

Injured at Work

What workers' compensation data reveal about work-related musculoskeletal disorders (WMSDs)



SHARP | Safety & Health Assessment
& Research for Prevention

Promoting Safer, Healthier Workplaces

Overview of the Study



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Objective, Key Findings

The Safety and Health Assessment and Research for Prevention (SHARP) Program examined workers' compensation data to demonstrate the impact of work-related musculoskeletal disorders (WMSDs) in Washington State workplaces.

The data show that WMSDs¹ continue to represent a significant proportion of workers' compensation costs.

(See Figure 1.)

- WMSDs account for 27 percent of all accepted State Fund² workers' compensation claims.
- These claims are 40 percent of all compensable³ claims.
- WMSDs account for 44 percent of the cost of State Fund workers' compensation claims (compensable and medical-only).

The fact that WMSDs represent a significant proportion of workers' compensation costs suggests that they should be a high priority for injury prevention.

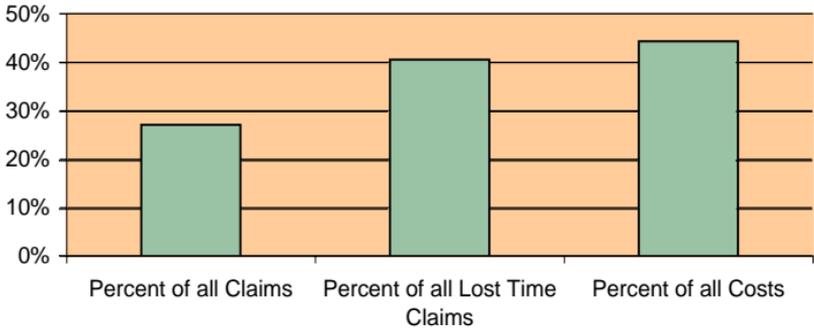
FOOTNOTES

- ¹ All references to WMSDs in this summary refer to disorders of the neck, back, hand/wrist, elbow and shoulder, unless otherwise indicated.
- ² "State Fund" means the workers' compensation program operated by the Department of Labor and Industries. Some large employers are self-insured.
- ³ Generally, "compensable" means the worker received benefits beyond payment of medical bills. These may include partial wage-replacement benefits for being off work four or more days, disability payments, etc.

SHARP's research activities bring together injury and illness data, site visits at participating businesses, scientific literature, and industry practices to prevent workplace illnesses and injuries.

FIGURE 1.

WMSDs of the Neck, Back and Upper Extremities — State Fund Claims



WMSD Risks

- ⊙ Work-related musculoskeletal disorders are a number of physical conditions affecting muscles, tendons, nerves and joints that are not caused by acute trauma. Examples include back strain, tendinitis and carpal tunnel syndrome. They occur when the physical demands of work damage these areas of the body.
- ⊙ WMSDs are caused or aggravated by exposures to frequent or heavy manual handling, awkward postures and forceful or repetitive exertions.
- ⊙ Risk increases as the frequency, duration or intensity of these exposures increase, or multiple risk factors occur at the same time. Fewer injuries and less-severe injuries would occur by reducing the number and frequency of exposures.

Research Methods

In the current study, the SHARP Program researchers examined State Fund workers' compensation claims for general and selected specific hand/wrist, elbow, shoulder, neck and back disorders accepted between 1996 and 2004. They examined closed compensable claims from self-insured employers for general categories because diagnostic codes (ICD-9) were unavailable. Claims data for the lower extremity are not included in this report. Researchers also used a prevention index (PI) to identify and rank industries with a high risk of WMSDs (see page 10). By using Washington State Quarterly Workforce Indicator data (2001-2004) as a denominator, researchers also estimated WMSD incidence rates by age and industry sector.

Claims Data: State Fund Claims

Number and Costs of State Fund Claims

Between 1996 and 2004, the State Fund accepted 345,923 claims for WMSDs. (See Table 1.)

- These claims cost \$3.8 billion in medical costs and partial wage-replacement benefits.
- The average cost per WMSD claim was \$4,100 more than the average cost of all claims.

TABLE 1.

State Fund Workers' Compensation Claims: All Claims, WMSD Claims Compared

	All Claims	WMSD Claims
Total claims 1996-2004	1,275,721	345,923
Percent of all claims	100.0%	27.1%
Total direct cost 1996-2004	\$9,114,586,942	\$3,839,530,011
Average total no. claims per year	141,747	38,436
Percent female	32.6%	37.2%
Median age	35	37
Average yearly claim rate per 10,000 FTEs	997.7	270.4
Overall severity rate (lost days) per 10,000 FTEs ^{††}	36989.7	18,009.7
Total compensable claims	305,463	123,893
Percent of total compensable claims	23.9%	35.8%
Overall yearly compensable claims rate per 10,000 FTEs	237.8	96.5
Average time-loss days^{††}	178	208
Median time-loss days ^{††}	34	41
Average total direct cost/claim*	\$7,232	\$11,334
Median total direct cost/claim*	\$411	\$851

^{††}Cost adjusted to 2004 using medical CPI for medical costs and overall CPI for wage replacement costs.
* Based on 1997-2004 compensable time-loss days.

Affected Body Areas — State Fund Claims

Table 2 displays information about the number and cost of State Fund claims by affected body area.

- ⦿ WMSDs of the back represent more than 14 percent of all accepted claims.
- ⦿ WMSDs of the neck require an average of 261 days away from work.

TABLE 2.

State Fund WMSD Claims: Number and Cost of Claims by Affected Body Area

	Neck	Back	Shoulder	Elbow Forearm	Hand Wrist
Total claims 1996-2004	41,695	180,452	46,295	22,275	65,861
Total direct cost 1996-2004	\$128.2M	\$1.6B	\$463.7M	\$111.5M	\$504.7M
Average yearly claim rate per 10,000 FTEs	32.5	141.1	36.1	17.4	51.5
Overall severity rate (lost days) per 10,000 FTEs ^{††}	585.7	8,214.3	2,726.7	685.5	3,031.2
Percent of claims which are compensable	49.2%	38.4%	41.5%	34.2%	38.4%
Overall yearly compensable claims rate per 10,000 FTEs	16	53.9	14.9	5.9	19.7
Average time-loss days^{††}	261	186	247	214	209
Median time-loss days ^{††}	51	23	80	64	69
Average total direct cost per claim*	\$14,334	\$10,689	\$14,651	\$7,760	\$10,167
Median total direct cost per claim*	\$874	\$773	\$955	\$610	\$830

^{††}Cost adjusted to 2004 using medical CPI for medical costs and overall CPI for wage replacement costs.
* Based on 1997-2004 compensable time-loss days.

Table 3 displays information about the number of claims and average costs for selected WMSDs.

- ⊙ Although claims for sciatica were infrequent, they were the most costly WMSD claim.
- ⊙ The second and third most-costly WMSD claims were for rotator cuff syndrome and carpal tunnel syndrome, respectively. These claims occurred two and a half to three times as often as sciatica.

TABLE 3.
Number of State Fund Accepted Claims,
Average Costs for Selected WMSDs

	Sciatica	Rotator Cuff Syndrome	Epicondylitis	Hand/ Wrist Tendinitis	Carpal Tunnel Syndrome
Total claims 1996-2004	7,275	21,923	14,334	20,287	26,828
Overall yearly claim rate per 10,000 FTEs	5.7	17	11.2	15.8	20.9
Overall severity rate (lost days) per 10,000 FTEs	1,871.8	2,242	538.8	1,169.4	2,422.7
Average time-loss days ^{††}	528	323	263	254	250
Average total direct cost/claim [*]	\$64,719	\$29,877	\$11,382	\$13,013	\$21,208
Average time on the job (months)	14	19	17	17	30
Average BMI ^Δ	27.1	27.4	26.6	26.9	28.3
[*] Cost adjusted to 2004 using medical CPI for medical costs and overall CPI for wage replacement costs. ^{††} Based on 1997-2004 compensable time loss days. ^Δ Body Mass Index = [Weight (lbs) / Height (in) ²] * 703					

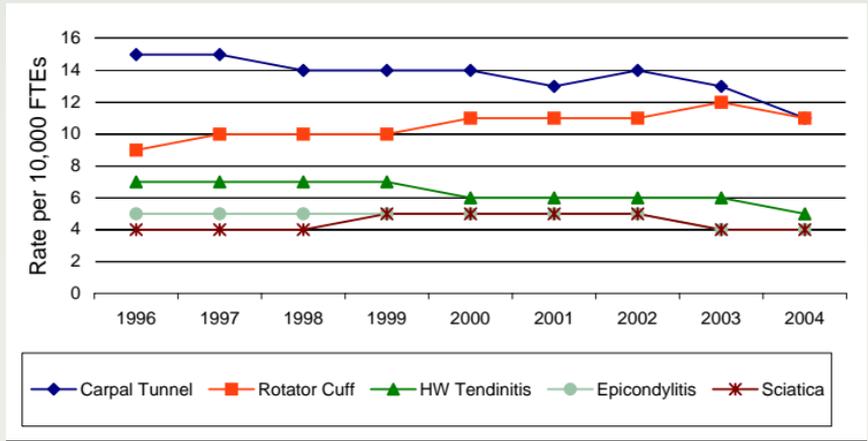
Changes in Compensable Incidence Rates — State Fund Claims

Figure 2 shows the incidence rates for specific WMSD conditions.

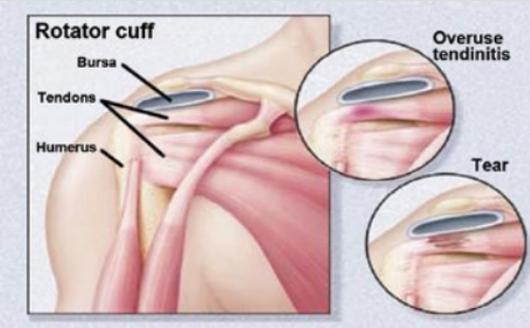
- ⊙ **Sciatica** – remained stable at 0.6% decrease per year
- ⊙ **Rotator cuff** – increased 3.6% per year
- ⊙ **Epicondylitis** – decreased 2.6% per year
- ⊙ **Carpal tunnel syndrome** – decreased 2.5% per year
- ⊙ All State Fund compensable claims decreased 3.9% per year

FIGURE 2.

Incidence Rates for Specific WMSD Conditions: State Fund Compensable Claims



Specific WMSD Conditions Illustrated



Rotator Cuff Syndrome

Involves inflammation, degeneration and tear of the tendons around the shoulder (with the supraspinatus tendon most frequently involved).

Illustration courtesy of Mayo Foundation for Medical Education and Research.

Epicondylitis

An inflammation of the tendon at the elbow (lateral epicondylitis or tennis elbow is most common).

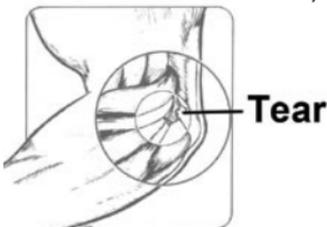


Illustration courtesy of Taylor & Francis, LTD.

Sciatica

The sciatic nerve runs between L5 and S1 and can be compressed by herniation of the disk there. Sciatic pain is manifested as radiating back pain that goes below the knee.



Hand/wrist Tendinitis

Is the inflammation of the flexor or extensor tendons or their lubricating sheaths (tenosynovitis).

Carpal Tunnel Syndrome

Is the compression of the median nerve at the wrist, due to inflammation.



Claims Data: Self-insured Employers

The SHARP Program researchers also reviewed data on self-insured employers. These employers tend to be larger companies and represent a different set of risks than employers covered by the State Fund. For self-insured employers, only data on closed compensable claims were available for review. (See Table 4.)

- For the period 1996 to 2004, self-insured employers closed 73,380 compensable WMSD claims, an average of 8,153 per year.
- WMSDs represent 46 percent of the compensable claims closed by self-insured employers.
- WMSDs of the back represent 22 percent of compensable claims in self-insured companies. Table 5 shows claims by affected body area.

TABLE 4.

Characteristics of Compensable WMSD Claims, Self-insured Employers, 1996-2004

	All Claims	WMSD Claims
Total compensable claims	160,831	73,380
% of all compensable claims	100.0%	45.6%
Average total no. claims/year	17,870	8,153
% female	44.1%	48.0%
Median age	42	41
Average yearly claim rate per 10,000 FTEs	307	140

TABLE 5.

Compensable WMSD Claims By Affected Body Area, Self-insured Employers, 1996-2004

	Neck	Back	Shoulder	Elbow Forearm	Hand Wrist
Total claims	2,014	34,865	10,235	2,551	11,878
Percent of all compensable claims	1.3%	21.7%	6.4%	1.6%	7.4%
Average total number claims per year	224	3,874	1,137	283	1,320
Percent female	50.3%	41.1%	44.2%	45.1%	58.2%
Median age	40	40	43	42	42
Average yearly claim rate per 10,000 FTEs	3.8	66.6	19.5	4.9	22.6

Compensable Claims Rate — State Fund and Self-insured Employers

The claims rate for all compensable claims and for compensable WMSD claims decreased significantly for both State Fund and self-insured employers. (See Figure 3.)

Rates for compensable claims increased by age group until age 35-44 and then declined. (See Figure 4.)

FIGURE 3.

Claims Rates — All Compensable Claims Compared to Compensable WMSD Claims

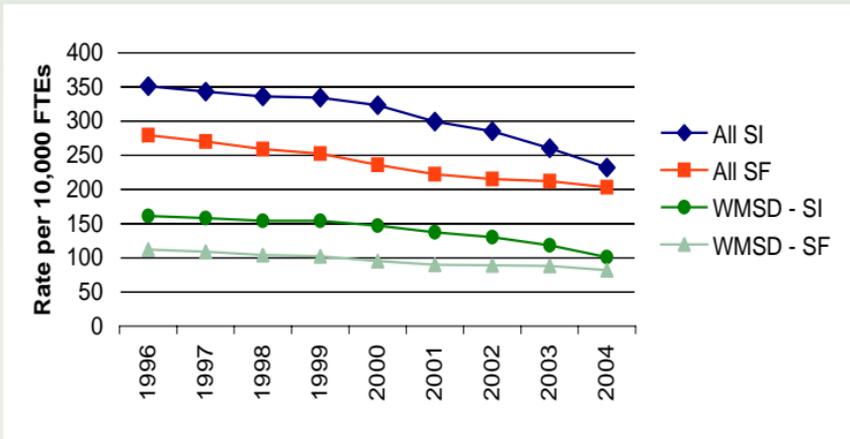
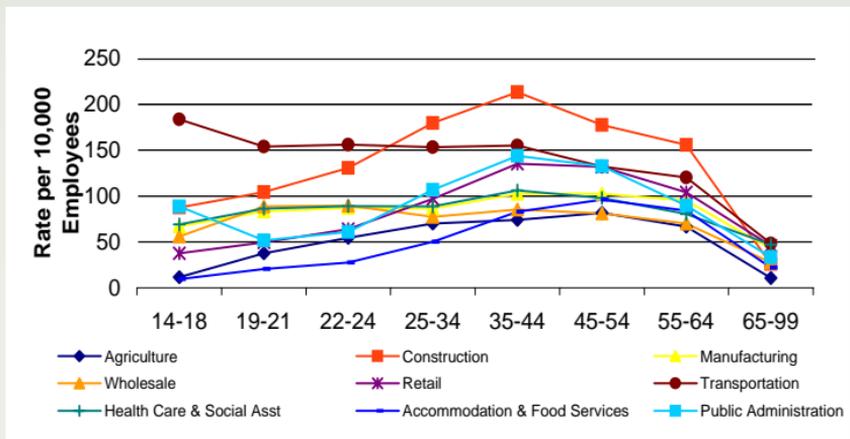


FIGURE 4.

Incidence of WMSD Claims by Age and Industry, 2001-2004



Industries with Highest Risk of WMSDs

SHARP researchers use a prevention index (PI) to identify the industry sectors with the greatest potential for prevention of WMSDs. The PI is the average of an industry's ranking for number of injuries and its ranking for claims rate.

An industry will rank high on the PI if it has a relatively large number of claims and a relatively high claims rate.

SHARP researchers also calculate a rate ratio for each industry. The rate ratio compares the claim incidence rate for each industry with the overall claim incidence rate for all industries in Washington State.

A rate ratio of 3, for example, means that the rate for that industry is three times the overall rate.

Industry Sectors – State Fund Claims

For State Fund employers, construction, manufacturing, and health care were the top three industry sectors on the prevention index. **(See Table 6, Page 11.)** Claim costs and lost time are also highest in construction.

Industry Sectors – Self-insured Claims

Among self-insured employers, the top three industry sectors on the prevention index were health care, transportation, and public administration. **(See Table 7, Page 12.)**

Four-digit NAICS⁴ Ranking by Prevention Index

In addition to the PI ranking by industry sector (two-digit NAICS), SHARP researchers also calculated the PI for the more-specific four-digit NAICS categories. This ranking combined State Fund and self-insured compensable claims.

Couriers had the highest incidence rate, which was 4.3 times the overall WMSD rate for all industries. **(See Table 8, Page 13.)**

FOOTNOTES

⁴ NAICS is the North American Industry Classification System.

TABLE 6.

Industry Sector Ranking by Prevention Index, State Fund Claims, 1996-2004

NAICS Description	Count	Cost	Lost Work Days	Rate	Rate Ratio
23 Construction	52,921	\$992,335,582	4,754,493	489.8	1.8
32 Manufacturing (Wood, Paper, Printing)	15,501	\$149,802,296	785,275	438.5	1.6
62 Health Care and Social Assistance	36,123	\$305,516,990	1,835,581	311.0	1.2
33 Manufacturing (Metals, Equipment)	21,448	\$228,472,234	1,248,599	342.5	1.3
44 Retail Trade (Non-Department Stores)	32,209	\$300,436,484	1,664,184	287.7	1.1
48 Transportation and Warehousing	12,771	\$158,404,713	799,815	432.4	1.6
42 Wholesale Trade	25,099	\$239,029,345	1,234,559	296.8	1.1
56 Admin/Support & Waste Mgmt. & Remediation Services	20,451	\$188,814,926	1,223,364	304.0	1.1
72 Accommodation and Food Services	26,956	\$196,225,250	1,351,620	249.0	0.9
31 Manufacturing (Food, Fabric, Textiles)	8,942	\$84,454,422	527,551	409.6	1.5
92 Public Administration	15,132	\$143,775,680	577,709	254.5	0.9
49 Transportation & Warehousing	2,686	\$21,605,045	136,091	483.5	1.8
81 Other Services (Except Public Admin.)	15,089	\$194,809,535	1,113,501	228.9	0.8
45 Retail Trade (Department Stores)	9,665	\$82,549,904	510,624	246.1	0.9
11 Agriculture, Forestry, Fishing and Hunting	11,733	\$126,959,167	744,660	225.9	0.8
21 Mining	859	\$14,625,659	64,604	344.6	1.3
22 Utilities	1,262	\$15,382,798	53,262	315.2	1.2
61 Educational Services	8,799	\$73,421,791	380,895	132.1	0.5
53 Real Estate and Rental and Leasing	7,731	\$79,844,540	454,267	186.6	0.7
71 Arts, Entertainment, and Recreation	3,553	\$29,044,386	165,278	209.9	0.8
54 Professional, Scientific, & Technical Service	7,728	\$82,787,560	427,698	83.6	0.3
51 Information	3,579	\$32,320,468	152,943	114.6	0.4
52 Finance and Insurance	3,739	\$35,235,818	182,680	64.9	0.2
99 Unclassified Establishments	262	\$2,844,914	20,910	208.4	0.8
55 Management of Companies and Enterprises	97	\$1,823,430	10,602	189.5	0.7

2-digit NAICS codes for Industry Sector. NAICS codes are missing for 1,588 claims.

Cost adjusted to 2004 using medical CPI for medical costs and overall CPI for wage replacement benefits.

Time-loss days from 1997-2004.

TABLE 7.

Industry Sector Ranking by Prevention Index, Self-insured Claims, 1996-2004

NAICS Description	Count	Rate	Rate Ratio
62 Health Care and Social Assistance	11,321	180.1	1.3
48 Transportation	5,425	350.1	2.5
92 Public Administration	7,131	168.2	1.2
49 Warehousing and Couriers	3,019	495.6	3.5
45 Retail Trade (Department Stores)	6,294	164.2	1.2
44 Retail Trade (Non-Department Stores)	7,391	152.6	1.1
33 Manufacturing (Metals, Equipment)	11,357	124.4	0.9
32 Manufacturing (Wood, Paper, Printing)	3,200	159.6	1.1
56 Admin/Support & Waste Mgmt. & Remediation Services	1,504	230.5	1.6
31 Manufacturing (Food, Fabric, Textiles)	2,840	164.1	1.2
42 Wholesale Trade	1,523	147.2	1.1
61 Educational Services	5,644	79.4	0.6
72 Accommodation and Food Services	932	113.1	0.8
21 Mining	148	150.7	1.1
51 Information	1,823	53.2	0.4
81 Other Services (Except Public Administration)	803	111.7	0.8
22 Utilities	758	121.2	0.9
11 Agriculture, Forestry, Fishing and Hunting	914	81.5	0.6
53 Real Estate and Rental and Leasing	36	127.1	0.9
23 Construction	799	107.5	0.8
52 Finance and Insurance	501	28.2	0.2
71 Arts, Entertainment, and Recreation	15	32.5	0.2

TABLE 8.

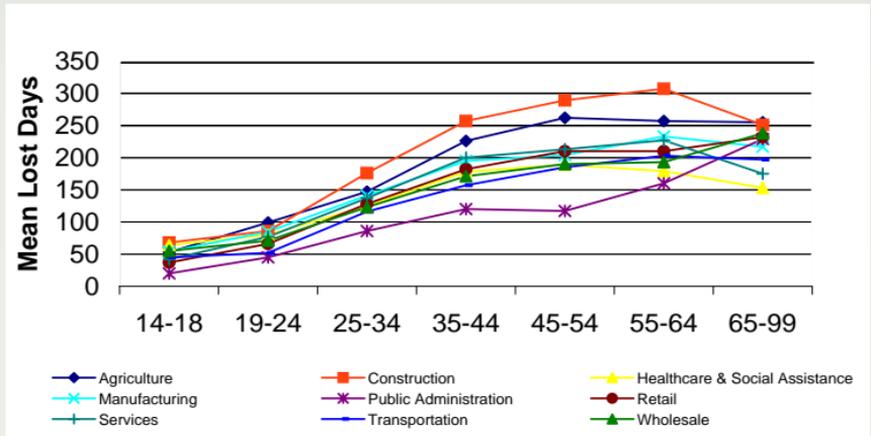
Four-digit NAICS Ranking by Prevention Index (Top 25), Combined State Fund and Self-insured Compensable Claims

NAICS Description		Count	Rate	Rate Ratio
4921	Couriers	3,267	469.5	4.3
2381	Foundation, Structure, & Building Exterior Contractors	5,681	282.9	2.6
4811	Scheduled Air Transportation	3,179	373.4	3.4
6231	Nursing Care Facilities	3,558	272.3	2.5
4841	General Freight Trucking	3,190	259.2	2.4
2383	Building Finishing Contractors	3,139	252.1	2.3
2361	Residential Building Construction	3,614	222.6	2.0
6233	Community Care Facilities for the Elderly	2,508	250.8	2.3
5621	Waste Collection	1,157	376.9	3.5
4451	Grocery Stores	7,202	191.7	1.8
5617	Services to Buildings & Dwellings	3,513	203.1	1.9
4842	Specialized Freight Trucking	1,328	272.1	2.5
6221	General Medical & Surgical Hospitals	0,228	180.7	1.7
3219	Other Wood Product Manufacturing	2,159	207.5	1.9
2389	Other Specialty Trade Contractors	1,497	196.7	1.8
7213	Rooming & Boarding Houses	1,377	201.0	1.8
6222	Psychiatric and Substance Abuse Hospitals	808	317.7	2.9
4521	Department Stores	5,222	169.1	1.6
3116	Animal Slaughtering & Processing	1,101	215.8	2.0
4854	School & Employee Bus Transportation	679	386.4	3.5
4248	Beer, Wine, & Distilled Alcoholic Beverage Merchant Wholesalers	792	227.4	2.1
3121	Beverage Manufacturing	840	217.1	2.0
4244	Grocery & Related Product Wholesalers	2,956	164.7	1.5
3313	Alumina/Aluminum Production & Processing	883	194.2	1.8
2362	Nonresidential Building Construction	1,725	162.3	1.5
NAICS groups averaging less than 100,000 hours per year were excluded from the analysis				
NAICS codes are missing for 1,104 cases				

Incidence Rate by Age and Industry Sector

FIGURE 5.

Rate for Compensable WMSD Claims: State Fund and Self-Insured Employers Combined



Average Lost Workdays: State Fund Claims

The average lost workdays per claim increases with age until 64, where it begins to decline. Administratively, lost days are counted only until the claim is closed (possibly with a pension or voluntary retirement in the older age groups). (See Figure 5)

Full Report Available

This document is a summary of Technical Report Number 40-10a-2006, **Work-related Musculoskeletal Disorders in the Neck, Back, and Upper Extremity in Washington State, 1996-2004.**

For a full discussion and detailed methodology, contact the SHARP Program to obtain a copy of the full report, authored by Barbara Silverstein, Ph.D., MPH, Darrin Adams, BS.

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Conclusions

Workers' compensation data for Washington State show that work-related musculoskeletal disorders (WMSDs) continue to be a large and costly problem.

- ⦿ WMSDs account for 27 percent of accepted State Fund claims and 44 percent of the cost.
- ⦿ WMSDs cost the State Fund an average of \$435 million each year.
- ⦿ The highest risks of WMSDs are in industries where workers' jobs involve manual handling and forceful repetitive exertions.

Rates evolve differently by type of injury

The rates for some WMSDs (back, carpal tunnel syndrome) are decreasing relatively rapidly, while others are stable (epicondylitis), or increasing (rotator cuff, sciatica). These variations may reflect changes in the work environment in some industries (reducing manual handling and repetitive work) that is not occurring in other industries.

Injuries differ by industry, age and gender

Although claims rates are relatively stable across age groups by industry, average lost time days increase with age until age 64. While a greater proportion of wrist WMSD claimants are female, claimants in other body regions tend to be male. Carpal tunnel syndrome claimants had more than twice the time on the job than non-CTS claimants. Body mass index was also higher among CTS claimants.

Cost estimates for WMSDs do not capture all financial impacts

The burden of WMSDs is mostly underestimated because the estimates do not include claims data for the lower extremity. In addition, there is evidence in scientific literature that these kinds of disorders are underreported, and the indirect costs to the employer, employee and society are not included.

How You Can Prevent WMSDs

It is important to identify factors in the work system that may contribute to injury. How does the individual relate to their work environment, organization, technology or equipment, and task? Imbalanced or broken relationships in the work system can result in musculoskeletal disorders.

Implementing simple principles can reduce risk:

- ⦿ The body is made to move: use the muscles but don't abuse them.
- ⦿ Body parts are connected: make sure you haven't improved the posture of one part of the body at the expense of another.

Back and shoulder WMSDs are primarily related to manual lifting, carrying, pushing or pulling heavy, awkward loads. To reduce risks:

- ⦿ Find mechanical ways to lift, carry, push or pull. Use carts or hoists that easily roll or reposition.
- ⦿ Use slide boards or rollers to reposition heavy objects.
- ⦿ If you have to lift manually, keep the load close to the body and between shoulder and knee height.
- ⦿ Get someone to help you.

Neck and upper extremity WMSDs are primarily related to too much or too little movement, particularly when combined with high hand or finger force or awkward postures. To reduce risk:

- ⦿ Increase variation of tasks.
- ⦿ Look for ways to reduce high pinch or power grips.
- ⦿ Eliminate sharp edges that can dig into soft tissues.
- ⦿ Reduce extended reaches.

Find more ideas about preventing WMSDs

Check out L&I's Ergonomics Idea Bank at www.Ergonomics.LNI.wa.gov



www.SHARP.LNI.wa.gov