The relationship between compensable status and long-term patient outcomes following orthopaedic trauma

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ABSTRACT

Objective: To determine the relationship between compensable status in a "no-fault" compensation scheme and long-term outcomes after orthopaedic trauma.

Design and setting: Prospective cohort study within two adult Level 1 trauma centres in Victoria, Australia.

Participants: Blunt trauma patients aged 18–64 years, admitted between September 2003 and August 2004 with orthopaedic injuries and funded by the no-fault compensation scheme for transport-related injury, or deemed non-compensable.

Main outcome measures: 12-item Short Form Health Survey (SF-12) and return to work or study at 12 months after injury.

Results: Of 1033 eligible patients, 707 (68.8%) provided follow-up data; 450 compensable and 247 non-compensable patients completed the study. After adjusting for differences across the groups (age, injury severity, head injury status, injury group, and discharge destination) using multivariate analyses, compensable patients were more likely than non-compensable patients to report moderate to severe disability at follow-up for the physical (adjusted odds ratio [AOR], 2.0; 95% CI, 1.3–2.9), and mental (AOR, 1.6; 95% CI, 1.1–2.5) summary scores of the SF-12. Compensable patients were less likely than non-compensable patients to have returned to work or study, even after adjusting for injury severity, age, head injury status and discharge destination (AOR, 0.6; 95% CI, 0.3–0.9).

Conclusions: Patients covered by the no-fault compensation system for transport-related injuries in Victoria had worse outcomes than non-compensable patients.

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There is mounting evidence that compensation status influences patient outcomes.[1-5] In a meta-analysis of 211 studies, 83% showed worse outcomes in compensated patients.[2] Most studies have focused on injuries such as whiplash, and chronic and non-specific low back pain. Few have investigated the effect of compensation on outcomes after severe traumatic injury. A prospective cohort study of 120 patients with distal radius fractures identified compensation (involved in litigation or workers compensation) as a predictor of pain and disability at 6 months.[5] Studies of non-neurotrauma and polytrauma found worse outcomes for patients covered by workers compensation,[1,6] whereas a study of unilateral lower extremity fractures found no association with compensable or litigation status.[7]

In Australia, orthopaedic injury is the most common form of trauma requiring hospitalisation, with fractures recorded for 36% of admitted injured patients.[8] Most orthopaedic trauma is due to transport accidents or falls. In Victoria, 46% of patients with orthopaedic trauma admitted to Level 1 trauma centres are covered by the Transport Accident Commission (TAC) "no-fault" compensation scheme.[9] This scheme provides payment for medical treatment, rehabilitation services, disability services, income assistance, travel and household support services.

The aim of this prospective cohort study was to determine the relationship between TAC compensable status and 12-month outcomes for patients with orthopaedic trauma.

METHODS

Patients

The Victorian Orthopaedic Trauma Outcomes Registry (VOTOR) collects data about all orthopaedic trauma patients admitted to the two adult Level 1 trauma centres in Victoria, and has been approved by human research ethics committees at the participating hospitals and Monash University.

Patients aged 18–64 years with blunt trauma, admitted between September 2003 and August 2004, and funded by the TAC or deemed non-compensable were included in our study. Patients were excluded if they died during their hospital stay, were covered by workers compensation, had a documented diagnosis of dementia or mental illness, did not speak English, or refused follow-up.

Procedures

The aims and methods of the registry have been published elsewhere.[9,10] Briefly, the VOTOR captures information from the medical record and hospital information systems and from patient interviews during the hospital stay and 12 months after injury. From the registry, we obtained patient demographics, injury event details, diagnoses according to the Abbreviated Injury Scale codes, and the Injury Severity Score (ISS). The in-hospital interview provided information on marital status, highest level of education, whether the patient was working or studying before injury, and pre-injury health status in the week before injury as measured by the 12-item Short Form Health Survey (SF-12) for physical component summary (PCS-12) and mental component summary (MCS-12) scores.[11] Outcomes at 12 months after injury were collected by telephone interview, which assessed living status (eg, at home or in rehabilitation); current SF-12 scores; and return to work or study.

Data analysis

Analyses were performed using SPSS version 14.0 (SPSS Inc, Chicago, Ill, USA). Descriptive statistics were used to summarise the characteristics of each patient group. We used χ^2 analysis to compare groups (ie, responders versus non-responders, compensable versus non-compensable) for categorical variables. Mann–Whitney and independent t tests were used to compare groups on continuous variables, depending on data distributions. $P < 0.05$ was considered significant. Pre-injury and 12-month post-injury PCS-12 and MCS-12 scores were compared with Australian population norms[12] using means and 95% confidence intervals for each age group. Overlapping intervals were taken to represent no significant differences.

The association between compensable status and patient outcomes at 12 months after injury was assessed using three variables. The MCS-12 and PCS-12 summary scores were used to describe 12-month health status outcomes of patients. As these scores did not meet the distribution criteria for linear regression, patients were categorised into none,

1 Demographic details and pre-injury status of orthopaedic trauma patients

Variable	Non-compensable ($n=257$)	TAC compensable ($n=450$)
Sex (95% CI)		
Male	68.5% (62.8%–74.2%)	67.6% (63.3%–71.9%)
Female	31.5% (25.8%–37.2%)	32.4% (28.1%–36.7%)
Mean age in years (95% CI)	40.3 (38.7–41.8)	36.3 (35.1–37.5)
Marital status (95% CI)		
Married	38.4% (32.2%–44.6%)	36.6% (31.8%–41.4%)
Never married	39.7% (33.5%–45.9%)	42.9% (38.0%–47.8%)
Divorced/separated/widowed	11.8% (7.7%–15.9%)	12.9% (9.6%–16.2%)
Living with partner	10.1% (6.3%–13.9%)	7.6% (5.0%–10.2%)
Level of education (95% CI)		
Postgraduate degree	11.7% (7.6%–15.8%)	9.4% (6.5%–12.3%)
Tertiary degree	13.9% (9.4%–18.4%)	8.4% (5.6%–11.2%)
Advanced diploma, diploma or certificate	16.4% (11.6%–21.2%)	12.8% (9.4%–16.2%)
High school	56.3% (49.9%–62.7%)	66.5% (61.8%–71.2%)
Other	1.7% (0–3.4%)	2.9% (1.2%–4.6%)
Working before injury? (95% CI)		
No	23.0% (17.8%–28.2%)	21.8% (18.0%–25.6%)
Yes	77.0% (71.8%–82.2%)	78.2% (74.4%–82.0%)
Mean pre-injury MCS-12 score (95% CI)	52.6 (51.4–53.7)	55.5 (52.7–54.2)
Mean pre-injury PCS-12 score (95% CI)	53.9 (52.5–55.2)	55.3 (54.4–56.2)

Shading indicates a significant difference across the patient groups. TAC = Transport Accident Commission. MCS-12/PCS-12 = mental/physical component summary of 12-item Short Form Health Survey. ◆

mild (> 40) disability, or moderate to severe (≤ 40) disability. Return to work or study (yes/no) was also analysed.

Multivariate binary logistic regression was used to quantify the association between compensable status and each outcome, adjusted for variables showing a significant ($P<0.05$) difference between groups on preliminary analyses. Adjusted odds ratios (AORs) with 95% confidence intervals for compensable patients relative to non-compensable patients are reported.

RESULTS

During the 12-month period, 1033 eligible patients were registered by the VOTOR. Five patients died after discharge; 707 (68.8%) of the remaining patients provided follow-up data. There was no difference between the responders and patients lost to follow-up for cause of injury, level of education, injury group, ISS, destination following discharge from the acute hospital, or head injury status. There were differences for sex, compensable status, marital status, age, and work status before injury. Patients lost to follow-up tended to be male, younger, never married, not working before injury, and non-compensable.

Box 1 shows the demographic and pre-injury profile of the patients. Non-compensable patients were older than compensable patients ($P<0.001$).

There were differences between patient groups for injury cause, ISS, the profile of injuries sustained, and the destination following discharge from the acute hospital (Box 2). Almost 75% of compensable patients also sustained non-orthopaedic injuries, compared with 26.5% of non-compensable patients ($P<0.001$). Compensable patients were more likely to have a serious head injury (OR, 3.1; 95% CI, 1.8–5.4) and a higher ISS ($P<0.001$). The cause of injury reflects the criteria for TAC compensation, with all patients sustaining their injuries in transport-related incidents. A small proportion (14%) of non-compensable patients also sustained their injuries in transport-related incidents, but did not meet the criteria for TAC compensation. There was an association for discharge destination ($P<0.001$), with a higher proportion of compensable patients (49%) discharged to in-patient rehabilitation centres and most non-compensable patients (82%) discharged directly home (Box 2).

The median time for completion of the pre-injury SF-12 was 7 (interquartile range, 3–13) days after injury. There was no difference in the pre-injury PCS-12 or MCS-12 scores across the groups (Box 1). At follow-up, compensable patients had lower PCS-12 ($P<0.001$) and MCS-12 ($P<0.001$) scores than non-compensable patients.

Box 3 summarises the SF-12 results for the two groups. Compensable patients had mean pre-injury PCS-12 scores above, but similar to, the population norms. By 12 months after injury, PCS-12 scores had not returned to pre-injury levels and were below population norms in every age group. A similar pattern was seen for non-compensable patients. Compensable patients reported pre-injury mental health status scores above population norms. At follow-up, MCS-12 scores remained below population norms for compensable patients. This pattern was not seen for non-compensable patients.

After adjusting for the differences across the groups, compensable patients were more likely than non-compensable patients to report moderate to severe disability at 12 months for the PCS-12 (AOR, 2.0; 95% CI, 1.3–2.9) and MCS-12 (AOR, 1.6; 95% CI, 1.1–2.5) scores. More than half the compensable patients (56%) reported ongoing physical disability in the moderate to severe range of the SF-12 at 12 months after injury, compared with 35% of non-compensable patients. Similarly, 57% of compensable patients reported moderate to severe disability on the MCS-12 score, compared with 20% of non-compensable patients.

Among patients who were working or studying before injury, compensable patients were less likely than non-compensable patients to have returned to work or study by 12 months, even after adjusting for injury severity, age, head injury status and discharge destination (AOR, 0.6; 95% CI, 0.3–0.9). The return to work or study rate for non-compensable patients was 84% compared with 67% for compensable patients.

DISCUSSION

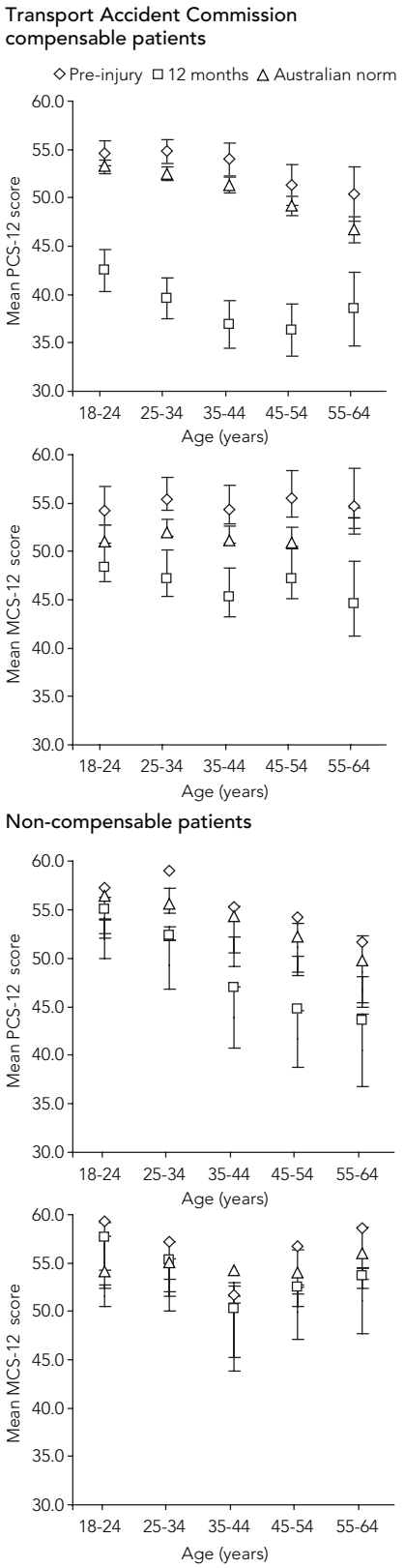
This is one of the largest prospective cohort studies to investigate the relationship between compensation and long-term outcomes following injury. We found that the physical health of all patients remained significantly below pre-injury levels at 12 months after injury. Although non-compensable patients at follow-up reported mental health scores similar to pre-injury scores, patients covered by a no-fault compensation scheme reported ongoing disability on the

2 Event and injury details

Variable	Non-compensable ($n = 257$)	TAC compensable ($n = 450$)
Median Injury Severity Score (range)	9 (1–38)	13 (1–57)
Injury profile (95% CI)		
Isolated lower extremity injury	31.1% (25.4%–36.8%)	5.3% (3.2%–7.4%)
Isolated upper extremity injury	12.1% (8.1%–16.1%)	3.3% (1.6%–5.0%)
Multiple lower extremity injuries	14.0% (9.8%–18.2%)	6.7% (4.4%–9.0%)
Multiple upper extremity injuries	7.4% (4.2%–10.6%)	1.8% (0.6%–3.0%)
Spinal injuries only	5.8% (2.9%–8.7%)	3.5% (1.8%–5.2%)
Orthopaedic injuries: multiple regions	3.1% (1.0%–5.2%)	4.7% (2.7%–6.7%)
Orthopaedic and other injuries	26.5% (21.1%–31.9%)	74.7% (70.7%–78.7%)
Serious head injury (95% CI)		
No	93.4% (90.4%–96.4%)	81.8% (78.2%–85.4%)
Yes	6.6% (3.6%–9.6%)	18.2% (14.6%–21.8%)
Cause of injury (95% CI)		
Motor vehicle crash	0.4% (0–1.2%)	53.5% (48.9%–58.1%)
Motorcycle crash	6.6% (3.6%–9.6%)	27.3% (23.2%–31.4%)
Pedal cyclist	6.2% (3.3%–9.1%)	5.8% (3.6%–8.0%)
Pedestrian	0.8% (0–1.9%)	11.1% (8.2%–14.0%)
Low fall	27.6% (22.1%–33.1%)	0
High fall	33.1% (27.3%–38.9%)	0
Struck by or collision with object/ person	8.6% (5.2%–12.0%)	0
Other cause	16.7% (12.1%–21.3%)	2.2% (0.8%–3.6%)
Discharge destination (95% CI)		
Home	81.7% (77.0%–86.4%)	47.4% (42.8%–52.0%)
Rehabilitation	14.4% (10.1%–18.7%)	48.6% (44.0%–53.2%)
Other	3.9% (1.5%–6.3%)	4.0% (2.2%–5.8%)

Shading indicates a significant difference across the patient groups. TAC = Transport Accident Commission. ◆

3 Mean (95% CI) SF-12 physical (PCS-12) and mental (MCS-12) summary scores



SF-12 = 12-item Short Form Health Survey. ◆

MCS-12 scale. Irrespective of age, injury pattern, injury severity, and access to inpatient rehabilitation, compensable patients were more likely than non-compensable patients to report moderate to severe disability on the SF-12 physical and mental scores, and were less likely to have returned to work by 12 months.

The residual disability 12 months after injury is consistent with other reports,[6,13-16] and suggests that the aim of rehabilitation — return of the patient to the pre-injury state — had not yet been achieved. Our results are consistent with the evidence that outcomes are worse in compensable patients. Reasons proposed for the poorer health outcomes of compensable patients include the psychosocial environment of the patient before injury, the traumatic nature of the injury event, greater severity of injury, the psychosocial environment of the patient following injury, the patient's experience within the compensation system, and illness behaviour directed towards secondary gain.[1,2,4,17,18] Many of these explanations are speculative and difficult to study, but some inferences from the VOTOR data can be made.

Pre-injury MCS-12 scores did not differ for compensable and non-compensable patients. However, whether the SF-12 measures the key issues of psychosocial environment or is sensitive enough to detect finer differences between groups is unknown. A previous study found an association between traumatic origin and higher levels of pain and emotional distress among patients with chronic pain.[18] As all injuries in our study were traumatic, it is unlikely that this fully explains the differences identified. The nature of the traumatic event may be more important. All compensable patients in our cohort were injured in road trauma, whereas the non-compensable patients were predominantly injured in falls. The strong correlation between compensable status and mechanism of injury precluded adjustment for this vari-

able in the multivariate analysis. Whether the mechanism of injury or the provision of compensation was more important in explaining the poorer outcomes in the compensable group could not be determined. While a controlled trial randomising compensation status in transport-related cases would answer the question of causation, it would not be ethically or legally possible to undertake in this setting.

Assessing patients' experiences with the compensation system is beyond the scope of the VOTOR. Almost half the compensable patients were discharged to inpatient rehabilitation, compared with only 14% of non-compensable patients. Further studies are needed to define the benefit of such programs in improving long-term outcomes. A previous study in Canada found that changing from a tort compensation system to a no-fault system resulted in significant decreases in incidence of whiplash and improved outcomes for whiplash patients.[3] Our study shows that outcomes are worse even in a no-fault compensation scheme. Like other no-fault systems, the TAC system allows people who can prove fault to pursue further compensation through the courts if the injury is serious enough according to the legislation. The TAC legislation also allows for lump sum payments to people who experience permanent physical or psychological conditions. As final compensation depends on the level of disability, there is a potential for patients to overstate their limitations for secondary gain. As the VOTOR does not collect information about legal action, it was not possible to estimate this potential effect of secondary gain in explaining our findings.

The strengths of our study were the prospective design, the use of a validated health-related quality of life instrument and the focus on a broad population of patients with serious orthopaedic injuries. Nevertheless, some limitations warrant consideration. Although 69% of patients were followed up, a rate consistent with other trauma outcome studies,[14-16,19,20] patients lost to follow-up tended to be young, single men whose injuries were non-compensable.

Efforts were made to adjust for potential confounders and differences between the groups. Nevertheless, the data items collected by the VOTOR are not exhaustive, and the differences seen between the groups could relate to unknown confounders. The retrospective collection of data about pre-injury status also warrants comment, as experiences after injury might influence a patient's perception of pre-injury state.[19] However, this method is commonly used because of the lack of alternative sources of information, and the data were collected soon after injury.[21] Whether the multivariate analysis was sufficient to adjust for differences across the groups could be questioned.

A problem for generalisation of our findings is that compensation schemes differ between and within countries. Nevertheless, our finding of worse outcomes for compensable orthopaedic trauma patients, compared with non-compensable patients, is consistent with other studies.

Our study adds to the evidence that compensation schemes may impede recovery from injury. It is essential that the potentially detrimental effect of compensation systems be explored in large prospective cohort studies that enable comparison of individual injury outcomes across compensable groups. Cohort studies across jurisdictions are also needed, as there may be important differences between compensation schemes.

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COMPETING INTERESTS

None identified.

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