and duration move fairly closely together over time, but less so for claims with surgery.
- Correlations over time vary at the diagnosis level, but are generally strongly positive.
- Next step—may use statistical modeling at the claim level.

# Previous Study Results Factors Driving Medical Severity: Price, Utilization, and Mix 1996/97-2001/02



## A “Model” of Claims Costs

**Cost = Price x Utilization**

**Utilization = Quantity and Mix**



## Key Findings From Previous Study: Quantification of Effects

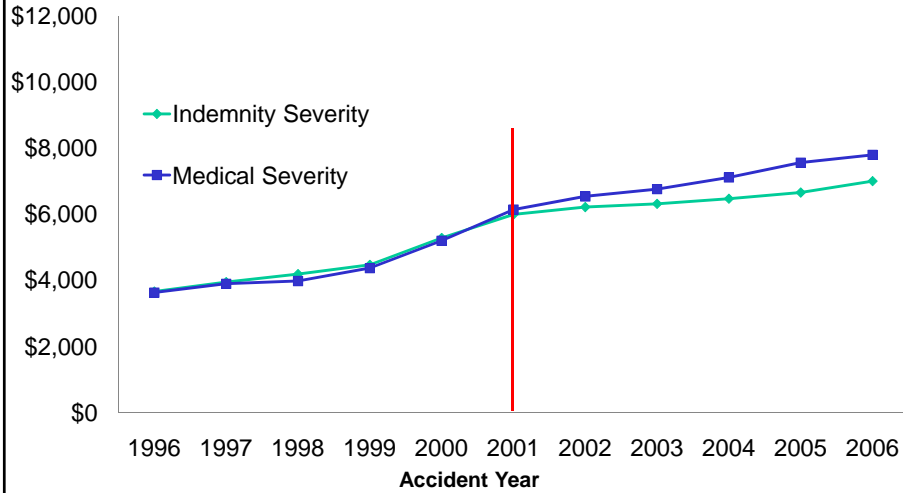
- A shift toward relatively more severe injuries accounts for roughly 20% of the increase in medical severities
- A markedly higher number of treatments per claim within each diagnosis and service category accounts for roughly 50% of the increase
- Medical care price increases and changes in treatment mix account for the remaining 30%



## Indemnity and Medical Severity



## Indemnity and Medical Severity



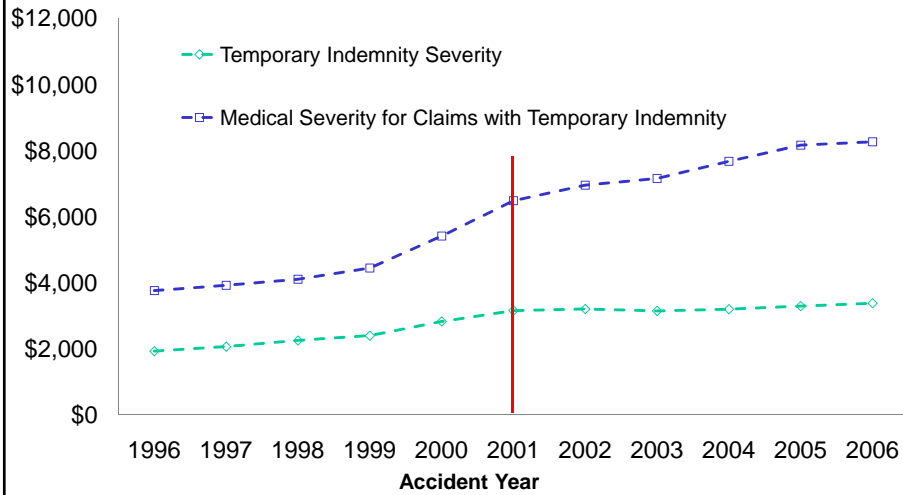
Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States  
Source: NCCI

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## Indemnity and Medical Severity for Claims with Temporary Payments



Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States  
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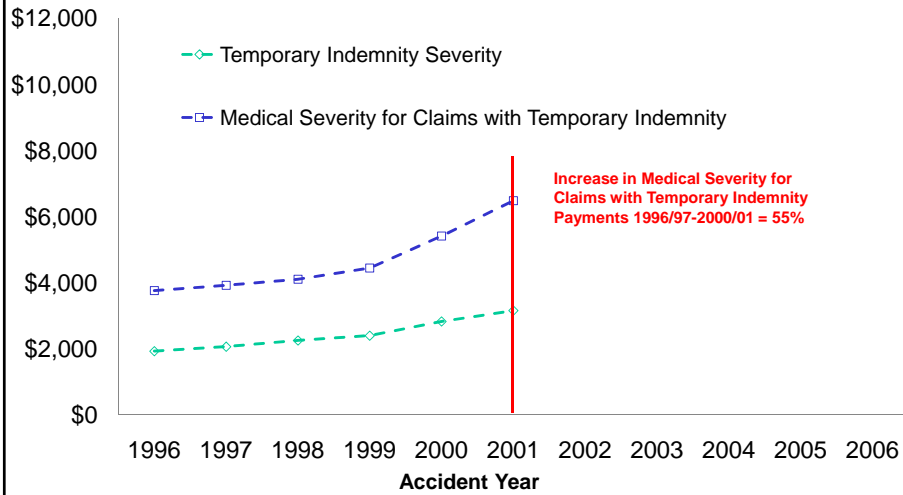
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# Factors Driving Medical Severity for Claims with Temporary Indemnity Payments



## Indemnity and Medical Severity for Claims with Temporary Payments



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



## Share of Medical Severity Increase (For Claims with Temporary Payments) Due to Mix, Quantity, and Price

### Paid Medical Severities on Temporary Lost-Time Claims Closed Within 24 Months of Date of Injury

	1996/97-2000/01		2001/02-2005/06	
Total	55%	100%		
Share Due to Diagnosis Mix	11%	20%		
Share Due to Number of Treatments				
Share Due to Price and Other Factors				

Source: NCCI  
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## 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

	Accident Years 1996/1997		Accident Years 2000/2001	
	Diagnosis and Severity Index		Diagnosis and Severity Index	
1	Sprain Lumbar Region	0.42	Sprain Lumbar Region	0.37
2	Lower Leg Injury, not otherwise specified	0.90	Lower Leg Injury, not otherwise specified	0.76
3	Unilateral Inguinal Hernia	1.14	Carpal Tunnel Syndrome	1.26
4	Carpal Tunnel Syndrome	1.44	Unilateral Inguinal Hernia	0.87
5	Sprain Lumbosacral	0.31	Cervicalgia	1.27
6	Lumbar Disc Displacement	1.96	Lumbar Disc Displacement	1.98
7	Cervicalgia	1.37	Tear Medial Cartilage/Meniscus of Knee	1.73
8	Sprain of Ankle, not otherwise specified	0.22	Sprain Rotator Cuff	2.15
9	Lumbago	0.55	Sprain of Ankle, not otherwise specified	0.24
10	Sprain of Neck	0.56	Lumbosacral Neuritis, not otherwise specified	1.66

The severity index is the ratio of paid medical severity for that diagnosis to overall average paid medical severity. Source: NCCI  
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## Share of Medical Severity Increase (For Claims with Temporary Payments) Due to Mix, Quantity, and Price

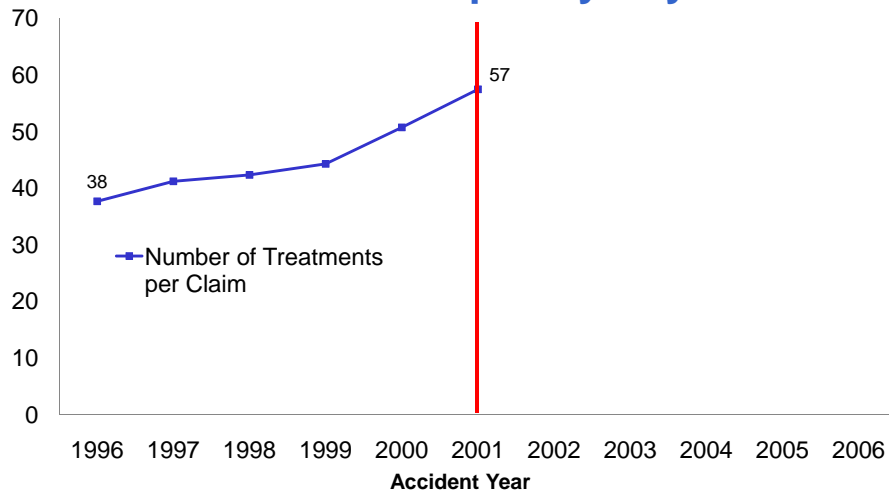
Paid Medical Severities on Temporary Lost-Time Claims Closed Within 24 Months of Date of Injury

	1996/97-2000/01		2001/02-2005/06	
Total	55%	100%		
Share Due to Diagnosis Mix	11%	20%		
Share Due to Number of Treatments	32%	58%		
Share Due to Price and Other Factors				

Source: NCCI  
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## Utilization – Treatments per Claim on Claims with Temporary Payments



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

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## Share of Medical Severity Increase (For Claims with Temporary Payments) Due to Mix, Quantity, and Price

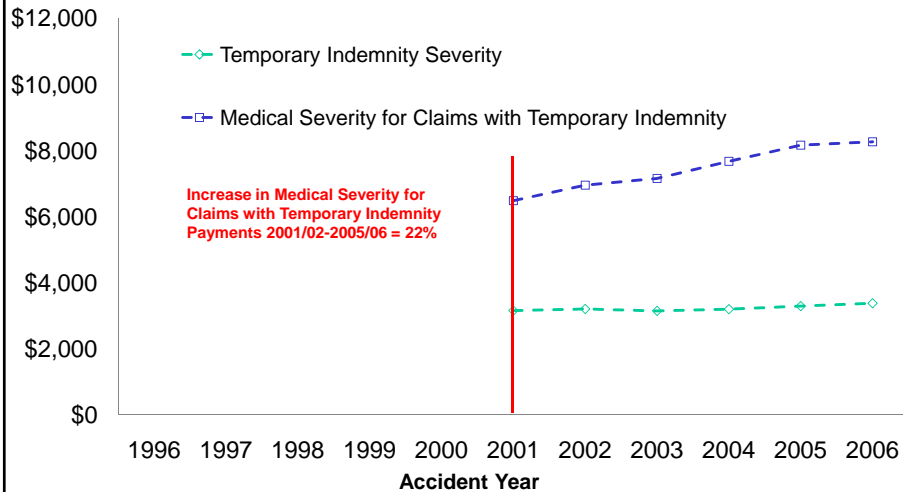
Paid Medical Severities on Temporary Lost-Time Claims Closed Within 24 Months of Date of Injury

	1996/97-2000/01		2001/02-2005/06	
Total	55%	100%		
Share Due to Diagnosis Mix	11%	20%		
Share Due to Number of Treatments	32%	58%		
Share Due to Price and Other Factors	12%	22%		

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## Indemnity and Medical Severity for Claims with Temporary Payments



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

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## Share of Medical Severity Increase (For Claims with Temporary Payments) Due to Mix, Quantity, and Price

### Paid Medical Severities on Temporary Lost-Time Claims Closed Within 24 Months of Date of Injury

	1996/97-2000/01		2001/02-2005/06	
Total	55%	100%	22%	100%
Share Due to Diagnosis Mix	11%	20%	4%	20%
Share Due to Number of Treatments	32%	58%		
Share Due to Price and Other Factors	12%	22%		

Source: NCCI  
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## 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

	Accident Years 2001/2002		Accident Years 2005/2006	
	Diagnosis and Severity Index		Diagnosis and Severity Index	
1	Sprain Lumbar Region	0.37	Lower Leg Injury, not otherwise specified	0.79
2	Lower Leg Injury, not otherwise specified	0.75	Sprain Lumbar Region	0.30
3	Carpal Tunnel Syndrome	1.19	Unilateral Inguinal Hernia	0.82
4	Unilateral Inguinal Hernia	0.83	Cervicalgia	1.16
5	Cervicalgia	1.23	Sprain Rotator Cuff	2.08
6	Lumbar Disc Displacement	1.94	Tear Medial Cartilage/Meniscus of Knee	1.44
7	Tear Medial Cartilage/Meniscus of Knee	1.64	Carpal Tunnel Syndrome	1.13
8	Sprain Rotator Cuff	2.14	Lumbar Disc Displacement	1.67
9	Sprain of Ankle, not otherwise specified	0.23	Rotator Cuff Syndrome, not otherwise specified	1.79
10	Lumbosacral Neuritis, not otherwise specified	1.59	Lumbosacral Neuritis, not otherwise specified	1.27

The severity index is the ratio of paid medical severity for that diagnosis to overall average paid medical severity. Source: NCCI  
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## Share of Medical Severity Increase (For Claims with Temporary Payments) Due to Mix, Quantity, and Price

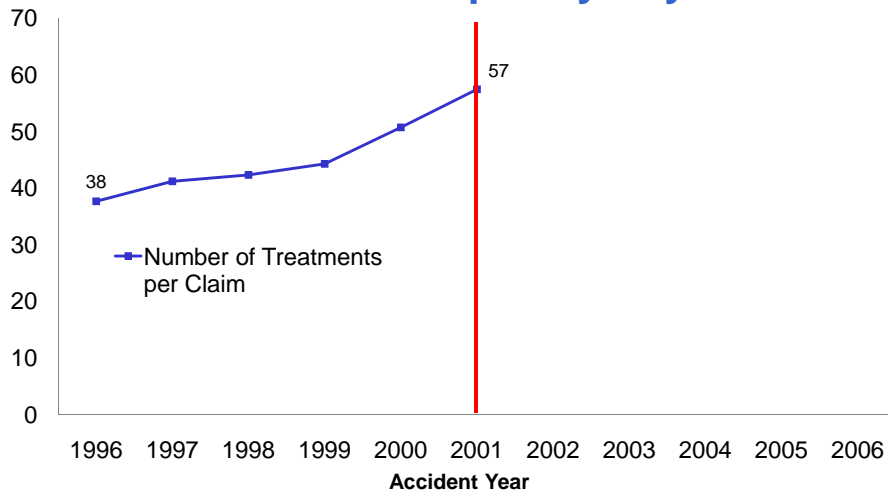
### Paid Medical Severities on Temporary Lost-Time Claims Closed Within 24 Months of Date of Injury

	1996/97-2000/01		2001/02-2005/06	
Total	55%	100%	22%	100%
Share Due to Diagnosis Mix	11%	20%	4%	20%
Share Due to Number of Treatments	32%	58%	-4%	-19%
Share Due to Price and Other Factors	12%	22%		

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## Utilization – Treatments per Claim on Claims with Temporary Payments



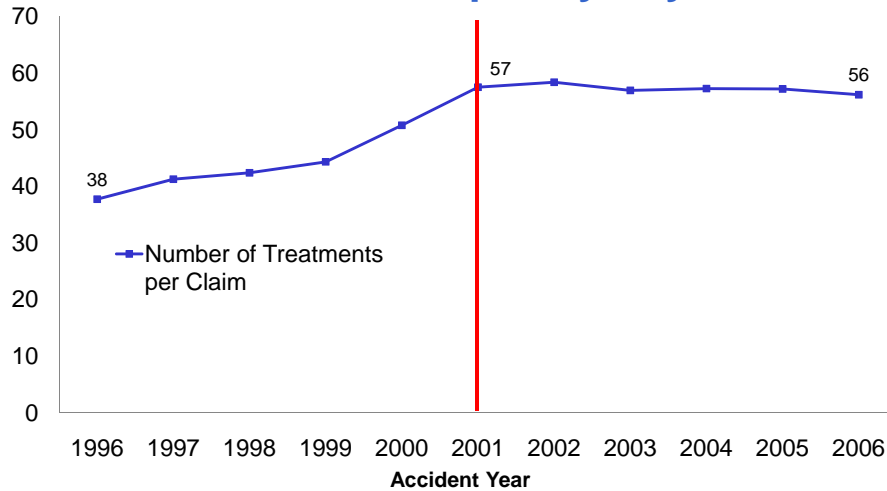
Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States  
Source: NCCI

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## Utilization – Treatments per Claim on Claims with Temporary Payments



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

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## Share of Medical Severity Increase (For Claims with Temporary Payments) Due to Mix, Quantity, and Price

### Paid Medical Severities on Temporary Lost-Time Claims Closed Within 24 Months of Date of Injury

	1996/97-2000/01		2001/02-2005/06	
Total	55%	100%	22%	100%
Share Due to Diagnosis Mix	11%	20%	4%	20%
Share Due to Number of Treatments	32%	58%	-4%	-19%
Share Due to Price and Other Factors	12%	22%	22%	99%

Source: NCCI  
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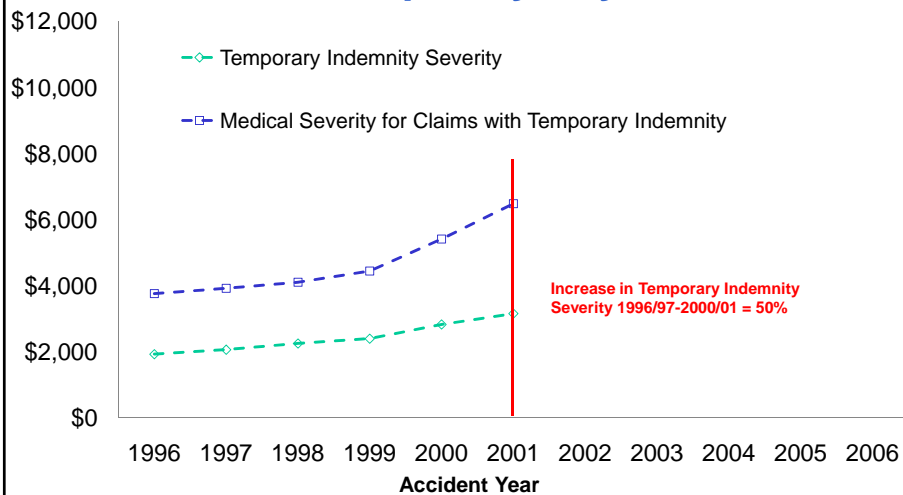
## Factors Driving Temporary Indemnity Severity

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## Indemnity and Medical Severity for Claims with Temporary Payments



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

	1996/97-2000/01		2001/02-2005/06	
Total	50%	100%		
Share Due to Diagnosis Mix	10%	19%		
Share Due to Duration	18%	36%		
Share Due to Price and Other Factors	23%	45%		

Source: NCCI  
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## Changes in the Mix of Diagnoses for Claims with Temporary Payments

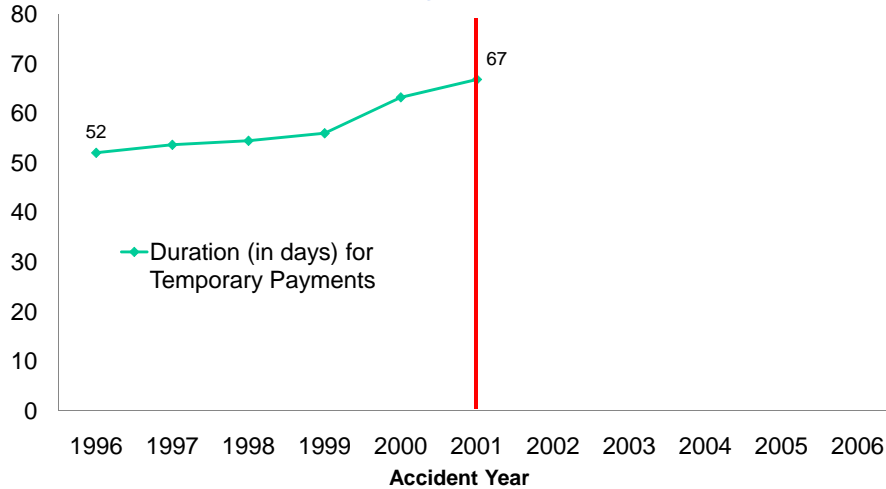
### Top 10 Claim Diagnoses by Accident Year for Lost-Time Claims with Temporary Payments That Closed Within 24 Months of Date of Injury

	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 indemnity severity for that diagnosis to overall average paid indemnity severity. Source: NCCI  
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## Utilization – Duration for Temporary Payments



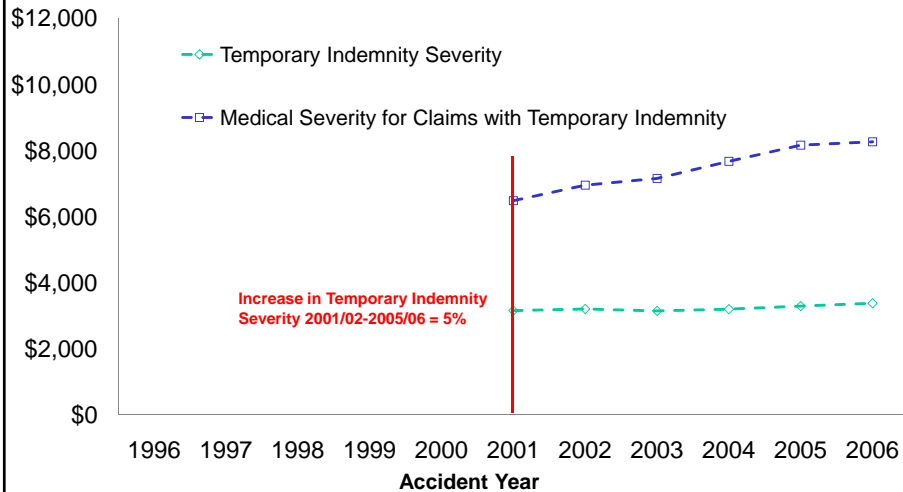
Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States  
Source: NCCI

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## Indemnity and Medical Severity for Claims with Temporary Payments



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## 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

	1996/97-2000/01		2001/02-2005/06	
Total	50%	100%	5%	100%
Share Due to Diagnosis Mix	10%	19%	3%	52%
Share Due to Duration	18%	36%	-6%	-120%
Share Due to Price and Other Factors	23%	45%	8%	168%

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## 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

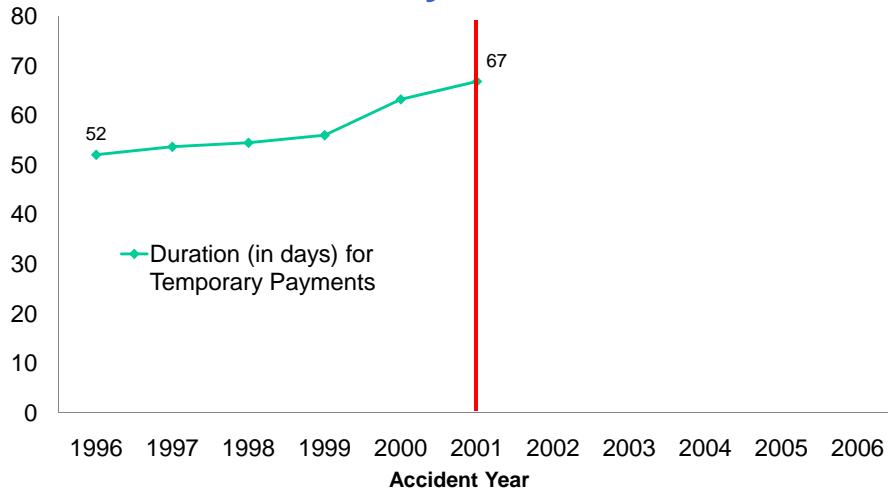
	Accident Years 2001/2002		Accident Years 2005/2006	
	Diagnosis and Severity Index		Diagnosis and Severity Index	
1	Sprain Lumbar Region	0.49	Lower Leg Injury, not otherwise specified	0.88
2	Lower Leg Injury, not otherwise specified	0.87	Sprain Lumbar Region	0.44
3	Carpal Tunnel Syndrome	1.33	Unilateral 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 indemnity severity for that diagnosis to overall average paid indemnity severity. Source: NCCI  
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## Utilization – Duration for Temporary Payments



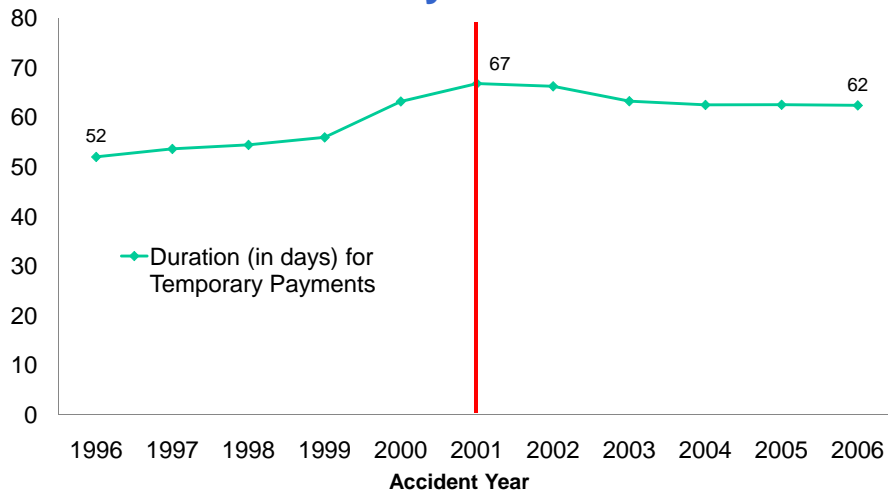
Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States  
Source: NCCI

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## Utilization – Duration for Temporary Payments



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

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

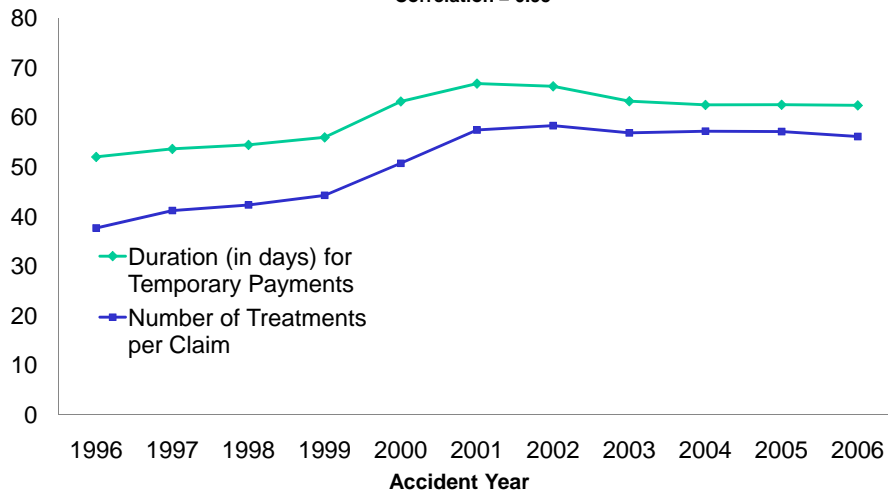
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## Duration and Treatments per Claim

Correlation = 0.95



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Source: NCCI

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## Does Surgery Make a Difference?

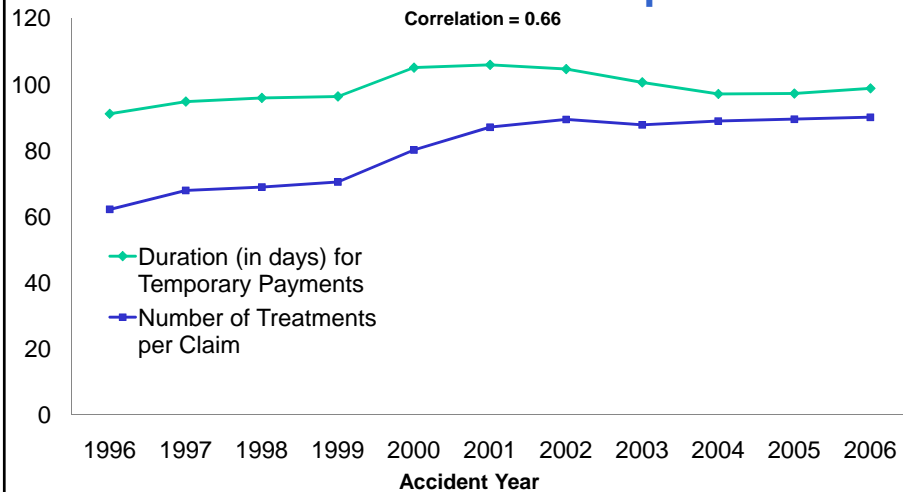
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## Surgical Claims Duration and Treatments per Claim

Correlation = 0.66



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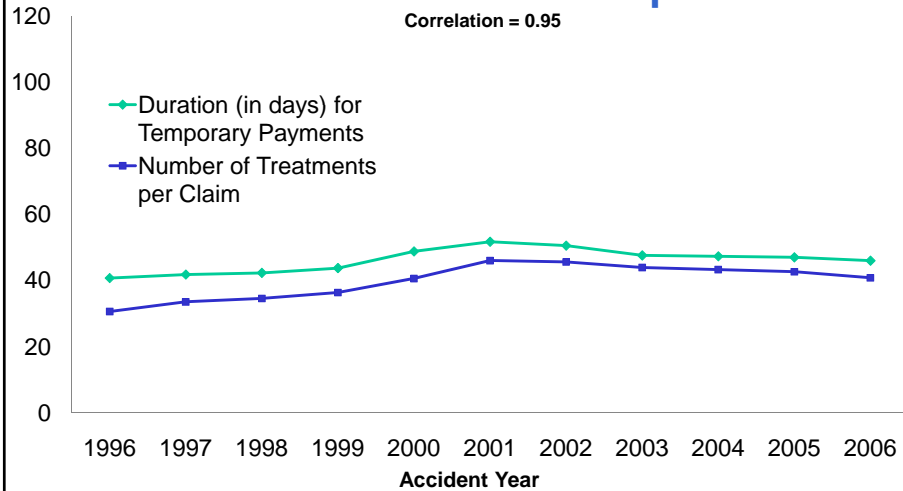
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## Non-surgical Claims Duration and Treatments per Claim

Correlation = 0.95



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## By Diagnosis Over Time and By Claim

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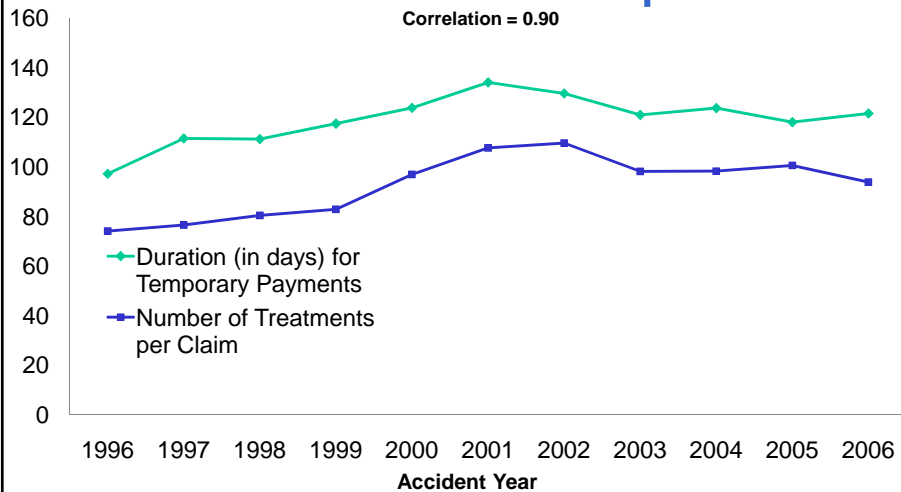
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## Correlations of Treatments per Claim and Duration by Diagnosis (Over Time and By Claim)

- Correlations over time vary at the diagnosis level, but are generally strongly positive.
  - For the 14 diagnoses in the top 10 from 1996 to 2006, correlations over time range from -0.05 to 0.96.
  - Ten are greater than 0.70
- Correlations at the claim level all range from 0.50-0.62.
- A next step may be to use statistical modeling at the claim level to control for differences by claim.

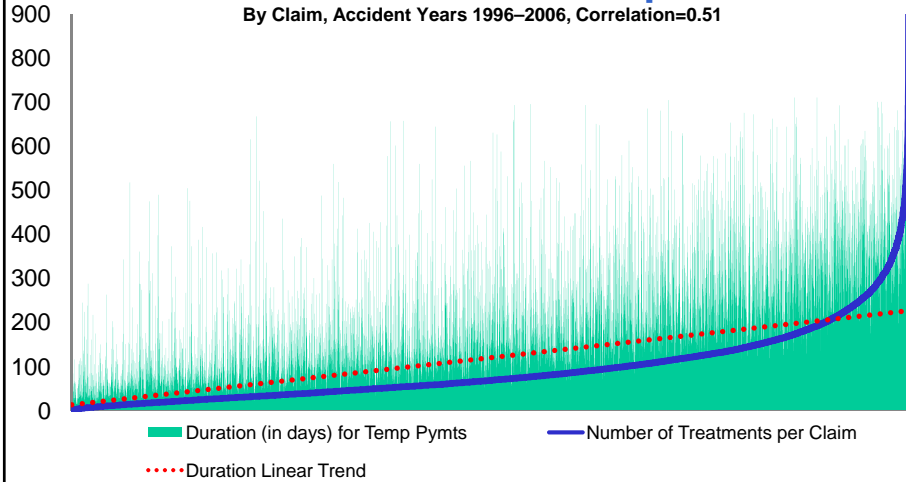
## Lumbar Disc Displacement Duration and Treatments per Claim



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

## Lumbar Disc Displacement Duration and Treatments per Claim

By Claim, Accident Years 1996–2006, Correlation=0.51



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

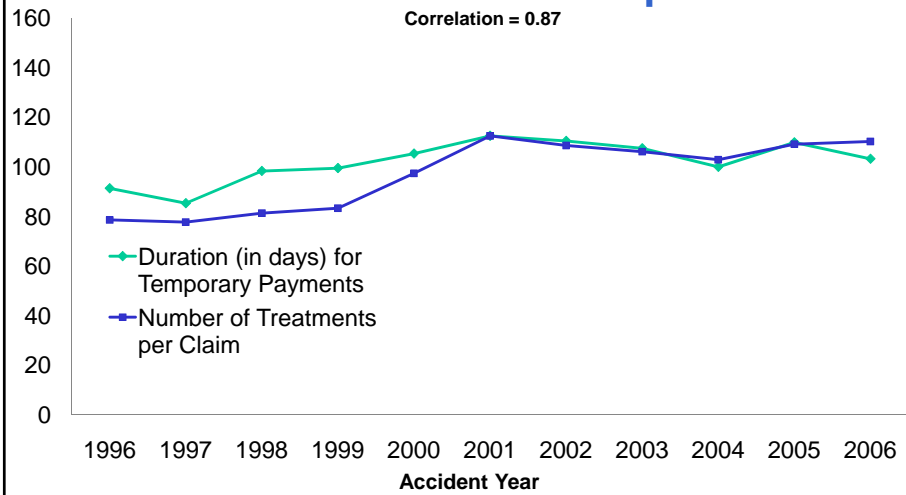
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## Rotator Cuff Syndrome Duration and Treatments per Claim

Correlation = 0.87

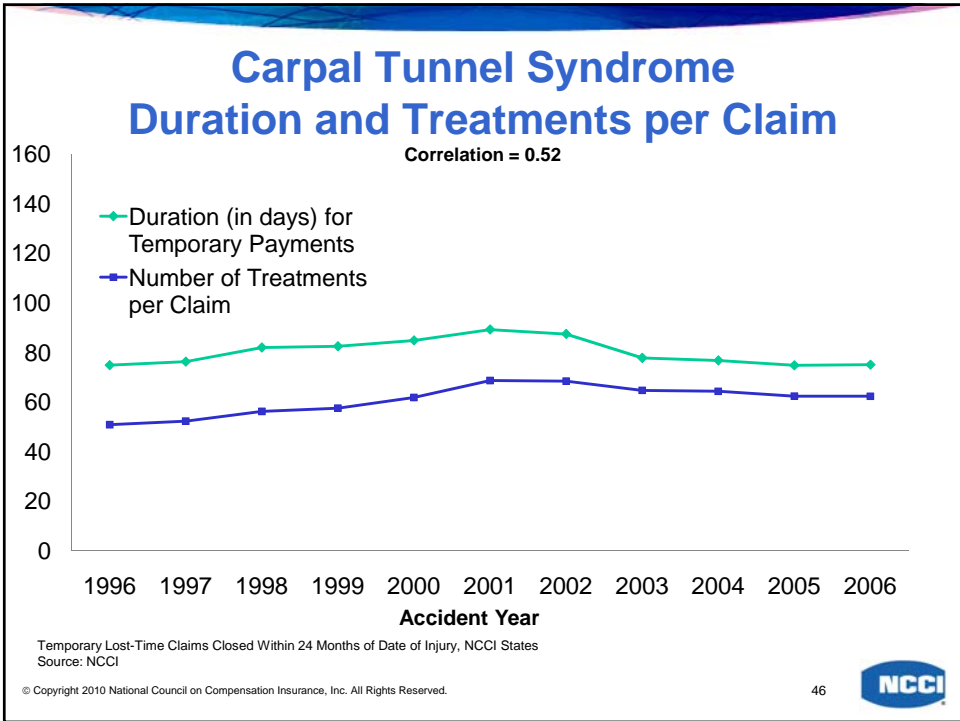
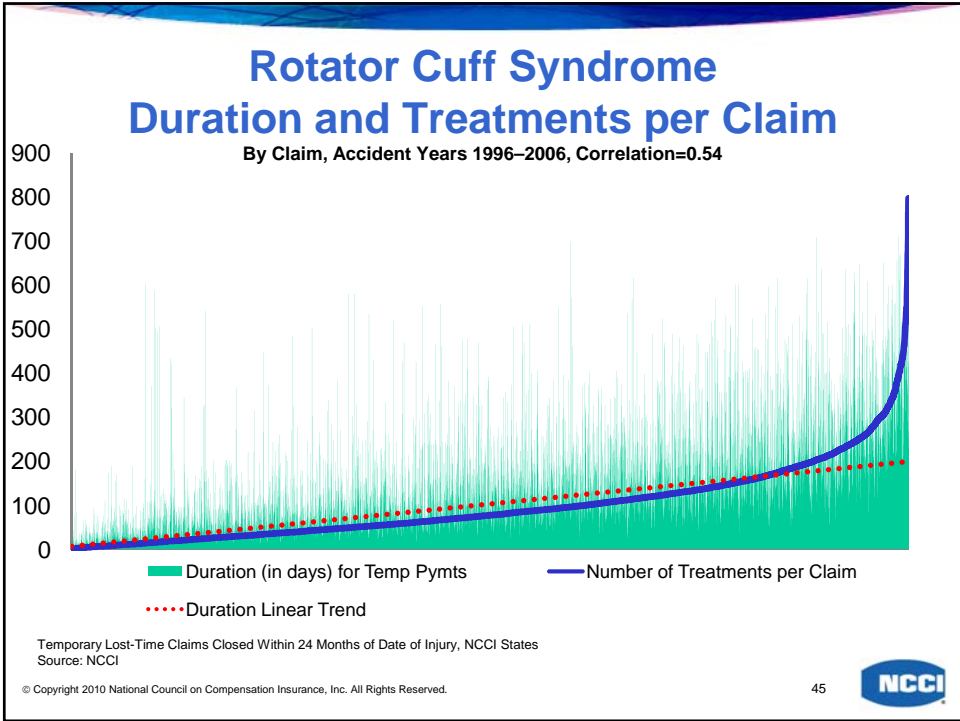


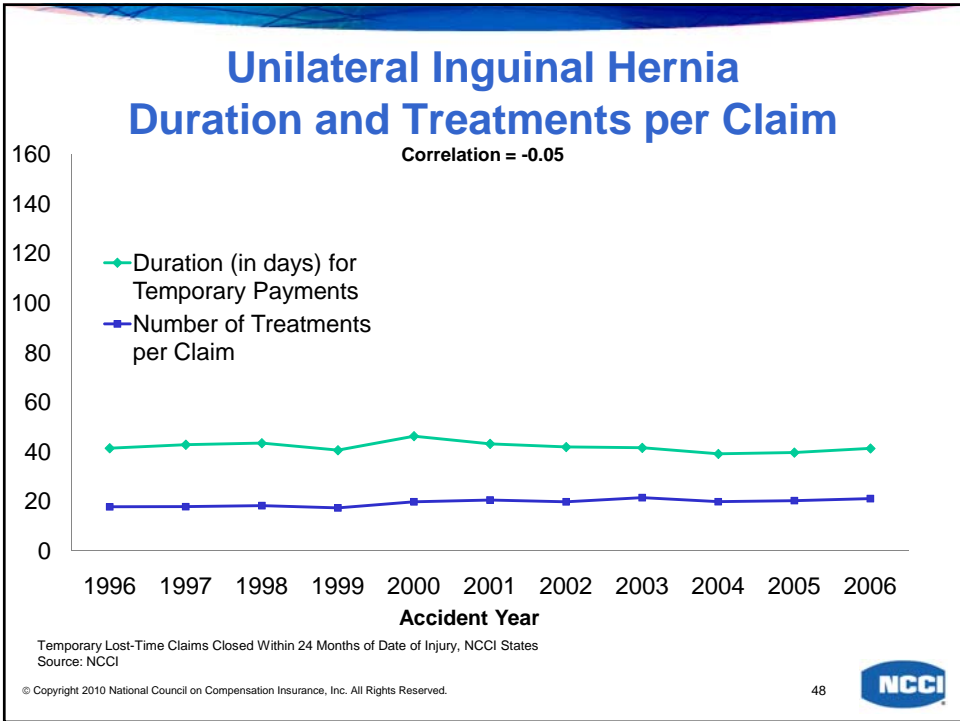
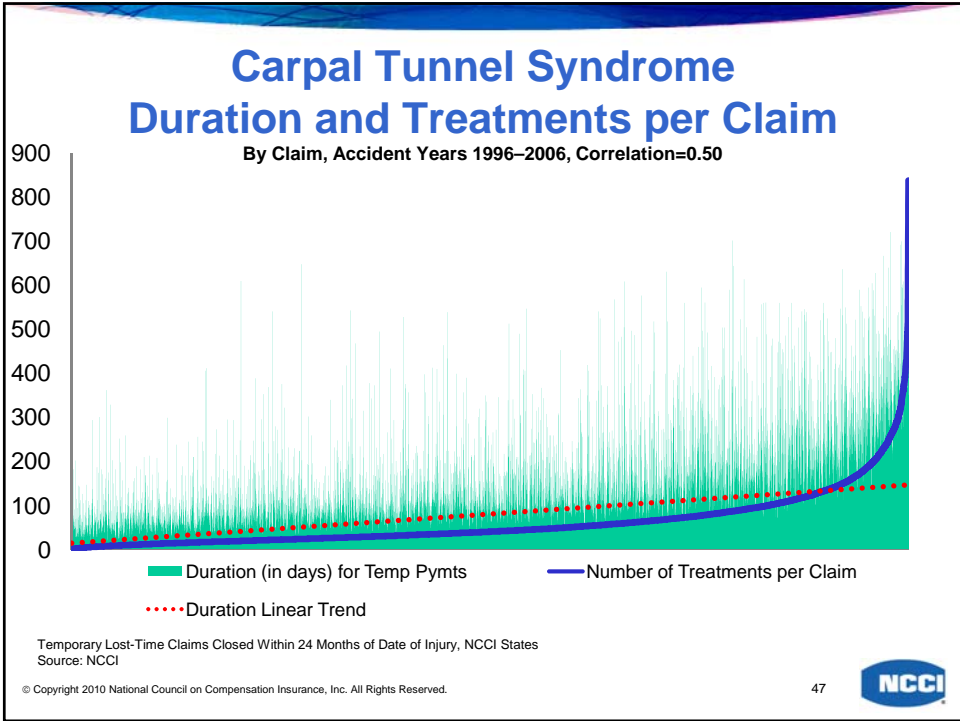
Temporary Lost-Time Claims Closed Within 24 Months of Date of Injury, NCCI States  
Source: NCCI

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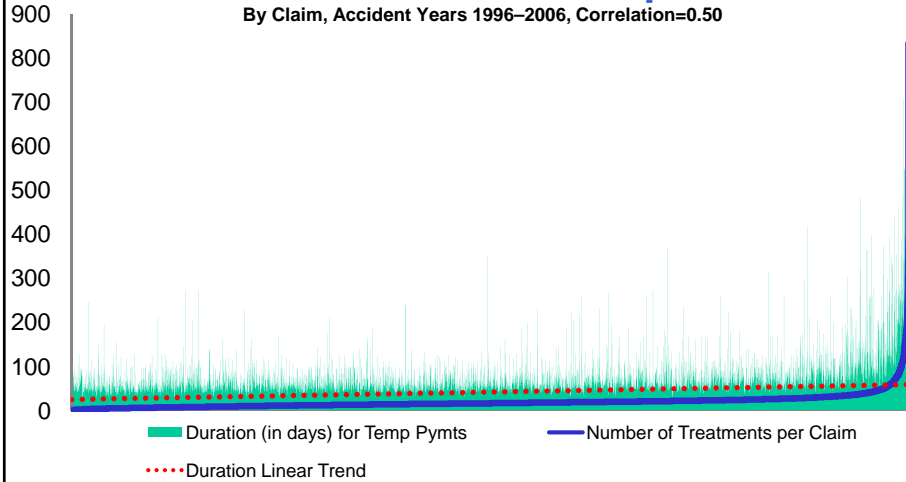






## Unilateral Inguinal Hernia Duration and Treatments per Claim

By Claim, Accident Years 1996–2006, Correlation=0.50



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Source: NCCI

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## Key Findings

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## Key Findings

- The share of the increase in medical severity due to increases in the number of treatments per claim has diminished.
- The share of the increase in indemnity severity due to increases in duration has also diminished.
- In the aggregate, the number of medical treatments per claim and duration move fairly closely together over time, but less so for claims with surgery.
- Correlations over time vary at the diagnosis level, but are generally strongly positive.
- Next step—may use statistical modeling at the claim level.



## Questions and More Information

- Two papers on this subject are available for download in the Research and Outlook Section on **ncci.com**
  - “Measuring the Factors Driving Medical Severity: Price, Utilization, Mix” posted in Spring 2007
  - “Factors Influencing the Growth in Treatments per Claim” posted in September 2008

