

Special Article

EFFECT OF ELIMINATING COMPENSATION FOR PAIN AND SUFFERING ON THE OUTCOME OF INSURANCE CLAIMS FOR WHIPLASH INJURY

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ABSTRACT

Background and Methods The incidence and prognosis of whiplash injury from motor vehicle collisions may be related to eligibility for compensation for pain and suffering. On January 1, 1995, the tort-compensation system for traffic injuries, which included payments for pain and suffering, in Saskatchewan, Canada, was changed to a no-fault system, which did not include such payments. To determine whether this change was associated with a decrease in claims and improved recovery after whiplash injury, we studied a population-based cohort of persons who filed insurance claims for traffic injuries between July 1, 1994, and December 31, 1995.

Results Of 9006 potentially eligible claimants, 7462 (83 percent) met our criteria for whiplash injury. The six-month cumulative incidence of claims was 417 per 100,000 persons in the last six months of the tort system, as compared with 302 and 296 per 100,000, respectively, in the first and second six-month periods of the no-fault system. The incidence of claims was higher for women than for men in each period; the incidence decreased by 43 percent for men and by 15 percent for women between the tort period and the two no-fault periods combined. The median time from the date of injury to the closure of a claim decreased from 433 days (95 percent confidence interval, 409 to 457) to 194 days (95 percent confidence interval, 182 to 206) and 203 days (95 percent confidence interval, 193 to 213), respectively. The intensity of neck pain, the level of physical functioning, and the presence or absence of depressive symptoms were strongly associated with the time to claim closure in both systems.

Conclusions The elimination of compensation for pain and suffering is associated with a decreased incidence and improved prognosis of whiplash injury. (N Engl J Med 2000;342:1179-86.)

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WHIPLASH injury results from acceleration-deceleration forces applied to the neck, usually in motor vehicle collisions.¹ This type of injury is a common cause of chronic neck pain in industrialized countries. Symptoms of whiplash include pain in the neck, shoulder, or arm; headache; jaw pain; dizziness; tinnitus; and memory and concentration difficulties.² The subjective nature of these symptoms and

their high prevalence have led to controversy over the determination of their cause and appropriate financial compensation.³⁻⁶ An insurance system in which financial compensation is determined by the continued presence of pain and suffering provides barriers to recovery. In this respect, such an insurance system may promote persistent illness and disability.

In 1995, on the basis of a systematic review of the literature on whiplash injury, Spitzer et al. recommended minimal intervention, including reassurance, encouragement to resume normal activity, and simple exercises to be performed at home for acute injury.² They found little support for other treatment approaches. The report by Spitzer et al. raised the possibility that regional variations in the incidence and prognosis of whiplash injury might be due to different incentives in insurance-compensation systems. The authors strongly recommended that prognostic studies be performed to determine risk factors and the influence of insurance incentives.

Saskatchewan Government Insurance is the only insurer for motor vehicle injuries in Saskatchewan, Canada, a province with approximately 1.1 million residents. On January 1, 1995, the province's tort system for compensation was changed to a no-fault system. This change provided an opportunity to conduct a natural study. Under the tort system, persons injured in motor vehicle collisions could sue for pain and suffering, and the number and cost of claims were escalating. With the change to a no-fault system, payments for pain and suffering — and therefore most court actions — were eliminated, and medical and income-replacement benefits were increased. Tort action was still possible under the no-fault system if costs exceeded the benefits (e.g., if medical costs exceeded \$500,000 or if the annual income-replacement

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claim exceeded \$50,000). Saskatchewan has a universal health care program, with no cost to the patient for treatment, and there are no barriers to care. All practitioners must report to Saskatchewan Government Insurance information on patients seeking treatment for injuries sustained in motor vehicle collisions. We are not aware of any substantial changes in lawyers' fees during the period of our study. The purpose of our study was to determine whether the change from a tort system of compensation to a no-fault system was associated with a reduced number of claims and a more rapid recovery after whiplash injury.

METHODS

Study Population and Design

The population base for our cohort included all Saskatchewan residents, 18 years of age or older, who submitted a claim to Saskatchewan Government Insurance for a traffic injury that occurred between July 1, 1994, and December 31, 1995. The date of entry into the cohort was the day of the injury and the date of exit was the day on which the claim was closed or November 1, 1997, when data on all claims remaining open were censored. Not included in the cohort were persons who died, those who filed workers' compensation claims, non-English-speaking persons, those with more than one injury claim during the study period, and those who had injuries (e.g., catastrophic head injury) or unassociated illnesses (e.g., Alzheimer's disease) that precluded completion of the study questionnaires. We formed a subcohort of persons with whiplash injuries by excluding persons who were not injured in a motor vehicle (pedestrians, bicyclists, and motorcyclists) and those hospitalized for more than two days (i.e., those with serious injuries) and by including persons who answered yes to the following questions: "Did the accident cause neck or shoulder pain?" and "Have you felt neck or shoulder pain or have you felt reduced or painful neck movement since the accident?"

All claimants were asked to complete an anonymous base-line questionnaire that covered information in six categories: sociodemographic characteristics, collision-related factors, health, injury-related factors, pain, and the health care provider seen initially. Saskatchewan Government Insurance provided us with these unidentified base-line data for all subjects. Eighty percent of the claimants completed this form within one month after the collision. Claimants who provided written consent also completed follow-up questionnaires mailed to them approximately six weeks, four months, eight months, and one year after the collision. These questionnaires asked about pain and other symptoms and included questions about health-related quality of life⁷ and depressive symptoms.⁸ The respondents indicated the intensity of pain in the neck, head, and other areas of the body on a 100-mm visual-analogue scale by placing a mark between the two ends of the scale, labeled "no pain" and "pain as bad as it could be."⁹ The percentage of the body affected by pain was determined on the basis of a drawing on which the respondent indicated painful areas.¹⁰

Subjects gave written informed consent to be included in the follow-up portion of the study. The study was approved by the University of Saskatchewan's Advisory Committee on Ethics in Human Experimentation.

Follow-up data on the intensity of neck pain, physical functioning, and depressive symptoms were used to evaluate various aspects of recovery. We used the physical-functioning scale of the 36-item Medical Outcomes Study Short-Form General Health Survey to assess the ability to perform daily activities.¹¹ Scores range from 0 to 100, with higher scores indicating better functioning. This scale has good psychometric properties and is used extensively.¹²⁻¹⁵ To evaluate depressive symptoms, we used the depression scale of the Center for Epidemiologic Studies, which asks about symptoms in the previous week.⁸ Scores range from 0 to 60, and a score of

16 or higher suggests marked depressive symptoms. This scale also has good psychometric characteristics¹⁶⁻²¹; a score of 16 or higher has a sensitivity of 64 percent and a specificity of 94 percent for identifying depression in the general population.^{8,22}

Outcome Measure

Our outcome measure was the number of days from the date of the injury to the date on which the claim was closed (i.e., payments ceased and a final agreement was reached between the insurer and the claimant). The time to closure of the claim is a common proxy for recovery in studies of insurance claims for traffic injuries and workers' compensation claims for occupational injuries.^{2,23,24} The decision to close a claim involves negotiations among the claimant, the claimant's health care provider, the insurance adjuster, and sometimes a lawyer. Closure usually coincides with the end of treatment or the attainment of maximal medical improvement or with the end of income-replacement payments. In some cases, claims are reopened because of late accounts or recurrent symptoms. Unfortunately, Saskatchewan Government Insurance does not record information about reopened claims in its data base, nor is the first closure date retained in records of reopened claims. Therefore, our prognostic models are based on claims that were not reopened. We did not collect information on overall costs, such as administrative costs or the amount of money awarded to claimants.

The six-month cumulative incidence of whiplash injuries was calculated for claims filed within the last six months of the tort system (July through December 1994) and within the first six months (January through June 1995) and the second six months (July through December 1995) of the no-fault system. Age- and sex-specific rates were calculated with the use of the Saskatchewan population at midyear as the denominator.²⁵ We also calculated incidence rates using the total number of vehicle-damage claims and the total number of kilometers driven in Saskatchewan as denominators.²⁶ The time to the closure of claims was calculated with the use of a Kaplan-Meier analysis.²⁷ Incidence rates, closure times, and base-line variables were compared for the three six-month periods. Because there were no significant differences in closure time or base-line variables between claims made during the two no-fault periods ($P \geq 0.05$ in all cases), combined values for the two periods were used in further analyses.

Cox proportional-hazard models for tort and no-fault claims were constructed with the use of base-line variables as prognostic factors for the time to the closure of a claim.²⁷ A three-stage modeling strategy was used. First, a model was constructed for each of the six categories of factors covered in the base-line questionnaire. Factors with beta values for which the P values were less than or equal to 0.10 by the Wald test in univariate models were entered into the appropriate category-specific model. Second, factors with beta values for which the P values were less than or equal to 0.10 in these six models were entered into a full multivariate model. The final model included factors with beta values for which the P values were less than 0.05. The proportionality assumption was tested by plotting $\log[-\log(\text{survival function})]$ against time. The results are presented as hazard rate ratios with 95 percent confidence intervals.

To investigate the relation between claim closure and recovery from whiplash injury, we measured the association between the time to closure of a claim and the intensity of neck pain, level of physical functioning, and presence or absence of depressive symptoms.²⁸ We constructed three Cox models in which the values of the covariate were updated and three in which the values of the covariate were updated and the relation between the covariate and the outcome may have varied over time.²⁹⁻³¹ The models were constructed separately for the tort period and the no-fault periods. All models were adjusted for age and sex and for other variables that caused the exposure estimates for neck pain, decreased physical functioning, and depression to vary by 10 percent or more.³² The log-likelihood statistic was used to select the best-fitting models, and the adjusted beta values were used to calculate the effect of neck pain, decreased physical functioning, and depression on the time

to the closure of claims. We performed analyses with the use of SPSS,³³ SAS,³⁴ and Stata³⁵ software packages. All reported P values are two-tailed.

RESULTS

Characteristics of the Study Population

Of the 15,738 Saskatchewan residents who submitted injury claims during the study period, 10,902 were eligible for the study. A total of 292 persons died, 113 filed workers' compensation claims, 107 had injuries or unassociated illnesses that precluded answering the questionnaires, 86 filed more than one injury claim, and 81 did not speak English. A total of 1010 persons decided not to complete the claim process, and 207 were advised by their lawyers not to answer the base-line questionnaire, leaving 9006 eligible subjects. We excluded 525 persons who were hospitalized for more than two days and an additional 357 who were not injured in motor vehicles. Of the remaining 8124 persons, 7462 (83 percent of the 9006 eligible persons) met the case definition for whiplash and were included in the analysis of incidence rates.

There were no significant differences in base-line characteristics between persons who filed claims during the first six months of the no-fault period and those who filed claims during the second six months (Table 1). Tort claimants tended to be younger than no-fault claimants and were more likely to be male, single, and in a lower-income group. Twenty-two percent of tort claimants and 5 percent of no-fault claimants initially retained a lawyer. Tort claimants were more likely than no-fault claimants to report that they had never experienced neck pain before the injury, and tort claimants reported slightly higher levels of pain and slightly higher percentages of the body that were affected by pain. There were no important differences in educational level, employment status, health before the collision, or other symptoms caused by the collision. Overall, 50 percent of claimants worked full time and 19 percent part time; 46 percent of the claimants were not working at the time of the claim because of their injuries. The vehicle was hit in the rear in 41 percent of cases, in the front in 27 percent, and on the side in 32 percent.

Whiplash Claims

The incidence of whiplash claims dropped by 28 percent after the change to a no-fault system of compensation (Table 2), despite increases in the number of vehicle-damage claims and in the number of kilometers driven. The rates in each period were higher for women than for men, but the decrease in the incidence of claims after the change to a no-fault system was greater among men (a 43 percent decrease, as compared with a 15 percent decrease among women). With respect to age, the largest reduction occurred in the younger age groups (18 to 29 years).

Closure of Claims

Because of uncertainty about the reasons for reopening 2064 claims and the lack of information about the first closure date, these claims were not included in our time-to-event analyses. Under the tort system, 22 percent of whiplash claims were reopened, and under the no-fault system, 32 percent were reopened. The median time to the closure of a reopened claim was 12 days (95 percent confidence interval, 9 to 15); 37 percent of reopened claims were closed on the day they were reopened. These data suggest that in most cases, there were administrative reasons for reopening a claim, such as the payment of a bill. The base-line characteristics of the 2064 persons with reopened claims and the 5398 persons with claims that remained closed were similar (data not shown). Of these 5398 claims, 2377 were for injuries that occurred during the tort period, and 3021 were for injuries that occurred during the no-fault period.

For the 5398 whiplash claims that were not reopened, the median time to closure was 433 days (95 percent confidence interval, 409 to 457) during the tort period and 194 days (95 percent confidence interval, 182 to 206) and 203 days (95 percent confidence interval, 193 to 213) during the first and second six months of the no-fault period, respectively (Fig. 1). Overall, there was a 54 percent decrease in the time to closure during the no-fault period. Under both systems, the time to closure was longer for older persons, women, and those with a higher level of education (Table 3). A higher base-line score for the intensity of pain and a greater percentage of the body in pain were associated with a longer time to closure. Full-time employment, anxiety before the collision, reduced or painful jaw movement, concentration problems, and not being at fault for the collision were associated with delayed closure under the tort system. Under the no-fault system, being married, having pain or numbness in the arm, having broken bones, and having memory problems after the collision were associated with delayed closure. Under both systems, having a lawyer involved was a strong predictor of delayed closure. Under the tort system, closure of claims took longer for persons who initially consulted a medical doctor and a physical therapist or a medical doctor and a chiropractor than for those who did not initially consult a health care provider. Under the no-fault system, closure took longer for persons who initially consulted a chiropractor alone or a chiropractor and a medical doctor.

Follow-up information on neck pain, physical functioning, and depressive symptoms was available for 1200 of the 2377 tort claimants (50.5 percent) and 1583 of the 3021 no-fault claimants (52.4 percent). Under the tort system, the claim-closure rate was similar for persons who provided follow-up information and for those who did not, after adjustment for base-line differences (hazard rate ratio for nonrespondents,

TABLE 1. BASE-LINE CHARACTERISTICS OF 7462 WHIPLASH CLAIMANTS.*

VARIABLE†	TORT (N=3046)	NO-FAULT		P VALUE‡
		FIRST 6 MO (N=2230)	SECOND 6 MO (N=2186)	
Age				
No. of respondents	3046	2230	2186	
Mean age — yr	36.2±14.8	37.7±15.3	37.6±14.9	<0.001
Male sex — no./total no. (%)	1283/3046 (42.1)	835/2227 (37.5)	808/2186 (37.0)	<0.001
Marital status — no./total no. (%)				0.01
Married	1604/3044 (52.7)	1211/2230 (54.3)	1210/2186 (55.4)	
Single	1087/3044 (35.7)	714/2230 (32.0)	693/2186 (31.7)	
Separated or divorced	262/3044 (8.6)	239/2230 (10.7)	220/2186 (10.1)	
Widowed	91/3044 (3.0)	66/2230 (3.0)	63/2186 (2.9)	
Annual family income — no./total no. (%)				<0.001
≤\$20,000	1304/3010 (43.3)	840/2216 (37.9)	801/2167 (37.0)	
\$20,001–\$40,000	891/3010 (29.6)	722/2216 (32.6)	712/2167 (32.9)	
\$40,001–\$60,000	503/3010 (16.7)	396/2216 (17.9)	412/2167 (19.0)	
>\$60,000	312/3010 (10.4)	258/2216 (11.6)	242/2167 (11.2)	
Current neck pain§				
No. of respondents	2290	2201	2158	
Mean score	59.8±23.8	56.2±24.9	54.3±25.1	<0.001
Current headache§				
No. of respondents	2994	2209	2165	
Mean score	42.5±34.6	34.9±33.3	32.7±33.0	<0.001
Percentage of body in pain				
No. of respondents	3033	2219	2167	
Mean percentage	22.3±16.5	20.1±14.4	20.7±14.6	<0.001
Initial health care provider — no./total no. (%)				<0.001
None	67/2977 (2.3)	93/2195 (4.2)	68/2151 (3.2)	
Medical doctor	1825/2977 (61.3)	1500/2195 (68.3)	1409/2151 (65.5)	
Chiropractor	144/2977 (4.8)	112/2195 (5.1)	149/2151 (6.9)	
Medical doctor and chiropractor	483/2977 (16.2)	275/2195 (12.5)	272/2151 (12.6)	
Medical doctor and physical therapist	458/2977 (15.4)	215/2195 (9.8)	253/2151 (11.8)	
Absent from work because of collision — no./total no. (%)	1416/2996 (47.3)	1001/2225 (45.0)	1006/2179 (46.2)	
Symptoms after collision — no./total no. (%)				
Reduced neck movement	2645/3042 (86.9)	1976/2230 (88.6)	1915/2183 (87.7)	
Headache	2541/3042 (83.5)	1838/2229 (82.5)	1816/2184 (83.2)	
Numbness or pain in arms or hands	1257/3042 (41.3)	975/2230 (43.7)	976/2185 (44.7)	
Reduced or painful jaw movement	534/3038 (17.6)	381/2228 (17.1)	378/2180 (17.3)	
Dizziness	1387/3041 (45.6)	982/2223 (44.2)	1025/2184 (46.9)	
Low back pain	1955/3042 (64.3)	1374/2229 (61.6)	1406/2184 (64.4)	
Retained a lawyer — no./total no. (%)	671/3043 (22.1)	114/2230 (5.1)	93/2180 (4.3)	<0.001
At fault for collision — no./total no. (%)	321/3029 (10.6)	343/2213 (15.5)	277/2174 (12.7)	<0.001
Neck or shoulder pain before collision — no./total no. (%)				<0.001
Never	2356/3044 (77.4)	1614/2229 (72.4)	1589/2184 (72.8)	
Sometimes	497/3044 (16.3)	479/2229 (21.5)	472/2184 (21.6)	
Very often	95/3044 (3.1)	89/2229 (4.0)	77/2184 (3.5)	
Every day	96/3044 (3.2)	47/2229 (2.1)	46/2184 (2.1)	

*Plus-minus values are means ±SD.

†Not all variables are shown. Significant differences between groups (P<0.05) were also found in the intensity of pain in other parts of the body, the intensity of usual neck pain and headache since the collision, and the presence of difficulty concentrating since the collision. No significant differences were found in body-mass index; number of dependents; educational level; employment status; main work activities; time of day when the collision occurred; the claimant's location in the vehicle; the direction of the impact; whether the vehicle was stopped at the time of the collision; whether the vehicle rolled over; whether the vehicle could be driven after the collision; the type of road and road conditions; whether a seat belt was used; the type of headrest and head position at impact; whether the claimant was hospitalized, had broken bones, had an impact to the head, or lost consciousness; general health before the collision; symptoms before the collision; and whether there was a previous neck injury from a motor vehicle collision.

‡P values are for the difference between the tort group and the two no-fault groups combined. Chi-square tests were used for comparisons of categorical variables, and analysis of variance for comparisons of continuous variables. Only P values for significant differences are shown.

§The intensity of neck pain and headache was measured on a 100-mm visual-analogue scale, with higher scores indicating more intense pain.

TABLE 2. SIX-MONTH CUMULATIVE INCIDENCE OF WHIPLASH CLAIMS.

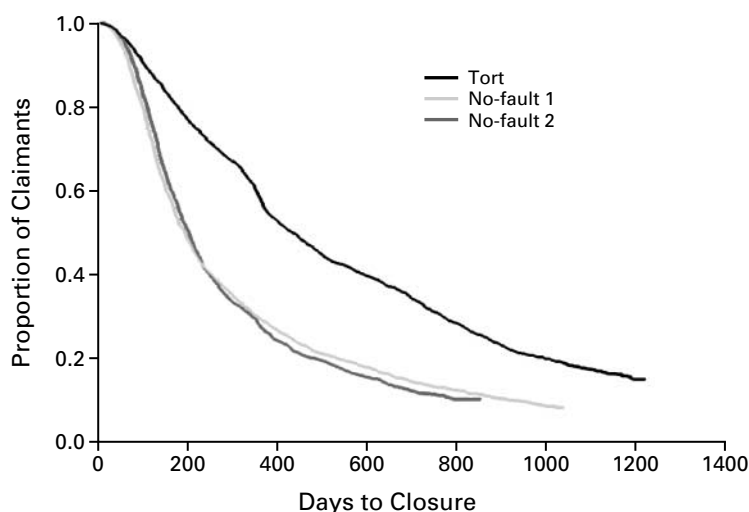
CLAIMS	TORT (N=3046)	No-FAULT	
		FIRST 6 MO (N=2230)	SECOND 6 MO (N=2186)
		Total	
No./100,000 persons	417	302	296
No./10,000 vehicle-damage claims	1156	743	652
No./billion kilometers driven	513	365	358
According to sex			
No./100,000 men	398	230	223
No./100,000 women	432	371	367
According to age			
No./100,000 persons 18–23 yr old	888	592	551
No./100,000 persons 24–29 yr old	637	408	424
No./100,000 persons 30–39 yr old	469	336	324
No./100,000 persons 40–49 yr old	365	288	293
No./100,000 persons ≥50 yr old	195	165	163

0.99; 95 percent confidence interval, 0.90 to 1.10).²⁸ However, multivariate adjustment did not eliminate the difference between the claim-closure rates for the two groups during the no-fault period (hazard rate ratio, 1.17; 95 percent confidence interval, 1.08 to 1.27), indicating that there were differences in some unmeasured characteristics. Nevertheless, our follow-up analyses of no-fault claimants provide conservative estimates of the rate of claim closure, because the

crude time to closure was longer for claimants who provided follow-up information (220 days; 95 percent confidence interval, 209 to 230) than for those who did not (175 days; 95 percent confidence interval, 167 to 183).²⁸ There was no relation between nonresponse to follow-up questionnaires and the involvement of a lawyer during the no-fault period (data not shown).

Under the tort system, there was no association between the intensity of neck pain and the closure of claims during the first six weeks of the follow-up period. Thereafter, according to the time-varying covariate and coefficient model, an improvement of 10 mm on the 100-mm visual-analogue scale was associated with a 13 to 24 percent increase in the rate of claim closure for the remainder of the follow-up period. Time-varying covariate models best described the associations between physical functioning and claim closure and between depressive symptoms and claim closure, suggesting that these associations were consistent throughout the entire follow-up period. A 10-point increment on the 100-point physical-functioning scale was associated with a 17 percent increase in the rate of claim closure. The rate was 37 percent lower for persons with depression than for those without depression.

Under the no-fault system, the time-varying covariate models best described the associations between neck pain and the closure of claims and between depressive symptoms and the closure of claims during



Tort	2377	1831	1251	938	669	468	30
No-fault 1	1525	736	403	267	186	40	0
No-fault 2	1496	757	358	229	48	0	0

Figure 1. Kaplan-Meier Estimates of the Time to Closure for 5398 Whiplash Claims.

Data were censored as of November 1, 1997. No-fault 1 denotes the first six months of the no-fault system, and No-fault 2 the second six months of the no-fault system. The numbers of open claims at each point in time are shown below the graph.

TABLE 3. FACTORS ASSOCIATED WITH THE TIME TO CLAIM CLOSURE.*

FACTOR†	TORT	No-FAULT‡
	hazard rate ratio (95% CI)§	
Age		
18–23 yr¶	1.00	1.00
24–29 yr	0.92 (0.80–1.07)	0.83 (0.73–0.96)
30–39 yr	0.79 (0.69–0.91)	0.66 (0.57–0.75)
40–49 yr	0.68 (0.58–0.81)	0.64 (0.55–0.75)
≥50 yr	0.81 (0.68–0.97)	0.58 (0.49–0.68)
Sex		
Male¶	1.00	1.00
Female	0.85 (0.77–0.95)	0.84 (0.77–0.91)
Educational level		
College graduate¶	1.00	1.00
Attended college	1.02 (0.87–1.22)	1.03 (0.89–1.18)
High-school graduate	1.15 (0.96–1.36)	1.06 (0.92–1.23)
Grade 9 or higher	1.29 (1.08–1.55)	1.10 (0.94–1.28)
Grade 8 or lower	1.23 (0.96–1.57)	1.56 (1.27–1.92)
Neck-pain score		
0–19¶	1.00	1.00
20–39	0.80 (0.66–0.97)	0.93 (0.80–1.08)
40–59	0.78 (0.65–0.93)	0.81 (0.70–0.93)
60–79	0.68 (0.57–0.81)	0.73 (0.64–0.85)
80–100	0.63 (0.52–0.76)	0.79 (0.67–0.93)
Percentage of body in pain		
0–9¶	1.00	1.00
10–19	0.87 (0.77–0.99)	0.91 (0.81–1.01)
20–29	0.76 (0.66–0.88)	0.79 (0.69–0.89)
30–39	0.74 (0.62–0.88)	0.82 (0.69–0.97)
40–100	0.59 (0.49–0.72)	0.72 (0.59–0.86)
Reduced or painful jaw movement		
No¶	1.00	—
Yes	0.80 (0.70–0.92)	—
Numbness or pain in arm		
No¶	—	1.00
Yes	—	0.84 (0.77–0.92)
Broken bones		
No¶	—	1.00
Yes	—	0.70 (0.55–0.89)
At fault for collision		
Yes¶	1.00	—
No	0.70 (0.61–0.80)	—
Lawyer retained		
No¶	1.00	1.00
Yes	0.60 (0.53–0.68)	0.61 (0.49–0.75)
Initial health care provider		
None¶	1.00	1.00
Medical doctor	0.85 (0.64–1.13)	1.12 (0.92–1.38)
Medical doctor and physical therapist	0.73 (0.53–0.99)	0.88 (0.69–1.11)
Chiropractor	0.72 (0.50–1.04)	0.61 (0.47–0.79)
Medical doctor and chiropractor	0.61 (0.45–0.84)	0.76 (0.60–0.97)

*The full multivariate models were based on data from 2228 of the 2377 tort claimants and from 2835 of the 3021 no-fault claimants.

†A dash indicates that the factor was not important in the final model. Full-time employment, anxiety before the collision, intensity of usual pain in other parts of the body since the collision, reduced or painful jaw movement, and concentration problems since the collision were associated with the time to claim closure under the tort system. Marital status, intensity of usual headache since the collision, current pain in other parts of the body, and memory problems since the collision were associated with the time to claim closure under the no-fault system.

‡The data for the two six-month periods under the no-fault system have been combined.

§Hazard rate ratios have been adjusted for all other factors in the models. CI denotes confidence interval.

¶This is the reference category.

||The intensity of neck pain was measured on a 100-mm visual-analogue scale, with higher scores indicating more intense pain.

the follow-up period. An improvement of 10 mm on the 100-mm visual-analogue scale for neck pain was associated with an 18 percent increase in the rate of claim closure, and depressive symptoms were associated with a 36 percent reduction in the rate of claim closure. A time-varying covariate and coefficient model best described the association between physical functioning and claim closure over the follow-up period. A 10-point improvement on the 100-point physical-functioning scale was associated with a 10 to 35 percent increase in the rate of claim closure. These analyses show that the intensity of neck pain, the level of physical functioning, and the presence or absence of depressive symptoms were independently associated with the time to the closure of claims under both the tort and no-fault insurance systems. Furthermore, the effect sizes were similar under the two systems, suggesting that the influence of a selection bias on the observed associations under the no-fault system was likely to have been minimal.

DISCUSSION

After the introduction of a no-fault insurance system in Saskatchewan, there was a 28 percent reduction in the incidence of whiplash claims, and the median time to the closure of claims was reduced by more than 200 days. This decrease occurred despite increases in the number of vehicle-damage claims and the number of kilometers driven. Large reductions in whiplash claims also occurred in the state of Victoria, Australia, after the introduction of legislation limiting court actions and compensation for whiplash.⁵ The explanations are not clear, but the decision to make a claim for whiplash could involve many factors beyond medical need, including financial gain and the desire for retribution.³ There is some evidence that whiplash injury is less of a problem in jurisdictions where there is little expectation of symptoms, disability, or compensation and where the involvement of health care providers is minimal.^{36,37}

We also found that claims were closed faster under the no-fault system than under the tort system, even though both the distribution and the severity of baseline symptoms were similar under the two systems. There was a strong and consistent association between the time to the closure of claims and indicators of recovery from the injury. A lower level of pain, a higher level of physical functioning, and the absence of depression were strongly associated with a shorter time to closure under both the tort and the no-fault systems. Not only did fewer persons file claims for whiplash injury under the no-fault system, but those who did recovered faster than similar claimants under the tort system.

Our findings confirm that providing compensation for pain and suffering after a whiplash injury increases the frequency of claims for compensation and delays the closure of claims and recovery.³⁸ Under a tort sys-

tem, claims are filed in a potentially adversarial environment that can promote the persistence of symptoms in claimants. In the course of proving that their pain is real, claimants may encounter conflicting medical opinions, unsuccessful therapies, and legal advice to document their suffering and disability. In the United States, excess use of medical services for traffic injuries (mostly strains and sprains) in response to incentives under a tort system is estimated to have accounted for about \$4 billion of health care resources in 1993.³⁹ Under the no-fault system, there is no financial incentive to delay recovery, since claimants have immediate access to medical care and other benefits without being required to substantiate their injuries.

With respect to the prognosis for persons with whiplash injury, our findings are consistent with reports that intrinsic factors such as age, sex, and the initial intensity of pain are important.^{40,41} In our study, however, extrinsic factors, such as the initial health care provider and whether or not a lawyer was involved, were equally important. An analysis adjusted for the severity of pain and other important factors showed that claimants who did not initially seek care or who initially saw only a physician closed their claims faster than those who initially saw a physical therapist or chiropractor — practitioners who are more likely to intervene actively. This finding is consistent with randomized trials showing that minimal intervention in the acute period aids recovery.^{42,43} In addition, we found that under both the tort and the no-fault systems, the involvement of a lawyer was associated with delayed claim closure. Studies in the United States have shown that claims in which a lawyer is involved take longer to close and cost more than those that do not involve a lawyer, for both workers' compensation and compensation for traffic injuries.^{44,45}

We conclude that the type of insurance system has a profound effect on the frequency and duration of whiplash claims and that claimants recover faster if compensation for pain and suffering is not available. Legislators may wish to consider the advantages of removing payments for pain and suffering from compensation systems.

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