Potentially preventable road trauma deaths in Victoria

Ben Beck[a], Karen Smith[a,b,c], Eric Mercier[a,d,e], Peter Cameron[a,e]

[a] Deparment of Epidemiology and Preventive Medicine, Monash University, Victoria, Australia; [b] Centre for Research and Evaluation, Ambulance Victoria, Australia; [c] Deparmtne of Community Emergency Health and Paramedic Practice, Monash University, Victoria, Australia; [d] Laval University, Quebec City, Quebec, Canada; [e] Emergency and Trauma Centre, The Aflred, Victoria, Australia.

Abstract

The majority of road trauma deaths will occur in the prehospital setting. However, these deaths have not been subject to the same scrutiny as in-hospital deaths. This study aimed to provide an overview of road trauma deaths and identify situations in which these deaths may have been prevented. Between 2008 and 2014, there were 1,374 deaths resulting from road traffic events in Victoria. Of the deaths that had a full autopsy and had attempted resuscitation from paramedics, 55 had 'potentially survivable' injuries. Of these, 45 were considered not preventable and 10 considered potentially preventable or preventable road trauma deaths.

Background

In Australia, road traffic crashes are the second leading cause of hospitalised injury and injury-related deaths (Henley and Harrison 2015). The majority of these deaths will occur either at the scene or on the way to hospital (European Transport Safety Council 1999, Beck *et al.* 2017), highlighting the importance of rapidly providing high-quality critical care (Jurkovich 2012). However, when compared to patients that survive to hospital, relatively little is known about patients that die at the scene.

This project focused on the acute treatment of road trauma patients. Firstly, we aimed to provide an epidemiological profile of road trauma deaths in Victoria, Australia, identifying specific causes of death in these patients. From this, we aimed to identify situations in which targeted interventions may improve survival through expert panel reviews of individual cases. We also aimed to evaluate whether any of these deaths may have been prevented.

Methods

We performed a retrospective review of prehospital and early in-hospital (<24 hours) road trauma deaths following a traumatic out-of-hospital cardiac arrest (OHCA) that were attended by Ambulance Victoria during the period of 2008 to 2014. Patients were identified from the Victorian Ambulance Cardiac Arrest Registry (VACAR) (Nehme *et al.* 2015) and these data were linked with coronial data from the National Coronial Information System (NCIS) and, for those patients who were transported to hospital, to the Victorian State Trauma Registry (VSTR) (Cameron *et al.* 2004).

A detailed review of each case was conducted to evaluate whether a proportion of these deaths were potentially preventable or preventable. This was conducted in a two phase review, where the first phase aimed to determine whether the anatomical injuries were 'potentially survivable' and the second phase used a multidisciplinary expert panel review methodology to identify opportunities for improvement in the system of care provided to road trauma patients.

Results

Over the 7 year study period, there were 1,374 deaths resulting from road traffic events that were included in the study. This comprised 858 (62%) vehicle occupant deaths, 251 (19%) motorcyclist

deaths, 221 (16%) pedestrian deaths, 34 (2%) pedal cyclist fatalities and 10 (1%) deaths occurred when the occupant was outside of their vehicle. Of the 1,374 road trauma deaths, 589 (45%) had a full autopsy. Overall, the most common medical causes of death were head injury (29%), multiple injuries (28%) and haemorrhage (20%).

Of the 169 deaths with full autopsies that underwent detailed review, 55 (33%) were considered to be 'potentially survivable' based on the anatomical injuries. These 55 cases underwent expert panel review. Of these, 45 were considered not preventable and 10 considered potentially preventable (n=8) or preventable (n=2) road trauma deaths. Potentially preventable or preventable deaths represented 18% of those cases that had 'survivable' injuries (10 of 55 deaths), and 6% of all cases that had attempted resuscitation from paramedics (10 of 169 deaths).

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 road trauma mortality.

References

Beck, B., Bray, J.E., Cameron, P., Straney, L., Andrew, E., Bernard, S., Smith, K., 2017. Resuscitation attempts and duration in traumatic out-of-hospital cardiac arrest. Resuscitation 111, 14-21.

Cameron, P.A., Finch, C.F., Gabbe, B.J., Collins, L.J., Smith, K.L., Mcneil, J.J., 2004. Developing australia's first statewide trauma registry: What are the lessons? ANZ Journal of Surgery 74 (6), 424-428.

European Transport Safety Council, 1999. Reducing the severity of road injuries through post impact care. European Transport Safety Council, Brussels.

Henley, G., Harrison, J.E., 2015. Trends in injury deaths, Australia: 1999–00 to 2009–10. Australian Institute of Health and Welfare, Canberra, Australia.

Jurkovich, G.J., 2012. Regionalized health care and the trauma system model. Journal of the American College of Surgeons 215 (1), 1-11.

Nehme, Z., Bernard, S., Cameron, P., Bray, J.E., Meredith, I.T., Lijovic, M., Smith, K., 2015. Using a cardiac arrest registry to measure the quality of emergency medical service care. Circulation: Cardiovascular Quality and Outcomes 8 (1), 56-66.