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Association between perception of fault for the crash and function, return to work and health status 1 year after road traffic injury: a registry-based cohort study

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ABSTRACT

Objectives: To establish the association between the patient’s perception of fault for the crash and 12-month outcomes after non-fatal road traffic injury.

Setting: Two adult major trauma centres, one regional trauma centre and one metropolitan trauma centre in Victoria, Australia.

Participants: 2605 adult, orthopaedic trauma patients covered by the state’s no-fault third party insurer for road traffic injury, injured between September 2010 and February 2014.

Outcome measures: EQ-5D-3L, return to work and functional recovery (Glasgow Outcome Scale—Extended score of upper good recovery) at 12 months postinjury.

Results: After adjusting for key confounders, the adjusted relative risk (ARR) of a functional recovery (0.57, 95% CI 0.46 to 0.69) and return to work (0.92, 95% CI 0.86 to 0.99) were lower for the not at fault compared to the at fault group. The ARR of reporting problems on EQ-5D items was 1.20–1.35 times higher in the not at fault group.

Conclusions: Patients who were not at fault, or denied being at fault despite a police report of fault, experienced poorer outcomes than the at fault group. Attributing fault to others was associated with poorer outcomes. Interventions to improve coping, or to resolve negative feelings from the crash, could facilitate better outcomes in the future.

INTRODUCTION

Road traffic injury remains a leading cause of death and disability globally.1 For every road traffic fatality, a further 20 sustain non-fatal but potentially disabling injuries. These injuries are generally considered unintentional,2 although the absence of intent does not preclude attribution of fault or blame for an injury. External attribution of responsibility for the incident, or blaming others, has been suggested as a reason for why some people do not recover well following injury. It has been hypothesised that blaming others negatively impacts on health due to anger, perceived injustice or victimisation, limiting the capacity to cope following injury or accept what has happened.3 4
Despite the potential for external attribution of fault to impact on recovery, the association has not been clearly established. While previous studies have shown these factors to be predictive of poorer physical and mental health outcomes, and greater healthcare utilisation, others have found limited or no association between fault or responsibility and health outcomes in injury populations. Differences in the populations studied, how the participants were recruited, methods for measuring blame or fault, outcomes of interest and the timing of capturing perceptions of blame or fault relative to the injury event, could explain the observed inconsistency of study findings. Furthermore, previous studies have been limited to small sample sizes, and cross-sectional studies focused on healthcare utilisation only without reference to patient-reported outcomes, and none have considered fault from the legal and individual’s perspective.

The aims of this study were to quantify the agreement between self-report and police-reported fault status, and to determine the association between fault (self-reported or police-reported) and 12-month patient-reported outcomes, in a cohort of orthopaedic trauma patients admitted to hospital following road traffic injury.

METHODS

Setting

Victoria accounts for 27% (5.8 million) of Australia’s population. Victoria’s third party, no fault insurer for transport-related injury, the Transport Accident Commission (TAC), is funded through a levy on vehicle registration fees and provides payment for treatment, disability services, income assistance, and other costs. The Victorian Orthopaedic Trauma Outcomes Registry (VOTOR) is a sentinel site registry collecting data from four hospitals in Victoria; two adult level 1 equivalent trauma centres, one regional trauma centre and one metropolitan trauma centre. All adult orthopaedic trauma patients, admitted for greater than 24 h, are included in the registry using an opt-out consent process where all eligible cases are included in the registry, and patients (or their next of kin) are provided with a letter and a brochure stating the aims of the registry, the data collected and any linkage of data, and that patients will be followed-up. The brochure provides the details for how to opt-out and the opt-out rate for VOTOR is 1.5%. At each follow-up interview, verbal consent to complete the interview is obtained. The registry uses an opt-out consent process due to the impracticability of informed consent, and to reduce the potential for selection bias.

Ethics statement

The registry has been approved by the Human Research Ethics Committee at Monash University and each participating hospital.

Participants

Cases registered by VOTOR were included in this study if their date of injury was between September 2010 and February 2014, and a valid TAC claim number was provided by the hospital. The timeframe was chosen to correspond with the inclusion of self-reported fault status in the TAC claims database. The TAC has separate claim divisions for catastrophic injury (severe traumatic brain injury and/or spinal cord injury) and less severe injury. The case management, from a compensation perspective, differs according to the claim division. For this reason, severe neurotrauma patients were excluded from the study. The TAC uses Glasgow Coma Scale scores and length of post-traumatic amnesia to define severe traumatic brain injury, while the American Spinal Injury Association (ASIA) Impairment Scale is used to identify patients with significant spinal cord injury. The TAC flag for catastrophic injury was used to identify and exclude these cases.

Procedures

Demographic, road user group, injury nature and severity, and in-hospital outcomes data were extracted from VOTOR for eligible cases. International Classification of Diseases 10th Revision—Australian modification (ICD-10-AM) diagnosis codes were mapped to the Charlson Comorbidity Index (CCI) to characterise comorbid conditions. The ICD-10-AM diagnosis codes were also used to classify the nature of orthopaedic injuries sustained and the presence of non-orthopaedic injuries. The patient’s residential postcode was mapped to the Accessibility/Remoteness Index of Australia. Injury severity was dichotomised as major trauma or not major trauma based on the Injury Severity Score (ISS) cut-off of 12. VOTOR does not directly capture Abbreviated Injury Scale (AIS) data and therefore the ISS is not collected by VOTOR. The ISS data were obtained from the Victorian State Trauma Registry, which collects AIS and ISS data for all major trauma patients in the state of Victoria, to establish whether the VOTOR patients met the ISS>12 criterion.

The registry follows up all survivors to hospital discharge by telephone at 6, 12 and 24 months postinjury to collect patient-reported outcomes data, and 12-month outcomes were extracted for this study. The EQ-5D-3L measures health status using five items (mobility, self-care, usual activities, pain/discomfort and anxiety/depression). The Glasgow Outcome Scale—Extended (GOS-E) categorises patient function into one of eight categories, with upper good recovery, representing return to preinjury function. The GOS-E is recommended for use in trauma populations. Return to work (yes/no) was collected for patients who reported working for income prior to injury.

Deterministic linkage was used to obtain the police-reported and patient-reported fault status from the TAC claims database for eligible cases using the TAC claim number and patient identifiers. No clinical or outcomes
information from VOTOR was provided to the TAC. Patient and police fault items were used to classify cases into fault status groups. The question asked of police was whether another vehicle was at fault for the crash (yes/no), while the patient was asked whether another person or organisation was at fault for the crash (yes/no) at the point of claim lodgement. Single vehicle crashes were included and the fault status judged according to the circumstances of the crash. There was no requirement to attribute fault to a vehicle in all cases. Therefore, the police could attribute no fault to the vehicle in single vehicle crashes.

Data analysis

Agreement between patient-reported and police-reported fault was measured using the percentage agreement and the $\kappa$ statistic. $^2$ $\chi$ analyses were used to assess the association between key descriptors of the patient population and fault group. Four fault status groups were used for analysis: (1) patient reported no other person at fault for the crash and police reported that the patient's vehicle was at fault ('at fault'); (2) patient reported no other person at fault for the crash and the police reported that the patient's vehicle was not at fault ('admits fault'); (3) patient reported another person at fault for the crash but police reported the patient's vehicle was at fault ('denies fault'); and (4) patient reported another person at fault and police confirmed that the patient's vehicle was not at fault ('not at fault'). Motor vehicle and motorcycle passengers were categorised in the 'denies fault' group if they attributed fault to another (presumably the driver) despite the police registering their vehicle as at fault for the crash.

The GOS-E was dichotomised for analysis as not recovered versus recovered (GOS-E upper good recovery). For each item of the EQ-5D-3L, the response was dichotomised for analysis into no problems versus problems. Multivariable linear regression was performed to quantify the association between the EQ-5D summary score and fault status. For the GOS-E, return to work and problems on each of the EQ-5D items, the association between fault group and outcome was modelled using modified Poisson regression with a robust variance estimator. The GOS-E and EQ-5D-3L models were adjusted for key potential confounders including age group, gender, injuries sustained (orthopaedic injury and the presence of non-orthopaedic injuries), major trauma status, level of education, preinjury work status, road user group, geographic remoteness according to the Accessibility/Remoteness Index of Australia, and the CCI. The return to work model was adjusted for the same factors, except only patients who reported working for income prior to injury were included in the model. Adjusted relative risks (ARR) and the corresponding 95% CIs are presented for the modified Poisson models, and adjusted mean differences and 95% CI for the linear model. An interaction between fault group and road user were considered but were not found to be important. Stata V.13 (StataCorp, College Station, Texas, USA) was used for all analyses and a $p$ value less than 0.05 considered significant.

RESULTS

Agreement between patient and police report of fault status

There were 3666 patients linked and 2605 (71%) had a patient and police-reported fault status recorded. The group with patient and police-reported fault status was comparable to the remaining 29% of linked claims. The mean (SD) age of included cases was 43.1 (18.7) years compared to 44.0 (20.2) years in the excluded cases. The proportion of male and major trauma cases was 67% and 66% in the included cases, versus 66% and 59% in the excluded group, respectively. The profile of road user group was also similar between the included cases (motor vehicle 50%, motorcycle 28%, pedal cyclist 9%, pedestrian 12% and other 1.8%) and excluded cases (motor vehicle 51%, motorcycle 25%, pedal cyclist 7%, pedestrian 15% and other 2.6%). The police and patient were considered to have agreed if the police reported the patient's vehicle at fault and the patient attributed fault to no other person, or vice versa. The percentage agreement between the police and patient reports of fault was 89% ($n=2322$); 91% for motor vehicle drivers, 85% for motor vehicle passengers, 89% for motorcyclists, 90% for pedal cyclists, 87% for pedestrians, and 88% for other transport cases. Where agreement occurred, 50% of patients were not at fault, though this varied by road user group; 29% for motor vehicle drivers, 85% for motor vehicle passengers, 37% for motorcyclists, 90% for pedal cyclists, 76% for pedestrians and 61% for other transport cases. The $\kappa$ coefficient was 0.78 (95% CI 0.76 to 0.81), indicating ‘substantial’ agreement between the sources of fault status. Of the 283 disagreements, 191 (67.5%) patients reported that another person was at fault for the crash when the police reported that it was the patient’s vehicle at fault (‘denies fault’) (table 1). Of the 2605 included cases, 48% were single vehicle crashes; 61% were considered at fault, 30% considered not at fault, with the remainder split between the disagreement groups.

Overview of patients in each fault group

There were differences between fault groups for age, injury severity, geographic remoteness, road user group and gender (table 2). Men were more commonly represented in the ‘at fault’ and ‘denies fault’ groups. A lower proportion of cases in the ‘not at fault’ and ‘denies fault’ groups were major trauma patients, and consistent with this, these groups had a lower proportion of motor vehicle crashes and multiple orthopaedic injuries (table 2). The ‘not at fault’ and ‘denies fault’ groups included a higher proportion of clients living in major cities and with a university level of education (table 2).
Table 1 Comparison of police-reported and patient-reported fault

<table>
<thead>
<tr>
<th>Patient report</th>
<th>Police report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient's vehicle not at fault</td>
<td>Patient's vehicle at fault</td>
</tr>
<tr>
<td>Another person at fault</td>
<td>1152†</td>
</tr>
<tr>
<td>No other person at fault</td>
<td>191‡</td>
</tr>
<tr>
<td>92‡</td>
<td>1170§</td>
</tr>
</tbody>
</table>

*Not at fault.
†Denies fault.
‡Admits fault.
§At fault.

A higher proportion of ‘not at fault’ cases were injured while cycling (table 2). Only 3% (n=1) of motorcycle passengers, and 4% (n=12) of motor vehicle passengers were in the ‘denies fault’ group.

Functional recovery (GOS-E score upper good recovery)

At 12 months, 2272 (87.2%) patients had a valid GOS-E score. The proportion of patients who had fully recovered was lower in all other groups compared to the ‘at fault’ group (table 3). After adjusting for key potential confounders of the relationship between fault status and outcomes, the relative risk of a complete functional recovery was lower for the ‘not at fault’ and ‘denies fault’ groups (table 3).

Return to work

Seventy-one per cent (n=1841) were working prior to injury. Return to work status was known for 1683 (91.4%) patients at 12 months. The ARR of returning to work was 8% lower for ‘not at fault’ patients compared to ‘at fault’ patients, but was not different for the groups (table 3).

Health status-EQ-5D-3L

The EQ-5D-3L questionnaire was completed for 2252 (86.4%) patients at 12 months. The ARR of reporting problems was higher in the ‘not at fault’ group for the mobility, usual activities, pain or discomfort and anxiety or depression items, (table 3). The ‘denies fault’ group demonstrated a similar pattern of higher adjusted risk of poorer outcome for the EQ-5D-3L outcomes. The ‘admits fault’ group experienced higher adjusted risk of poorer EQ-5D-3L outcomes but only for some items (table 3).

DISCUSSION

Recovery from an orthopaedic injury can be prolonged and complex. Understanding the factors that impact on recovery is needed to identify patients at risk of poorer outcome, and to develop effective strategies and services to reduce the potential for permanent disability.

External attribution of responsibility for the crash or injury event, or blaming others, has been suggested as a reason for why some people do not recover well following injury. Blaming others may negatively impact on mental health due to anger, perceived injustice or victimisation and limit the capacity for acceptance and recovery following injury. In this study of 2605 orthopaedic trauma cases, injured in road traffic accidents, there was agreement between the police report and patient perception of fault in 89% of cases, and there was a clear pattern of association between fault status and 12-month patient-reported outcomes.

After adjusting for key potential confounders, the group who were not at fault according to the police and the patient, were at higher risk of poorer functional, return to work and health status outcomes when compared to the group where fault for the crash was attributed to the patient (or their vehicle) by the police and the patient. Similarly, patients who considered another person at fault for the crash despite the police determining the patient’s vehicle was at fault also demonstrated poorer outcomes. If this group were all motorcycle or motor vehicle passengers, we would expect a similar pattern of association with outcome as the ‘not at fault’ group. However, only 7% of this group were motor vehicle or motorcycle passengers, and passenger status was adjusted for in all models. While our observational study was not able to identify reasons for the association, the findings were consistent with previous studies undertaken in road trauma and general injury settings.

Littleton et al studied 193 patients presenting to a single emergency department following a road traffic crash and reported that the group not at fault had poorer mental health in the immediate postcrash period. Similarly, Thompson et al, in their study of a random sample of 995 TAC claimants, found that external attribution of responsibility was associated with poorer physical and mental health. While Clay et al found that external attribution of responsibility was a strong predictor of the presence and severity of pain 6 months after injury. In a study of 30 severely injured patients, blaming others for the crash or injury event was associated with poorer coping, while a study of 165 motor vehicle crash victims in the USA found that external attribution of responsibility was a risk factor for posttraumatic stress disorder only if the person was the driver of the vehicle involved in the crash. In our study, the findings were consistent, irrespective of road user group. Trost et al studied 155 trauma survivors managed at a level 1 trauma centre and found that higher levels of perceived injustice were associated with poorer physical and psychological outcomes 12 months following injury. Almost half of their sample were road traffic injuries but the association was consistent for all injury types.

There were a number of strengths to our study when compared to previous studies. This is the largest study to