

# Use of health care services 6 months following major trauma

Belinda J Gabbe, Ann M Sutherland, Owen D Williamson and Peter A Cameron

## Abstract

To establish the use of health care services 6 months following major trauma, 243 blunt major trauma patients were recruited during their acute hospital stay and followed up by telephone interview at 6 months post-injury. Data collected at 6 months included health care service usage and their level of disability according to the Glasgow Outcome Scale – Extended (GOSE). Ninety-four percent of patients were living in the community at 6 months, and most (69%) reported continued use of health care services. Of those with ongoing disability, non-compensable patients were significantly more likely (OR 3.7; 95% CI, 1.6–8.6) to have ceased health care service use than compensable patients, independent of injury severity.

**Aust Health Rev 2007; 31(4): 628–632**

MANY STUDIES HAVE described the outcomes of trauma survivors at various time points post-injury and demonstrated the presence of ongoing disability, handicap and lost quality of life.<sup>1–5</sup> Few studies have described the use of health care services post-trauma,<sup>1,6,7</sup> and the relationship between health care service use and ongoing disability experienced by patients is unknown. Understanding the degree of disability experienced by trauma survivors and their pattern of support and outpatient services use is important for evaluating management approaches and improving health service provision. The aim of this study was to establish the use of health care services at 6 months following major trauma.

## Methods

### Participants

Participants were recruited to this prospective cohort study between September 2004 and

### What is known about the topic?

While studies have described the outcomes of severely injured patients, there is a paucity of information about their use of outpatient health care services. Information about the pattern of support and outpatient services use is important for evaluating management approaches and improving health service provision.

### What does this paper add?

This paper describes the pattern of use of health care services 6 months following major trauma and has identified a high-risk group of patients who may benefit further from, but are no longer receiving, ongoing treatment. Despite ongoing disability, non-compensable patients were more likely to have ceased treatment.

### What are the implications for practitioners?

The findings suggest a potential inequality in the use, or provision, of outpatient treatment services in major trauma related to compensable status. This has implications for those providing referral to outpatient services and underlines the importance of monitoring patient outcomes following hospital discharge. Further investigation of the reasons for cessation of treatment and the relationship between health care service utilisation and recovery are required.

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# I Profile of major trauma participants and their 6-month outcomes (n = 236)

Demographic	No. (%) <sup>*</sup>
Age in years (median, [range])	33 (15–78)
Men	193 (81.8)
Marital status <sup>†</sup>	
Never married	129 (55.4)
Married or living with partner	78 (33.5)
Divorced, separated or widowed	26 (11.1)
Highest level of education <sup>‡</sup>	
Tertiary or postgraduate	111 (47.8)
High school	119 (51.9)
Other	2 (0.9)
<b>Injury details</b>	
Cause of injury	
Motor vehicle	101 (42.8)
Motorcycle	44 (18.6)
High fall	33 (14.0)
Pedestrian	15 (6.4)
Pedal cyclist	12 (5.1)
Low fall	10 (4.2)
Other cause	21 (8.9)
Injury severity score (median [range])	25 (9–75)**
Serious head injury <sup>§</sup>	117 (49.6)
<b>6-month outcomes</b>	
Living status	
Living at home independently	170 (72.0)
Living at home with care	47 (20.0)
Inpatient rehabilitation	10 (4.2)
Other	9 (3.8)
GOSE <sup>¶</sup> rating	
Upper good recovery	40 (16.9)
Lower good recovery	35 (14.8)
Upper moderate disability	69 (29.2)
Lower moderate disability	60 (25.4)
Upper severe disability	21 (8.9)
Lower severe disability	10 (4.2)
Vegetative state	1 (0.4)
Return to work or study	
No	69 (29.2)
Yes	102 (43.2)
Not applicable	65 (27.5)

<sup>\*</sup> Unless otherwise indicated. <sup>†</sup> Data missing for 3 cases.

<sup>‡</sup> Data missing for 4 cases. <sup>§</sup> Abbreviated injury scale

severity score >2. <sup>¶</sup> GOSE = Glasgow Outcome Scale —

Extended. \*\* Final, post-discharge ISS < 15 for 11 (4.5%) cases where the estimated ISS in-hospital was > 15.

March 2005 from the adult major trauma services in Victoria. Patients were eligible if they had a blunt mechanism of injury, survived to discharge, had an estimated Injury Severity Score (ISS) greater than 15 on admission, and were aged 15 to 80 years. Patients with penetrating or burn injuries were excluded from this study as they represent less than 10% of major trauma patients. Informed consent was obtained for all participants and ethics approval was granted by the participating hospitals and Monash University.

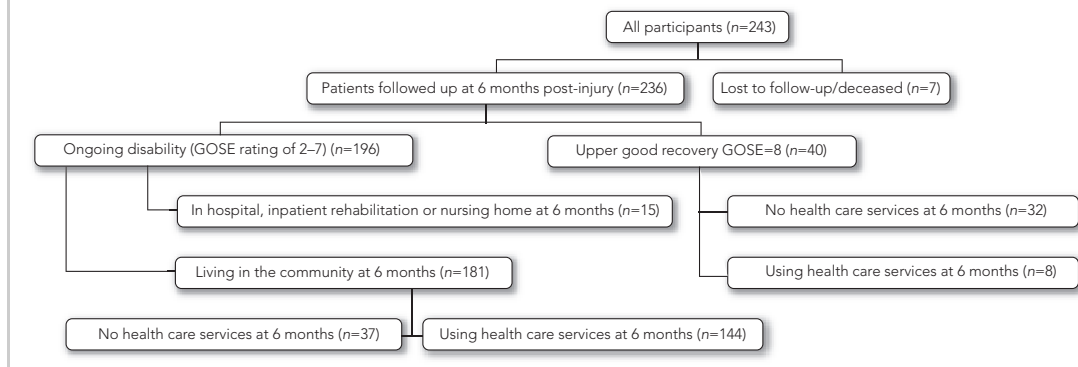
## Procedures

Data were obtained from the Victorian State Trauma Registry (VSTR),<sup>8,9</sup> an in-person interview at the time of discharge, and a telephone interview at 6 months post-injury. Data obtained from the VSTR included basic demographics, injury event details, injury diagnoses and severity and in-hospital outcomes. Abbreviated Injury Scale (AIS) codes were used for diagnoses. This scale groups the body into nine regions and assigns a code to each injury, including a severity score from a six-point, ordinal scale (from 1 [minor injury] to 6 [maximum injury]).<sup>10</sup> Further demographic information was obtained from the interview at discharge and included marital status, pre-injury work capacity and highest level of education. The 6-month interview collected information about residential status, use of health care services, return to work and the Glasgow Outcome Scale — Extended (GOSE). The GOSE enables allocation of patients to one of eight functional outcome categories from dead to upper good recovery.<sup>11</sup> A reliable, structured interview for GOSE scoring was used for this study.<sup>12</sup> Where patients were unable to provide the information due to their injuries, data were collected from the next of kin.

## Data analysis

Data were analysed using SPSS for Windows Version 14.0 (Microsoft Corporation, Redmond, Wash, USA). Descriptive statistics were used to describe the cohort and their 6-month outcomes. Patients with ongoing disability (GOSE

## 2 Study flowchart — participant outcomes and use of health care services



less than “upper good recovery”) and living in the community at follow-up were selected to establish predictors of cessation of services. Patients classified as “upper good recovery” on the GOSE were excluded from these analyses, as this group consists of patients who report no problems related to the injury that affect daily life and would have justification for the cessation of health service use. Chi-square tests were used to compare the “health service” and “no health service” groups for categorical variables, while Mann-Whitney *U* tests were used to compare the groups on continuous variables (ie, age, ISS) due to the skewed distribution of these measures. Variables demonstrating a significant association with health service cessation were entered into a multivariate, backward, stepwise logistic regression analysis to identify independent predictors of cessation of health services. A *P* value less than 0.05 was considered significant. Odds ratios and 95% CIs were reported for the multivariate analysis.

## Results

Complete data were collected at 6 months post-injury for 236 (97.1%) of the 243 recruited participants. Three patients died post-discharge and four were lost to follow-up. The profile of patients successfully followed up is shown in Box 1. Most participants were men and the common causes of injury were motor vehicle or

motorcycle collisions, and high falls (Box 1). At follow-up 15 patients remained in hospital, inpatient rehabilitation or had been discharged directly from the major trauma service to a nursing home (Box 1). The remaining 221 (93.6%) were living in the community.

Of the patients living in the community, the majority ( $n = 156$ ; 68.8%) reported continued use of health care services. The most commonly reported service was physiotherapy ( $n = 99$ ) followed by medical/specialist care ( $n = 65$ ), occupational therapy ( $n = 33$ ), mental health care ( $n = 24$ ), home help ( $n = 22$ ), and hydrotherapy ( $n = 20$ ). Fourteen patients were attending a gym organised by their therapist. Other services reported were chiropractic ( $n = 4$ ), massage ( $n = 2$ ), home nursing ( $n = 2$ ), dental care ( $n = 1$ ), home meal delivery ( $n = 1$ ), nutritionist ( $n = 1$ ), pain specialist ( $n = 1$ ), and social work ( $n = 1$ ).

Box 2 shows the movement of patients through the study. Forty patients (16.5%) were classified as “upper good recovery”, the highest level of function according to the GOSE, and only 8 of these patients reported continued use of health care services, predominantly physiotherapy ( $n = 6$ ) and medical care ( $n = 2$ ).

Of the 181 patients living in the community with ongoing disability, 37 reported that they were not using health care services at follow-up (Box 2), 19 with moderate and 2 with severe disability. Factors associated with health care service cessation at follow-up were destination

following discharge from the major trauma service hospital (home versus inpatient rehabilitation/other institution [ $\chi^2_1 = 3.2$ ;  $P = 0.002$ ]), compensable status ( $\chi^2_1 = 16.3$ ;  $P < 0.001$ ), head injury status (AIS severity score  $> 2$  versus  $\text{AIS} \leq 2$  [ $\chi^2_1 = 4.3$ ;  $P = 0.038$ ]), and the ISS ( $z = -2.0$ ;  $P = 0.048$ ). Multivariate analysis identified compensable status as a significant independent predictor of health care utilisation. Non-compensable patients were more likely than compensable (Victorian WorkCover Authority and Transport Accident Commission) patients to report that they were not using health care services at follow-up (OR 3.7; 95% CI, 1.6–8.6;  $P = 0.002$ ).

## Discussion

This study described the outcomes and use of health care services at 6 months following major trauma and found that while most (94%) had returned to living in the community, only 17% of patients reported no injury-related problems affecting daily life. Almost 70% of patients who were living in the community with persistent disability continued to use health care services, but non-compensable patients were significantly less likely to be using health care services at 6 months post-injury than compensable patients, independent of injury severity.

Physiotherapy, medical care and occupational therapy were the most commonly used health care services by major trauma patients in our cohort, but few studies of health care utilisation following trauma are available for comparison. One study of 64 severely injured (ISS  $\geq 24$ ) patients found that 39% of patients required follow-up medical care for at least one year post-injury, 8% required physical therapy, 5% required occupational therapy and 2% required psychological therapy.<sup>1</sup> These figures are lower than reported for our cohort, probably because DePalma and colleagues followed up patients 6 to 27 (mean, 13) months post-discharge, rather than at a standardised time point.

In a study of 112 upper extremity injury patients followed up at 7 months post-injury, 20% of patients were continuing to use therapy

services,<sup>7</sup> a substantially lower rate than our cohort of major trauma patients. However, as in our study, McCarthy et al identified a significant relationship between compensation and the use of health care services, with compensable patients receiving significantly more therapy visits than non-compensable patients, particularly in the less severely injured.<sup>7</sup> Our study did not collect information about the number of treatments received, but non-compensable patients were significantly more likely to have ceased health care utilisation at follow-up than compensable patients, despite ongoing disability and independent of injury severity. While patients discharged directly home were also at elevated risk of cessation of health care services compared with patients discharged to inpatient rehabilitation, this was not an independent predictor, probably because compensable patients were more likely to be discharged to inpatient rehabilitation than non-compensable patients (78% versus 40%). The reasons for non-compensable patients not receiving services despite ongoing disability are not entirely clear, but an inability to afford further health care is possible, given lower levels of private health insurance in injured patients compared with population norms.<sup>12</sup> However, the possibility of over-provision of services to compensable patients cannot be excluded. Alternatively, as compensable patients were more likely to go to inpatient rehabilitation, it is possible that these patients were afforded greater access to outpatient services than patients discharged directly home.

This study is one of very few to describe the use of health care services in trauma patients. The strengths of this study were its prospective design, the high follow-up rate (97%) and the standardised time for follow-up, but limitations exist. Health care service usage was collected through a series of interview prompts and questions about specific and common services used in rehabilitation but, ultimately, the information collected relied on patient or next of kin recall. The number of treatments received was not collected and the reasons for using or not using particular services was not collected.

## Conclusions

While most major trauma patients had returned to living in the community by 6 months post-injury, less than 20% reported no problems affecting daily life due to their injuries. The majority of patients continued to use health care services at 6 months but, independent of injury severity, non-compensable patients were more likely to have ceased treatment. The findings are useful for understanding the pattern of health care usage by major trauma patients in the community, and have identified a high-risk group of patients who may benefit further from, but are no longer receiving, ongoing treatment. Further investigation of the reasons for cessation of treatment and the relationship between health care service utilisation and recovery are required.

## Acknowledgements

This project was conducted with the assistance of funding from the Victorian Trauma Foundation. The Victorian State Trauma Registry is a Department of Human Services and Victorian Trauma Foundation funded and approved initiative. Dr Belinda Gabbe was supported by a Public Health Fellowship from the National Health and Medical Research Council. We would like to thank Mr Andrew Hannaford and Assoc Prof Rodney Judson for their assistance with this project.

## Competing interests

The authors declare that they have no competing interests.

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(Received 3/10/06, revised 23/01/07, accepted 16/04/07) □