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The influence of fault on health in the immediate post-crash period following road traffic crashes

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ABSTRACT

Objective: To compare the early health status of people who sustained injuries during road traffic crashes (RTC) in which they were at fault (AF), with people who sustained injuries in RTC in which they were not at fault (NAF).
Design: Prospective cohort study.
Subjects: People presenting to the emergency department with mild to moderate musculoskeletal injuries following RTC.
Main outcome measures: Physical Component Score (PCS) and Mental Component Score (MCS) of the Short Form 36 (SF-36) health status measure; Hospital Anxiety and Depression Scale (HADS) and the Functional Rating Index (FRI) recorded immediately post-crash.
Results: 193 people participated in the study and were enrolled a mean of 9.3 days following the crash. The mean age was 37 years and 60% were female. 71% were NAF. There was a significantly higher number of females in the NAF group (65% compared with 35% males; $p < 0.001$). Neck and back injuries were reported by 90.4% of the NAF group compared to 69.1% of the AF group ($p < 0.001$). There were no significant differences in PCS, FRI or pain intensity between the two groups at a mean of 9.3 days after the crash. The mean MCS for the NAF group was significantly worse than for the AF group (31.4 compared to 37.3; $p = 0.005$). The SF-36 domain revealed a significantly worse adjusted mean role emotional score for the NAF group (23.4 compared to 32.5, $p = 0.002$). Females had significantly worse MCS score than males (30.6 and 38.1 respectively; $p < 0.001$) and worse adjusted mean anxiety and depression scores (10 compared to 7.8; $p = 0.002$ and 7.6 compared to 5.5; $p = 0.002$ respectively).
Conclusions: Despite there being no difference in physical health status, the NAF group demonstrated more emotional and mental disturbance than the AF group; and this was significantly worse for females. Treatment strategies should focus on addressing early pain and disability as well as providing appropriate psychological interventions, particularly for people not at fault following RTC.

Introduction

Road traffic crashes are a significant cause of musculoskeletal injury in Australia.[12] The most frequently reported injuries include whiplash associated disorder and injury to the lower back, shoulder, hip and knee. Fifty percent of people sustaining such injuries experience poor recovery, continuing to report pain and disability two years following the motor vehicle accident.[34] This creates a significant financial burden on the health care system.

There are multiple factors associated with poor recovery, including high pain intensity,[23,35] depression and anxiety,[9,36] female gender[3,11] and older age.[11,35] In a study evaluating the injury related and psychological factors associated with ongoing disability in patients following orthopaedic trauma, ongoing pain, anxiety, depression and post traumatic stress disorder were the most significant predictors of outcome.[31] Ninety-three percent of patients in this study were injured in motor vehicle accidents. Interestingly, post traumatic stress disorder is reportedly not related to injury severity, instead being associated with other factors such as blaming others for the accident and the compensation claims process.[19,31]

The influence of blame and anger on recovery is particularly pertinent following road traffic crash as there is often an element of fault. The effect of feelings of injustice and blame following road

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traffic crashes has not yet been evaluated with regard to the fault status of the injured person. Specifically, there is a paucity of information that determines whether fault, irrespective of claim status, has an effect on health outcome.

This study reports the physical and psychological health status of people in the acute stage following a road traffic crash, and compares the effect of fault on health. The hypothesis of the study is that people who were not at fault will have poorer physical and psychological health scores, compared to those people who were at fault.

Methods

Design and data source

This study prospectively recorded data related to health status and other factors following injury in a road traffic crash. Participants were the control and intervention groups of the Accident Care Evaluation (ACE) study. The ACE study, a sequential cohort study, seeks to improve the health status of people injured in road traffic crashes in the Australian Capital Territory (ACT) using a follow-up clinic and an educational programme. All baseline data were collected prior to the delivery of the intervention.

Ethics approval

Human Research Ethics Committee approval was granted from all participating institutions: Australian National University, The Canberra Hospital, Calvary Public Hospital and the University of Sydney.

Inclusion and exclusion criteria

Data were collected from people identified from emergency department (ED) registers in the two public hospitals in the ACT. Participants were invited to join the study if they presented to the ED with mild to moderate musculoskeletal injuries (Injury Severity Score < 15) that had been sustained in a motor vehicle or motorcycle crash that had occurred no more than seven days prior to presenting to the ED; were aged between 18 and 70 years; and were usually resident in the ACT. Patients were excluded if they had sustained a head injury or spinal fracture or cord injury; required admission to hospital for more than three days; were from a non-English speaking background; did not wait to be seen for treatment; were pedestrians or were pregnant.

The ED admissions register was checked on a daily basis and patients that met the inclusion criteria were identified. Patients were then contacted via telephone and invited to participate in the study. Patients that were not able to be contacted or were not available to provide baseline data within 4 weeks of their crash were excluded. Patients who consented to participate in the study were interviewed at their home, workplace or in the research office in order to complete the baseline data questionnaire.

Recruited participants completed a questionnaire providing socio-demographic, injury (e.g. location and number of injury sites) and crash related information. Injuries were assigned an Abbreviated Injury Score (AIS)[18] by members of the research team experienced in injury coding. Two separate measures of injury severity were derived from the AIS. The first, Maximum Abbreviated Injury Score (MAIS), is a 6-point scale ranging from 1 (minor injury) to 6 (maximum injury, incompatible with life). MAIS represents the highest AIS regardless of body region, or the number injured body sites. The second measure, Injury Severity Score (ISS),[2] is a mathematically derived code number determined by adding the squares of each of the three most severely injured body regions. ISS was then categorised, using previously published cut-offs, into minor injury (ISS 1–3) and moderate (ISS > 4).[37] Health status was assessed with the Medical Outcomes Study Short Form 36 (SF-36), the Functional Rating Index (FRI), and the Hospital Anxiety and Depression Scale (HADS). Health measures were assessed post crash and reflected the post-injury status.

Health status measures

The SF36 Version 2.0 (Acute, Australian)[39] measures health related quality of life across eight dimensions (physical functioning, role physical, bodily pain, general health, vitality, social functioning, and role emotional and mental health). The range for each sub-scale is 0–100, with higher scores indicating a better perceived health status. Physical and Mental component scores are summary scores of the eight dimensions and are compared with Australian norms.[22]

The FRI combines concepts of the Oswestry Low Back Disability Questionnaire and the Neck Disability Index. The ten items measure both pain and function of the spinal musculoskeletal system.[15] Items use a 5-point scale ranging from 0 (no pain or full ability to function) to 4 (worst possible pain and/or unable to perform the function at all). Responses are summarised and an index score generated. The range of scores is 0% (no disability) to 100% (severe disability). Pain is measured using the pain intensity item of the FRI; where scores range from 0 (no pain) to 4 (worst possible pain).

The HADS is a 14 item scale with two sub-scales; one for measuring depression and one for anxiety. Each item has a 4 level response (scored 0–3). Scores are summed separately and total scores for each component are derived where 0–7 represents normal levels of anxiety or depression, 8–10 represents mild anxiety or depression, 11–14 moderate anxiety or depression and 15–21 represents severe anxiety or depression. HADS is a reliable measure of anxiety and depression in patients attending outpatient medical clinics[40] and has been used in previous studies investigating musculoskeletal injuries.[20,21,30]

Definitions

Fault was defined as any driver who caused the crash, or was largely responsible for the crash. It also included the driver of vehicles where no-one was at fault, for example a collision with wildlife. Under this definition, only those drivers or riders who caused the crash were included in the "at fault" (AF) group. All passengers and pillions, and any driver who was not responsible for the crash were included in the "not at fault" (NAF) group. Fault status was determined through a combination of personal interview, a review of ambulance records and hospital emergency department notes. Classification of fault status was made by two members of the research team (SL and SP). In the event of disagreement the final decision was made by a third assessor (PS). Employment was defined as being in full-time or part-time paid work. Students who performed some type of paid part-time work were also included in this group. Post secondary education was defined as completion of a tertiary degree or Technical and Further Education (TAFE) or college education. The 1997 Australian Standard of Classification of Occupation (ASCO) classification was used to define occupational group.[1]

Statistical methods

Data were analysed using SPSS version 17.0. The baseline characteristics of two groups were compared: those people at fault (AF) and those not at fault (NAF). For continuous data where normality could be assumed, independent *t*-tests were performed.