

Experience of pre-hospital treatment of survivors of falls-related trauma by an Australian helicopter emergency medical service[☆]

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ABSTRACT

Background: Greater Sydney Area Helicopter Emergency Medical Service (GSA-HEMS) operates a doctor and paramedic team providing pre-hospital and inter-hospital retrieval.

Falls are an important cause of morbidity and mortality among trauma patients. In NSW, patients injured by falling comprise 38% of those with serious to critical injuries (ISS > 15). The mortality of falls in this group is 15.2%, higher than the mortality rate for other common injury mechanisms. Mortality rate for high falls (>5 m) is similar to that of low/medium falls.

Aims: The primary aim was describe the basic demographics, transportation, injured areas, treatment and mortality of falls survivors attended to by GSA-HEMS. The secondary aim was to determine if there was any association between height of fall, revised trauma score (RTS_c) and need for advanced pre-hospital interventions.

Methods: Cases of trauma due to falling were identified by searching an electronic database covering the period June 2007 to March 2010. Hardcopy casesheets were abstracted using a proforma. Data was collected on demographics, timings, winch use, height of fall, physiologic variables, injured areas, advanced pre-hospital interventions and mortality at 24 h. Associations between height of fall and RTS_c, and height of fall and pre-hospital interventions were compared using Fischer's exact test.

Results: One hundred and fifty-four of 208 potential cases identified were cases of trauma due to falls, representing 13% of all pre-hospital trauma cases retrieved by the service. Median age of patients was 37, 67% of patients were male. Helicopter transport was use for 97% of cases, with 47% requiring winch extraction. High falls (>5 m), which accounted for 25% of cases, were more likely to show non-normal RTS_c. A greater proportion of high falls required advanced pre-hospital interventions.

Conclusions: Our experience describes a HEMS system that is often called to falls not just based on injury severity or requirement for advanced pre-hospital intervention, but also due to geographical and topographical impediments to access and transport of the patient by ground.

This may have implications in forward planning and activation of HEMS services.

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Background

Greater Sydney Area Helicopter Emergency Medical Service (GSA-HEMS) operates a doctor and paramedic team providing pre-hospital and inter-hospital retrieval for over 3000 patients per year using rotary wing, fixed wing and road platforms. Pre-hospital major trauma patients are transported to a designated major trauma centre, bypassing other hospitals which lack level one

designation. If not meeting major trauma criteria, some patients are transported to the nearest appropriate hospital.

Falls are an important cause of morbidity and mortality among trauma patients. The New South Wales Institute of Trauma and Injury Management (ITIM) publishes data from the NSW Trauma Registry.¹ This registry is collated from thirteen designated hospitals around the State and includes all the designated level one trauma centres. Data are submitted from patients with serious to critical injuries (defined as ISS > 15). Patients injured by falling mechanism comprise 38% of those patients across the registry. The mortality of falls in this group is 15.2%. High falls (>5 m) accounted for 4.2%, low/medium falls (<5 m) accounted for 34.2% of the registry. The mortality rate in the former was 13.7% (8th highest mortality rate), and 15.4% in the latter (3rd highest mortality rate).

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Aims

The primary aim of this study was to describe the basic demographics, transportation, injured areas, treatment and mortality at 24 h of patients who initially survived injury by a fall mechanism attended to by GSA-HEMS. The secondary aim was to see if there was any association between height of fall, revised trauma score² (RTS_c), and need for advanced pre-hospital interventions.

Methods

GSA-HEMS electronic database was queried for all pre-hospital trauma patients transported alive to a hospital between 1st June 2007 and 31st March 2010 by filtering the database for the pre-existing discrete search terms: “fall”, “cliff fall” or “bush incident”. The last term describes accidents related to rural/remote or wilderness geographical areas. Following electronic compilation of all potential cases, the hardcopy case sheets were reviewed. Data were then extracted by one of the authors (DJ) on a proforma containing demographics, timings, winch use, height of fall, physiologic variables, injured areas and advanced pre-hospital interventions. Categorical data on height of falls were collected using the proforma, which classified falls into Low (<1 m), Medium (1–5 m) and High (>5 m), in keeping with the NSW Trauma Registry Dataset.¹ Normal practice is to perform 24-h clinical follow-up by telephone of all patients, which is then recorded in the electronic database. Data were analysed using Microsoft Excel 2009 statistics package (Microsoft, USA). Descriptive statistics included median and interquartile ranges. Associations between height of fall and RTS_c, height of fall and interventions were compared by Fisher's exact test.

Ethical approval was granted through the South Western Area Health Service Research Ethics Committee, which is the body responsible for ethical review for the NSW Ambulance Service.

Results

Of 216 potential cases identified by the search, 208 hardcopy case sheets were located. Eight case sheets were missing. One hundred fifty four of 208 cases were trauma cases due to falls, representing 13% of all pre-hospital trauma cases retrieved by the service. Fifty-two cases were not related to falls (52/208). Of these non-falls cases 15 were from the “bush incident” group, whilst the remainder had been incorrectly classified as falls by the treating doctor when entering the case on the database.

Based on case notes and 24 h follow-up, the distribution of injured areas was assessed in each case (Table 1) using Abbreviated Injury Scale definitions.³ The median number of injured areas per case was 1 (range 1–4, IQR 1–2).

Results are presented in Table 1. Basic demographics are presented in Fig. 1. Timing of fall is shown in Fig. 2.

Survivors of high falls were more likely to have non-normal RTS_c. Requirement for one or more advanced pre-hospital interventions (tracheal intubation, transfusion or thoracostomy) was more frequent in the high falls group (Table 2).

Winch operations were analysed by grouping patients into one of three categories: doctor and paramedic winch, paramedic only winch and no winch operations. Patients requiring doctor and paramedic winch operations had similar frequency of requiring advanced pre-hospital interventions, and similar frequency of non-normal RTS_c than those who did not require winch operations. No patients in the paramedic-only winch group required advanced interventions nor had non-normal RTS_c (Table 3).

Table 1

Demographics, transport, timings, height of fall (high 5 m, medium 1–5 m, low <1 m), mode of fall, distribution of injuries, interventions and Coded Revised Trauma Score (RTS_c).² Data are presented as n(%) unless otherwise specified. Distribution of injuries was abstracted from case notes and 24 h follow-up using Abbreviated Injury Score³ definitions. More than one area may have been injured in each patient. Patients may have had more than one intervention.

	Total (n = 154)
Median age, years	37
Age range (IQR), years	3–82 (20–52)
Paediatric patients (0–14 years)	18 (12%)
Male	109 (69%)
Helicopter transport	149 (97%)
Winch extraction	72 (47%)
Transport to Major Trauma Centre	106 (69%)
Transport to Regional Trauma Centre or non-trauma hospital	48 (31%)
Time from tasking to patient contact (min)	
Median	40
Range (IQR)	8–405 (30–104)
High fall	38 (25%)
Medium fall	56 (36%)
Low fall	44 (29%)
Fall, height not recorded	16 (10%)
Mode of fall	
Cliff/canyon	46 (30%)
Walking	46 (30%)
Stairs/ladder	14 (9%)
Building	14 (9%)
Play equipment	8 (5%)
Other	22 (14%)
Unknown	4 (3%)
Distribution of injuries	
Head/neck	36 (23%)
Face	10 (6%)
Chest	16 (6%)
Abomen	20 (13%)
Pelvis/extremity	79 (51%)
External	65 (42%)
Advanced pre-hospital intervention	11 (7%)
RSI	10 (6%)
Blood transfusion	2 (1%)
Thoracostomy (tube or open)	2 (1%)
RTSc = 7.8408	136 (88%)
RTSc 7.0001–7.8407	3 (2%)
RTSc 6.0001–7.0000	6 (4%)
RTSc 5.0001–6.0000	3 (2%)
RTSc 4.0001–5.0000	2 (1%)
RTSc <4.0001	0
RTSc not able to be calculated	4 (3%)

Table 4 summarises the 16 cases with non-normal RTS_c and/or requirement for advanced pre-hospital interventions.

24-h mortality in the study was low. One patient, having sustained chest, abdominal and pelvis/extremity trauma after a fall

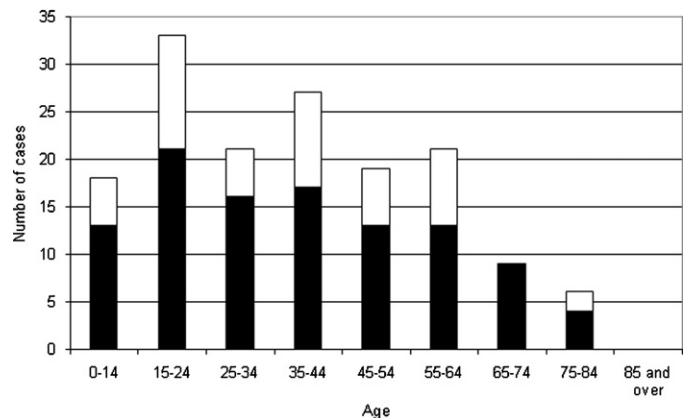


Fig. 1. Age and gender of patients. Male (■); female (□).

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