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Early risk factors for depression, anxiety and post-traumatic distress after hospital admission for unintentional injury: Multicentre cohort study

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ABSTRACT

Objective: To quantify psychological morbidity and identify baseline factors associated with depression, anxiety and post-traumatic distress symptoms up to 12 months post-injury.

Methods: Multicentre cohort study of 668 adults, aged 16 to 70, admitted to 4 UK NHS hospital trusts. Data on injury, socio-demographic characteristics and health status was collected at recruitment. Depression, anxiety and post-traumatic distress were measured at 1, 2, 4 and 12 months post-injury. Multilevel linear regression assessed associations between patient and injury characteristics and psychological outcomes over 12 months follow-up.

Results: Depression, anxiety and post-traumatic distress scores were highest 1 month post-injury, and remained above baseline at 2, 4 and 12 months post-injury.

Moderate or severe injuries, previous psychiatric diagnoses, higher pre-injury depression and anxiety scores, middle age (45–64 years), greater deprivation and lower pre-injury quality of life (QoL) were associated with higher depression scores post-injury.

Previous psychiatric diagnoses, higher pre-injury depression and anxiety scores, middle age, greater deprivation and lower pre-injury QoL were associated with higher anxiety scores post-injury.

Traffic injuries or injuries from being struck by objects, multiple injures (≥3), being female, previous psychiatric diagnoses, higher pre-injury anxiety scores and greater deprivation were associated with higher post-traumatic distress scores post-injury.

Conclusion: A range of risk factors, identifiable shortly after injury, are associated with psychological morbidity occurring up to 12 months post-injury in a general trauma population. Further research is required to explore the utility of these, and other risk factors in predicting psychological morbidity on an individual patient basis.

1. Introduction

Worldwide, injuries result in > 5 million deaths each year and account for 9% of all deaths. [1] Three quarters of these injuries are unintentional; most commonly caused by road traffic crashes and falls [1]. Injuries are a particular problem in working age adults; in England and Wales injuries result in > 20,000 deaths per year, > 10,000 of which occur between 15 and 64 years of age [2]. Injuries also place a considerable burden on health services, resulting in > 730,000 hospital admissions in England in 2015/16 in those aged 16–69 years [3].

With significant improvements in injury survival, the importance of psychological outcomes following injury are increasingly being recognised, affecting recovery [4, 5], quality of life [6] and return to work [7]. Systematic reviews show varying prevalences of psychological morbidity post-injury; estimated to range from 2 to 42% experiencing post-traumatic stress disorder (PTSD) [8, 9], 6–42% depression [10] and 4–24% anxiety [10]; and these conditions are commonly found to be comorbid [5, 8, 10]. The wide variation in prevalence rates may be due to differences in data collection tools, administration methods and timing of data collection in relation to the injury, differences in trauma

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populations including emergency department attenders or hospital admissions, injury mechanism and intent or demographic and cultural factors. Systematic reviews have also identified risk factors for psychological morbidity post-injury, including being female [11–13], past psychiatric disorders [11, 12, 14, 15], socioeconomic [11, 13, 14] and marital status [11, 14], employment [12], low social support [11, 13, 15], injury type [11], perceived threat to life [11, 14, 15], peritraumatic dissociation [11, 14, 15], pain [11, 14], involvement in litigation [11, 12, 15], and alcohol use during recovery [14]. Much of this literature focusses on PTSD [13–15] or specific injury types (e.g. road traffic crashes [15], burns [12, 14]) and is limited by small sample sizes (< 200 participants) [11, 12]. In addition, the UK literature in this area is sparse and not contemporaneous [16–20].

One UK study had developed a tool for predicting PTSD, anxiety and depression up to 3 months post-injury in emergency department attenders, using factors measured around the time of injury and up to one month later. Neuroticism scores, prior history of mental health problems and PTSD symptoms 1 month post-injury had high sensitivity in predicting the three outcomes, but also a high false positive rate, leading authors to conclude screening using the tool may not be acceptable to patients or cost effective [21]. In addition, performance of the tool amongst those admitted to hospital with an injury is unknown as is its ability to predict psychological outcomes beyond 3 months post-injury. Furthermore, its reliance on data collected one month post injury limits its usefulness in the acute hospital setting. Prediction tools have been developed for general trauma populations in other countries [22–24], but their generalisability to the UK is unclear due to differences in trauma populations, healthcare, compensation and legal systems.

The analyses presented in this paper aim to quantify psychological morbidity during the first 12 months post-injury and identify early factors, measurable around the time of the index admission, which are associated with symptoms of depression, anxiety and post-traumatic distress in the first 12 months post-injury. The paper draws on data collected amongst a general trauma population of working aged adults treated in the English NHS in the Impact of Injury Study [25].

2. Materials and methods

2.1. Study design

This was a multicentre longitudinal study of 668 patients recruited following hospital admission for unintentional injury.

2.2. Participants

Participants were 16–70 years old, admitted to one of 4 UK NHS hospital trusts in Nottingham, Leicester, Guildford or Bristol between June 2010 and June 2012. Eligible patients were recruited to the study within 3 weeks of injury either face-face, by post or by phone. Patients were excluded if they were not able to provide full consent, did not have a fixed address, or had a significant head injury (Glasgow Coma of < 15 at presentation, amnesia or loss of consciousness) to avoid confusion with psychological sequelae of head injury. Initial quota sampling between June 2010 and May 2011 which was based on age, injury type and sex, was subsequently replaced with invitation of all eligible patients due to slower than expected recruitment. Further details of the study can be found in the published protocol [25].

2.3. Measures

At recruitment, participants completed a self-administered questionnaire covering demographic characteristics (sex, age, marital status, ethnicity, employment status), injury characteristics (mechanism, location), pre-injury quality of life (EQ5D) [26], anxiety and depression (Hospital Anxiety and Depression Scale, HADS) [27], drug (Drug Abuse Screening Test, DAST) [28] and alcohol use disorders (Alcohol Use Disorders Identification test, AUDIT) [29], social functioning (Social Functioning Questionnaire, SFQ) [30], pre-injury visual analogue pain scale and long-term health conditions. Injury characteristics were also ascertained from medical records, including time spent in hospital, number of injuries, body part injured and injury severity measured by the Abbreviated injury Scale (AIS) [31]. The Index of Multiple Deprivation (IMD) [32] was used as a measure of socio-economic status. Psychiatric morbidity was also measured through a researcher administered Structured Clinical Interview (SCID) [33] which identified the number of psychiatric disorders in the 2 years pre-injury.

Participants were followed up at 1, 2, 4 and 12 months post-recruitment and completed postal questionnaires collecting data including the visual analogue pain scale, EQ5D, HADS, AUDIT, DAST, SFQ, Impact of Event Scale (IES) as a measure of PTSD [34], life events [35], health service use, compensation or litigation status, recovery expectations [36], social support (Crisis Support Scale, CSS) [37], and changes in outlook (Positive and Negative Changes in Outlook, CiOQ) [38]. The SCID was also administered at follow-up for participants who scored borderline or above thresholds for HADS, IES, AUDIT and DAST scales.

2.4. Data analysis

Characteristics of study participants were described using frequencies and percentages and means (standard deviations (SD)) or medians (interquartile ranges (IQR)) for continuous data as appropriate. These were compared descriptively between all study participants and those returning at least one follow-up questionnaire, as the latter formed the sample for the multilevel analyses presented in this paper. Univariate and multivariable multi-level linear regression models to account for repeated measures (observation at level 1, participant at level 2) calculated differences between means and 95% confidence intervals for each outcome separately (depression (HADS subscale), anxiety (HADS subscale)and post-traumatic distress (IES) at 1, 2, 4 and 12 months). Linearity of the relationship between continuous independent variables and the outcome variable was assessed by adding higher order terms to the model. Where there was evidence of non-linearity, continuous independent variables were categorised. Outcome scores were logarithmic transformed (natural logarithm + 1) as otherwise residual values were not normally distributed.

The analyses were carried out according to the statistical analysis plan written prior to undertaking analyses which detailed the variables considered for inclusion in the models and the model building process. Multivariable models were built for each outcome by firstly adding age, sex, study centre and follow-up time in one block and keeping these in the model regardless of statistical significance. This was followed by adding all variables measured at recruitment with a p-value of ≤ 0.2 on univariate analysis in a second block (considering number of psychiatric morbidities, depression (HADS subscale), anxiety (HADS subscale), AUDIT, DAST, long term conditions, EQ5D, length of hospital stay, injury severity, number of injuries, body part injured, injury mechanism, location of injury, employment status, ethnic group, deprivation, marital status). Variables were then removed in order of least statistical significance first, with the significance of their removal tested using a likelihood ratio test (LRT) with a p-value of < 0.05 taken as significant. Once no more variables could be removed, those that had been removed were reassessed for inclusion, by adding them back into the model, one at a time and tested for statistical significance using a LRT. Age, sex, study centre and follow-up time were defined a priori as variables that should be accounted for in the analysis, to adjust for confounding effects of age and sex and any differences between study centres and to allow for analysis accounting for changes over time. The remaining variables were included in the final model only if statistically significant as the aim of these analyses was to assess which of these baseline variables were significantly associated with the outcomes.