ORIGINAL ARTICLE

The psychological burden of injury: an 18 month prospective cohort study

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Emerg Med J 2002;19:400–404

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Accepted for publication
14 September 2001

Additional information
regarding this paper is
available on the journal
web site (emjonline.com)

Improvement of trauma care and trauma outcomes is a vital aspect of the work of accident and emergency (A&E) medicine. The Royal College of Surgeons of England report¹ highlights the importance of integration of rehabilitation care into acute care in order to optimise both physical and social functioning after recovery from injury.

Studies to date have documented rates of psychological disturbance among accident victims ranging between 11% and 39% in the weeks after injury.^{2–7} Few studies have examined the prevalence of psychological disorder among A&E department attenders after injury.^{5–8} The majority of published data has reported rates of psychological disturbance after specific type of injury such as road traffic accidents^{3–6} and assault, burn injury, and limb fracture.^{2–9–11}

There are a number of psychological and psychiatric disorders that can arise after traumatic events. Post-traumatic stress disorder (PTSD) is a severe condition that is characterised by persistent re-experiencing of the event, avoidance of stimuli associated with the event, and symptoms of increased arousal.¹² Its prevalence in the general population is between 1.0% and 9.2%.^{13–16} In addition, other disorders are recognised as developing more commonly after exposure to traumatic events including anxiety, depression, substance misuse, and specific phobias.^{2–3–5–11} We therefore set out to document the incidence of psychological upset in an unselected population of male A&E department attenders who required admission to hospital as a result of accidental injury and to document the change in symptoms over a longer term. This paper is the first of a series, with other aspects of trauma recovery to be dealt with elsewhere.

METHODS

Setting

This prospective cohort study was conducted in the Northern General Hospital Trust, a large urban teaching hospital.

Objectives: To determine the prevalence of post-trauma psychological problems among a cohort of male accident and emergency department patients admitted to hospital. To identify the changes in their psychological symptoms over an 18 month follow up period.

Methods: A prospective cohort study of male accident and emergency department patients who were admitted for treatment of an injury. Baseline interview recorded demographic details and accident details. Standardised questionnaires measured baseline psychological state and personality type. Follow up at six weeks, six months, and 18 months after injury was by face to face interview or postal questionnaire and recorded progress since injury, and documented psychological status through the use of standardised questionnaires to detect psychiatric disorder and symptoms of post-traumatic stress disorder (PTSD).

Results: 210 male patients were recruited into the study. Psychiatric disorder was identified in 47.6% of responders at six weeks, and 43.4% at six months after injury. This improved significantly at 18 months. PTSD symptoms were moderate in 25%–30% and severe in 5%–14% and did not change significantly over the study period. A significant relation was found between previous psychiatric history and psychological symptoms at 18 months after injury. No relation was identified between injury severity and psychological status after injury.

Conclusion: This study finds a high prevalence of psychological distress in male accident and emergency department patients after injury. Although some symptoms resolve over the follow up period, a proportion remain and may be related to previous psychiatric history. There was no relation identified between severity of injury and psychological morbidity.

Inclusion criteria

The subjects chosen for this study were a consecutive series of men within an age range of 17–60 years. The specific age range was chosen as this is representative of the male working population. All patients had suffered accidental injury requiring admission to hospital for treatment or observation for at least 24 hours after injury.

Exclusion criteria

Patients were excluded from the study if their injury was self inflicted or if they displayed psychotic symptoms at the time of admission.

Design

Over a six month period from February 1996 to August 1996, 215 consecutive male inpatients were contacted and invited to participate in the study. Altogether, 210 patients accepted and five patients declined to be interviewed. No specific reason for declining interview was given, in one instance, interview was impossible because of language difficulties.

Patients were interviewed after admission. They completed a semi-structured interview, which recorded demographic, and accident related details. Hospital stay was calculated from the inpatient notes.

Type of injury sustained was documented according to the system used by the Major Trauma Outcome Study (UK TARN). Physical findings were recorded and an Injury Severity Score calculated.¹⁷ The site of accident and other people involved was documented.

Follow up of all patients was at six weeks, six months, and 18 months. Follow up interviews were either conducted in person, or by postal questionnaire where interviews were not possible. At all follow up interviews, patients were asked about changes to their home or work circumstances since the accident, and involvement in litigation as a result of the accident.

Box 1 Measurement instruments at baseline interview

- Eysenck Personality Questionnaire (short scale version).¹⁸ A well validated measure of personality type.
- Hospital Anxiety and Depression Scale (HAD).¹⁹ A well validated measure of present state levels of anxiety and depression as experienced over the preceding few days.

Box 2 Measurement instruments at follow up interviews

- General Health Questionnaire-28 Item Scale (GHQ-28)²⁰ identifies psychiatric disorder and is widely used as a psychiatric screening instrument to detect non-psychotic disorders. It measures patients' experiences in the preceding few weeks and uses a cut off score that is adjusted according to the population under examination.
- Hospital Anxiety and Depression Scale¹⁹ (as above, not used at 18 months).
- Revised Impact of Events Scale²¹ measures symptoms of post-traumatic stress disorder (PTSD). The original Impact of Events Scale has been in use since 1979 and measured the intrusive and avoidance aspects of PTSD.²² In 1995, the scale was revised incorporating seven items to the existing 15 item scale documenting hyperarousal symptoms. The scale is self administered and documents the reaction to a stressful life event over the past seven days.

Data handling and statistics

All information received was scored and entered onto a database developed using the software package SPSS for Windows (Version 6.0). Initial analysis involved a drop out analysis comparing responders at each time point with non-responders. A combination of χ^2 tests, analysis of variance (ANOVA), and *t* tests were used to compare the categorical and continuous data respectively. A *p* value of <0.05 was judged as significant, and Scheffe's, post hoc test was applied to reduce the risk of type I error arising. Changes in psychological symptoms across time were calculated using repeated measures ANOVA to compare mean scores. This test was applied only to those patients responding at *all* the time points.

RESULTS

Of the 215 male inpatients approached, 210 agreed to participate in the study. Their ages ranged between 17 and 60 years (mean (SD) 34.4 (12.2) years). Most of the sample received their injuries as a result of falls (59, 28.1%), road traffic accidents (37, 17.6%), assaults (28, 13.3%), sporting injury (27, 12.9%), or were categorised as "other" (59, 28.1%). The

Table 1 Response rates for each follow up period

Interview time	Frequency	Percentage
Baseline	210	97.7
Six weeks	128	61.0
Six months	114	54.3
Eighteen months	96	45.7

"other" category represented mainly limb injuries sustained as a result of crushes or lacerations. Three quarters of the incidents in this category took place at work. Of the 37 patients involved in road traffic accidents, 15 were drivers, 7 passengers in cars, 7 motorcyclists, 5 pedestrians, and 3 cyclists.

Response rates and characteristics of non-responders

Table 1 gives the response rates at each of the three follow up periods. Any longitudinal study risks being compromised by selective drop out at each stage of the study. It was therefore important to examine the data for any systematic differences across the different time samples. The only consistently significant differences across time were in marital status, mean length of hospital stay, and the Eysenck Personality Questionnaire "psychoticism" scores. Responders at 18 months were more likely to be married (51.0% *v* 31.6%, $\chi^2=8.19$, *p*=0.04), and have longer inpatient stays and lower psychoticism and extroversion scores (see web site).

Injury severity

Physical severity of injury was documented by calculating the Injury Severity Score.¹⁷ Among the patients in the study, scores ranged from 1 to 38. Scores of 1–9 were found in 187 patients (89.0%), 10–15 in 16 patients (7.6%), and >15 in 7 patients (3.3%), indicating most of the sample had sustained relatively minor injuries.

The psychological response of those with moderate to severe injury (ISS $\geq$ 9, *n*=69 (32.9%)) were compared with those less severely injured (ISS<9, *n*=141 (67.1%)) using a *t* test on the General Health Questionnaire-28 item scale scores and Revised Impact of Events Scale scores. No significant differences were found between the more severely injured and the less severely injured groups at any of the follow up time points. This suggests that severity of injury has no relation with psychological morbidity, and other factors must be of greater importance.

Post-traumatic stress disorder symptoms

Symptoms of PTSD were documented using the Revised impact of Events Scale. Table 2 shows that the majority of

Table 2 Symptoms of post-traumatic stress disorder over time

Revised impact of events subscales	Six weeks (%) (<i>n</i> =116)	Six months (%) (<i>n</i> =109)	Eighteen months (%) (<i>n</i> =88)
Avoidance symptoms			
Normal/mild (0–1)	78 (67.2)	67 (61.5)	60 (68.2)
Moderate (1.01–2.49)	29 (25.0)	32 (29.4)	22 (25.0)
Severe (2.5–4.0)	9 (7.8)	10 (9.2)	6 (6.8)
Hyperarousal symptoms			
Normal/mild (0–1)	84 (72.4)	75 (68.8)	64 (72.7)
Moderate (1.01–2.49)	25 (21.6)	28 (25.7)	12 (13.6)
Severe (2.5–4.0)	7 (6.0)	6 (5.5)	12 (13.6)
Intrusion symptoms			
Normal/mild (0–1)	72 (62.1)	68 (62.4)	57 (64.8)
Moderate (1.01–2.49)	37 (31.9)	32 (29.4)	20 (22.7)
Severe (2.5–4.0)	7 (6.0)	9 (8.3)	11 (12.5)

Table 3 Change in mean score of PTSD symptoms over time and repeated measures analysis of variance

Revised impact of events subscales	Six week mean scores (SD) (n=56)	Six month mean scores (SD) (n=56)	Eighteen month mean scores (SD) (n=56)	Significance
Avoidance symptoms	0.81 (0.83)	0.89 (0.82)	0.79 (0.88)	0.52
Hyperarousal symptoms	0.69 (0.71)	0.74 (0.83)	0.72 (0.96)	0.85
Intrusion symptoms	0.89 (0.75)	0.85 (0.95)	0.92 (0.99)	0.78

responders had low scores indicating normal or mild post-traumatic symptoms. However, a surprising number indicated moderate or severe symptoms at all follow up time points, the majority in all three subscales falling into the moderate category. The scale was designed to be scored as a continuum, and the authors do not encourage the use of a cut off to define severity of symptoms. The grouping system used in the table 4 should merely be looked upon as a guide to severity of symptoms experienced by this group of patients.

Repeated measures ANOVA shown in table 3 tested the change in PTSD symptoms over the 18 month follow up period in those patients responding to *all* time points. There was no significant change in symptoms. It seems that the symptoms experienced at six weeks are maintained in the medium term.

Psychiatric symptoms

The GHQ-28 self report measure was administered at the six week, six month, and 18 month interviews. A cut off score of 5/6 was decided upon based on a validation study screening a community sample for psychiatric illness.²³ Table 4 shows a large proportion of the patients followed up were identified from the questionnaire as having a psychiatric disorder up to six months after injury, but this fell sharply by 18 months.

Repeated measures ANOVA was performed on GHQ-28 scores of patients responding at each time point. It shows that mean psychiatric symptom scores improved significantly over the 18 month follow up period ($p=0.04$, $F(2,108)=3.23$).

The HAD scale was administered at baseline, six week, and six month interviews. Moderate to severe anxiety was documented among 20 (9.8%) at baseline interview, 14 (11.6%) at six weeks, and 15 (13.8%) at six months. Similarly, depression was documented at baseline among seven (3.4%), six weeks 10 (8.3%), and six months 10 (9.2%). Repeated measures ANOVA shows no change in mean anxiety scores over the six month period ($F(2,170)=1.6$, $p=0.21$), but a significant deterioration in mean depression scores ($F(2,170)=4.2$, $p=0.02$).

Effect of previous psychiatric history

When asked, 10.5% of patients reported previously having seen a psychiatrist. A second question asked about visits to their general practitioner with mental health problems, and 15.8% of patients had attended for such problems.

We looked for a relation between previous psychiatric history and psychiatric disorder (GHQ-28) using a two tailed Pearson correlation. Table 5 shows no relation between

Table 5 Two tailed Pearson correlation between GHQ scores and previous psychiatric history

Follow up GHQ	Seen psychiatrist	Seen GP with mental health problem
Six weeks	0.05	-0.02
Six months	-0.05	-0.18
Eighteen months	-0.40**	-0.31**

** $p<0.01$.

psychiatric cases identified from the GHQ-28 and previous psychiatric history at the six week or six month follow up times. However, the relation became significant by 18 months ($p=0.0008$). This result suggests that previous psychiatric morbidity may be a factor in the longer term.

DISCUSSION

It is recognised that the psychological reaction to injury can be at least as important in the recovery as the physical effects of that injury. A number of previous studies^{2-4 11 24-26} have examined the psychological effects of physical trauma in selected populations. This is one of few studies to examine the incidence of psychological morbidity in an unselected cohort of patients attending the A&E department.^{3 8} If the goal of treatment is to return the patient to normal functioning, then some understanding of the types and extent of the psychological reaction to injury is important.

Injury severity

It is a commonly held belief that severity of injury correlates with psychological outcome. One might expect a more severely injured person to suffer more extreme psychological problems. In this study no relation was identified between injury severity and psychological response at any of the follow up time points. This agrees with most other studies^{6 24 27} with few studies stating the opposite.^{4 26}

Post-traumatic stress disorder symptoms

This study has documented PTSD symptoms in a moderate form at each follow up time point in up to 32% of responders. However, severe symptoms were experienced in less than 10% of responders up to six months after injury. These results concur with many other studies. Mayou and colleagues, in following up 188 road traffic accident victims found that 11% of the sample satisfied the criteria for PTSD within the 12 month follow up period.³ Feinstein and Dolan also found that at six weeks after injury, 25% of patients after limb fracture were diagnosed as having the disorder and 14% at six months after injury.² Blanchard and colleagues followed up 158 road traffic accident victims at between one and four months after their accident. They found that 39% of patients met the criteria for PTSD during this period.⁴ Joy and colleagues investigated the psychological reactions of A&E department attenders and found that 93% fulfilled the DSM IV criteria for PTSD at between one and three weeks after injury.⁸

Table 4 Psychiatric disorder as measured using GHQ scoring of the General Health Questionnaire-28 item scale cut off scores of 5/6 used to define disorder

Follow up interview	Non-cases (%)	Cases (%)
Six weeks (n=124)	65 (52.4)	59 (47.6)
Six months (n=106)	60 (56.6)	46 (43.4)
Eighteen months (n=87)	61 (70.1)	26 (29.9)

Psychiatric symptoms

This study has documented psychiatric symptoms after injury diagnosed using the self report General Health Questionnaire-28 Item Scale. At six weeks, 47.6% of responders were diagnosed as having a disorder, with 43.4% found at six months. This fell significantly to 29.9% by 18 months. Most studies have concentrated their efforts on describing the incidence of PTSD after injury^{2-5, 25} with very little attention being paid to other psychological sequelae of trauma. Feinstein and Dolan report psychiatric disorder among 62.5% of the 48 patients with lower limb fracture they interviewed while hospitalised.² However, this figure fell dramatically to 27.3% by six weeks and 25.6% by six months after injury.

Levels of anxiety and depression recorded after injury using the HAD found significant anxiety in 13.8% of responders, and significant depression among 9.2% by six months. Mayou,³ in interviewing 188 victims of road traffic accidents, found that 41% (n=77) of the subjects reported higher levels of anxiety and depression at baseline assessment, and, although not quoting figures he comments on the continuity of symptoms across time. Shepherd¹¹ also documented psychological distress after jaw fracture attributable to assault and found significant anxiety in 10% and significant depression in 8%. The difference in prevalence figures found between the present study and others could be accounted for by subject variation, assessment tools used, and variation in follow up times. When comparing these figures with a population of A&E department attenders, previous studies using the GHQ have found prevalence rates of minor psychiatric morbidity to be 27%.²⁸

Previous mental health problems

A proportion of patients in this study had experienced previous mental health problems. It can be difficult to separate chronic symptoms from those arising after a traumatic event. We documented psychiatric disorder using the General Health Questionnaire-28 Item Scale, which is a global measure of symptoms over a preceding period of weeks. Cases identified were high in the first six months of follow up (47.6% and 43.4% respectively). This proportion fell significantly by 18 months to 29.9%. Prevalence of psychiatric disorder in the general population using the General Health Questionnaire has been recorded. The Health and Lifestyle Survey of 1987 randomly interviewed 9000 people in the UK. They found that psychiatric disorders were identified among 27% of men from the age of 18 years.²⁹ These results would suggest that our sample displayed an acute reaction to the trauma they experienced, with a proportion recovering up to 18 months after the event. The percentage of cases identified at 18 months after their injury could represent premorbid mental health problems. A significant relation was found at 18 months between previous mental health problems, psychiatric disorder, and PTSD symptoms. This may indicate the importance of previous psychiatric history in predicting those patients likely to develop ongoing psychological problems after trauma.

Study limitations

This study has several limitations. Longitudinal studies such as this rely on the repeated response of patients to follow up. It is impossible to account for those patients who failed to respond to follow up after initially becoming involved in the study. The results from a complete dataset would obviously be more significant and permit more robust conclusions to be drawn from these findings. The differences found between responders and non-responders follow a pattern over the follow up periods. As one might expect, the patients who did not respond to follow up were likely to be younger, unmarried, of a lower social class, unemployed, or students and had a shorter hospital stay. They also had significantly higher scores on the "psychoticism" subscale of the EPQ. Some of the factors suggest a common link in increased social instability and

non-conformity that may indicate less readiness to comply with this type of study. The differences suggesting social instability also makes this group the hardest to maintain contact with because of more frequent change of address, no workplace, and no telephone contact.

We did not examine the patients seen and discharged from the A&E department and therefore cannot comment on the prevalence of psychological morbidity in this group but this is part of an ongoing project.

Most of the measurement instruments performed well. We found it difficult to interpret the Revised Impact of Events Scale. The questionnaire can act as a guide to symptom severity and is widely used in this type of research. The lack of formal "cut off" points for a diagnosis of PTSD is weakness. Formal diagnosis can only be made using a long diagnostic interview by using instruments such as the Clinician Administered PTSD Scale.³⁰ Such an additional diagnostic measure would have increased the validity of the results but time and funding limited our ability to use this approach. We are using this extended interview in ongoing work.

Clinical implications

It is clear that psychological reaction to injury is common. The results of this study may increase awareness and be useful in planning future services for those who develop psychological problems after injury. At present the evidence for intervention is weak. Recent randomised controlled trials of psychological debriefing of individuals suggested no benefit.³¹⁻³³ However, there are other approaches that have not been used and more research is required.

Increased awareness through education of nursing and medical staff of the existence of the types of problems that have been described is the first step to facilitating detection. Simple advice and support may help these patients. However, this study does lend some support to the theory that some people may not cope well with readjustment to life events in general and that this is a significant factor in long term psychological morbidity. Preventing such problems in this group may be a real challenge yet is obviously an area where great gains in reducing preventable morbidity might be made.

More research is needed to examine the value of intervention and treatment of at risk patients. There may also be more simple methods of prevention that could be useful in the acute setting such as the use of patient advice leaflets, or the availability of specialist nurse "counsellors" to liaise with patients. Given that psychological distress is often detected within the weeks after injury, an awareness of these problems within the primary care setting is essential. The development of care pathways for trauma patients in conjunction with the acute trauma specialties could provide a breakthrough in management.

Comment

Psychological morbidity after injury has been found to occur commonly in the short-term among male patients who have attended the A&E department. The sample studied had sustained accidental injury and were followed up for 18 months. Psychiatric disorder was found commonly within the first six months after injury, with symptoms of PTSD being less common. There was a relation between previous mental health problems and psychiatric disorder in the follow up period. There was no relation between the severity of injury and psychological morbidity.

Evidence to date for the effective management of these problems is poor. A simple form of intervention that can reduce the prevalence and intensity of psychological distress after injury would benefit both the patient and society as a whole. More work is needed to develop this area of trauma recovery and incorporate it into everyday care.

ACKNOWLEDGEMENTS

Mr D Woods for statistical assistance in data analysis.

Contributors

S Mason collected the data, interviewed patients, arranged follow up, marked the questionnaires, performed data entry and analysis, and wrote the paper. J Wardrope helped design the study, supervised the project, advised on data analysis and Injury Scoring, and helped write the paper. G Turpin advised on the trial design and measurement instruments. A Rowlands helped to design the study, advised on measurement instruments, and provided clinical psychology input into the study.

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Funding: The Royal College of Surgeons Research Fellowship Scheme (Hillsborough Award, 1996–1997) funded the study.

Conflicts of interest: none.

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