Potentially preventable trauma deaths in Victoria, Australia

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INTRODUCTION

BACKGROUND

- Regionalised trauma systems aim to ensure that severely injured patients are transported to trauma centres with appropriate specialist staff and equipment in a timely fashion, with the objective of reducing preventable deaths and disability.
- Reviewing preventable trauma deaths has been a mechanism used to examine quality of care, outcomes and evaluate the implementation of trauma systems.
- However, while the majority of trauma deaths occur in the prehospital setting, these deaths have not been subject to the same scrutiny as in-hospital deaths.
- Reviewing prehospital trauma deaths provides an opportunity to examine the entire system of care provided to trauma patients.

AIMS

- Use an expert panel review methodology to identify opportunities to improve the system of care provided to traumatic OHCA patients
- Identify opportunities for novel interventions

METHODS

DATA SOURCES

- Victorian Ambulance Cardiac Arrest Registry (VACAR)
- Prehospital information
- Victorian State Trauma Registry (VSTR)
- In-hospital information
- National Coronial Information System (NCIS)
- Autopsy information – cause of death and toxicology

REVIEW PROCESS

Phase 1: Survivability assessment

- Detailed review of all cases that had attempted resuscitation and had undergone full autopsy
- Exclude cases that had injuries considered unsurvivable (e.g. aortic laceration)

Phase 2: Expert panel reviews

- Multidisciplinary expert panels
- Paramedics, emergency physicians / trauma surgeons, intensive care physicians, nurses, forensic pathologists

Panelists provided with:

- Patient care records for all attending ambulance teams, autopsy, police report, toxicology information

Figure 1: Patient selection.

DEFINING PREVENTABILITY

Not preventable

- System provided appropriate and timely care
- Evaluation and management appropriate according to relevant clinical guidelines

Potentially preventable

- System generally provided appropriate and timely care, although potential for improvement
- Evaluation and management generally appropriate
- Some deviations from standard of care that may, directly or indirectly, have been implicated in patient's death

Preventable

- Delivery of care was suboptimal
- Avoidable error is judged to have directly caused the final outcome

RESULTS

Over the study period, there were 2,759 trauma-related deaths attended by AV. Of the 777 patients that received attempted resuscitation, 113 cases had full autopsies and were deemed to have ‘survivable’ anatomical injuries. Of these, there were 90 (80%) deaths that were considered to be non-preventable, 19 (17%) that were considered to be potentially preventable and 4 (3%) preventable deaths. Potentially preventable or preventable deaths represented 7% of cases that had attempted resuscitation from paramedics.

Table 1: Areas for improvement identified in the expert panel reviews, with results stratified by preventability groups.

	Potentially preventable	Not preventable
N	23	90
System factors		
Long notification time (time from injury event to 000 call)	1	0
Long response time	4	5
Dispatch / recognition in the call	4	0
Other	1	3
Diagnostic factors		
Missed/incorrect diagnosis	6	1
Delayed diagnosis	0	0
Other	0	0
Treatment/management factors		
Delayed treatment	1	1
Incorrect procedure	1	0
Correct procedure, but with complication	2	1
Correct procedure, incorrectly performed	2	1
Procedure not performed	6	4
Equipment failure	0	0
Inaccurate prognosis	4	2
Excessive on-scene time	5	0
Triage error	2	1
Other	5	1

Table 2: Noted novel system-related and clinical interventions that may have improved outcomes. These were documented for all cases that underwent review (n=113).

	Number of cases identified where novel intervention may have improved outcome
System-related interventions	
Early notification system (e.g. automatic crash notification or automatic quad-bike rollover notification)	4
Video emergency call	8
Provision of GPS coordinates as part of emergency call	2
Improved protocol around trapped patients	5
Improved protocol for crushed patients	2
Rapid launch protocol for HEMS	3
Clinical interventions	
Prehospital point of care ultrasonography	17
Prehospital resuscitative endovascular balloon occlusion of the aorta (REBOA)	2
Prehospital thoracotomy	0
Prehospital blood products (red cell concentrate / packed red bloods cells) ^a	24
Finger thoracostomy ^b	17
Arterial tourniquets	4
Novel methods of haemorrhage control (abdominal packing)	2
Remote decision-making support (telemedicine) for paramedics	6
Query the benefit of intubating a haemorrhagic/shocked patient, particularly in cases of penetrating chest trauma	6
Provide SAM pelvic binder to all crews ^c	6
Prioritise short on-scene times, particularly in penetrating trauma	5
Increased education on impact brain apnoea	2

CONCLUSIONS

No systematic problems were identified. Rather, we identified a number of specific circumstances in which the system of care provided to the patient was suboptimal. The identification of these issues highlights opportunities to make incremental improvements to reduce trauma mortality.