Responding to mass casualty incidents in the rural setting: a case study

Introduction

While buses are a relatively safe form of transport, when accidents do happen, they have the potential to generate large numbers of casualties. In Australia, most significant bus accidents over recent years have occurred in rural areas, necessitating responses by rural health facilities. One such event occurred near Albury in August 1998, involving the presentation of twenty-five Chinese patients to Albury Base Hospital. The hospital's disaster plan was activated, and all casualties were effectively managed over a three-hour period. This event demonstrated that all hospitals in rural environments should be prepared for such events, and that in fact rural hospitals have some advantages over metropolitan hospitals in responding to such incidents.

The accident

Shortly after 6pm on Thursday August 13th, 1998, a tourist coach and a semitrailer collided on the Hume Highway near Mullengandra, a small village approximately 30 km northeast of Albury. The coach and the truck clipped each other on a single-lane section of highway, resulting in the ripping out of the front right hand corner of the bus, and leaving a large tear almost the full length of the bus.

The semitrailer veered off the road, and ended up in a ditch on the side of the road. The truck driver was thrown out of his cabin, and died at the scene. The tourist coach contained 25 passengers, the majority of whom were non-English speaking, and belonged to a Chinese Government Delegation from Hebei province. Following the accident, several passengers were trapped in the wreckage of the bus, but were soon freed by rescue/SES/Fire Service personnel from Holbrook (a nearby small town) and Albury.

The first ambulance on the scene arrived from Holbrook, with two ambulances (including the site controller) arriving from Albury shortly after. Triage was undertaken, with walking patients directed to a tarpaulin on the ground, as well as utilisation of triage tags. Patients were then transported by ambulance vehicles and another bus, as these became available.

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The hospital response

At approximately 6.20pm, Albury Base Hospital received notification that a significant incident had occurred, and that there were at least ten seriously injured, 'with multiple amputated limbs'. At that time, the Emergency Department was quiet, and it was relatively easy to clear and prepare the Department.

The hospital disaster plan was activated, including the following components:
- call-in of necessary staff
- preparation of the Emergency Department to receive the more seriously injured
- preparation of the Day Oncology Unit to receive green category patients (the Walking Wounded)
- preparation of a casualty reception ward
- discharge or transfer of patients from other wards in the hospital
- establishment of a hospital control centre in the admission offices adjacent to the Emergency Department

Once the hospital control centre was established (and notified to the Ambulance Coordination Centre), further information as to nature and number of injuries was communicated. The first patients arrived from the scene by ambulance at 19.15. Triage was performed in the Ambulance bay by the Emergency Department Staff Specialist on duty (MR) and the Emergency Department Nurse Unit Manager, although green category patients arriving by bus were taken directly to the Day Oncology Unit, where they were separately triaged.

Table 1 (next page) outlines the casualties received (Baskett and Weller 1988).

The last casualty was received at 22.00, with the hospital being stood down at 23.00 (although arrangements for increased staffing were put in place overnight). Because of the particular characteristics of the group (foreign nationals, non-English speaking), it was necessary to access several interpreters (including local Chinese restaurant owners), as well as involve the Department of Community Services, who arranged for transport and accommodation of those Chinese patients who were discharged (as part of the local welfare recovery plan). The following day, an operational debrief was held involving all hospital departments as well as the Ambulance Service and Department of

The bus accident at Mullengandra resulted in the presentation of 25 patients to the Albury Base Hospital

Ser.	Age	Sex	Time of arrival	Injuries
1	49	F	1915	Fractured pelvis, fractured femur, fracture upper humerus
2	43	M	1915	Compound lower leg fractures (leading to amputation), facial lacerations
3	47	M	1950	Bilat. corneal/conjunctival abrasions, hyphaema, lacerations both elbows, contusions to chest, calf
4	31	M	1950	FB eye, hyphaema, facial grazes, contusions abdomen and thigh
5	33	M	1950	Multiple rib fractures, haemothorax, minor lacerations to chest
6	52	M	2008	Multiple facial lacerations, fracture / dislocation ® foot, hyphaema
7	39	F	2010	Contusion ® elbow, large scalp lacerations
8	42	F	2015	Multiple facial lacerations, FB eye and ear, fracture scapula
9	38	M	2019	Facial / scalp lacerations, chest contusion
10	44	M	2100	Upper leg laceration
11	44	M	2110	Scalp / feet lacerations
12	59	M	2110	Facial lacerations / bruising
13	45	M	2115	Lip contusion / facial lacerations
14	49	M	2115	Facial lacerations / corneal abrasion
15	44	M	2115	Lacerations face, knee
16	57	M	2115	Facial lacerations
17	59	M	2115	Facial lacerations
18	48	M	2120	FB eye, facial lacerations
19	52	M	2125	Contusions only
20	53	M	2130	Fractured fibula, phalanges. Lacerations
21	79	M	2135	Contusions only
22	31	M	2150	Minor injuries only
23	56	M	2200	Lacerations to forehead, ankle sprain, contusion chest wall

Table 1: Casualties received at the Albury Base Hospital

Community Services. This debrief was to review the performance of the hospital (and it's disaster plan), to recognise the efforts of the staff, and to provide the necessary information with regard to critical incident stress management.

Discussion

Bus travel is both a comfortable and relatively safe way to travel. *Table 2* provides estimates of the risk per hour from all forms of commuting (Baskett P. and Weller R 1988).

Despite this, when something does go wrong, the capacity of modern buses is such that large numbers of casualties can be generated over short time frames, overwhelming available medical facilities. Recent examples are included in *Table 3*.

Of these recent examples, it is interesting to note that the majority have occurred in rural areas, with the exception of Brisbane and Mt Tambourine (while Mt Tambourine could be regarded as rural, the medical response was directed from and supplied by metropolitan hospitals) (Green 1990, Gaul 1992).

A number of papers suggest that communities and/or health facilities in rural and remote areas are impacted by, and respond to disasters in different ways to their urban counterparts. (EMA1995, Somers 1997, BDS Idaho 1994, Quarantelli 1983, Johnson 1991, Thompson 1997, Arnold 1993, CES Seminar Committee 1990). The Australian Emergency Manual on Disaster Medicine (EMA 1995), identifies a number of difficulties in response, including limited communications, lack of alternative emergency resources, generally limited response capability, harsh environmental conditions, and the deleterious effects of prolonged evacuation times. Somers (1997) identifies that in such a setting, the general practitioner has a key role to play as the first medical responder. The Idaho Bureau of Disaster Services (1994) also identified that rural communities may not have the same expectations of emergency services as city dwellers, and, because of disproportionate media coverage, may believe that they are not as badly affected as the urban population.

Other factors that may also negatively impact on the medical response may include limited numbers of appropriately trained staff, incomplete range of services (especially in areas such as neurosurgery and burns), limited pre-hospital resources, and the limited capability of hospitals to dispatch site teams, given that casualties will inevitably be brought back to the same hospital.

Despite these factors, there may be some positive aspects to the rural response. Responders are used to working well in small groups, and cooperate well on a multi-agency level. Management structures are generally smaller, such that good communication exists on both a daily operational as well as major incident/ disaster basis. Indeed, Quarantelli (1983), in his study of a large series of mass casualty incidents in the United States of America, suggested that coordinated medical responses were far more likely to occur in small towns/cities than they were in large metropolitan areas. While this is probably more relevant in the North American context, where there may be multiple competing pre-hospital providers, these issues may also be relevant in some parts of rural Australia.

In addition, because medical resources are scarce, it is far more likely that arrangements will be in place with regard to cooperation between health facilities to cope with such events. In the case of the Albury bus crash, inpatients were transferred to a nearby Catholic hospital to free up beds, and non-disaster emergencies were directed to a nearby Victorian hospital. Regular meetings and the development of a cross-border mutual aid agreement had enhanced cooperation between the facilities.

It is also important to bear in mind that rural communities are not homogenous. The Australian Health Ministers Advisory Committee (1996) considers rural Australia to equate with non-metropolitan areas, and as such incorporate major provincial centres, country towns, mining and isolated communities. Existing as a subset of this is remote Australia, which consists of communities that are more than a few hundred kilometres from a capital city, or are separated from other major centres by a significant physical barrier. Significant differences may therefore exist between the medical response in Albury or Tamworth, and the medical response in remote centres like Bourke or Longreach.

With regard to the specific hospital response, the principles of an effective response have been recognised by a number of authors (Richardson 1991, Savage 1979, Waeckerle 1991, Doyle 1990, Noji 1994, Auf der Heide 1995). Richardson

(1991) notes that effective hospital disaster planning must include care of existing inpatients and outpatients, co-ordination of staff, clearance of wards, medical record creation, new triage procedures in the Emergency Department, and dealing with media and relatives. Savage (1979) defines hospital disaster planning as falling into three major components; medical management of casualties; staff alert, recall and deployment; and, information, control and communication. Waeckerle notes that the survival of victims once they reach the hospital may be dependent on the organisation, training and experience of the hospital staff. Doyle (1990) cites familiarity with the facility disaster plan as being essential to a smooth response. Noji (1994) identifies shortcomings of hospital disaster plans as including delayed or improper notification, poor delineation of command structure, overloaded or broken communications networks, improper or incomplete identification, lack of supplies and lack of public relations.

Lessons

With regard to the hospital response in the rural setting, we felt that the following lessons were particularly bought home in this incident:

- It is absolutely vital that a separate area be designated for the management of the walking wounded (green category). While this makes one triage point difficult, it ensures that the Emergency Department can be effectively utilised for the more seriously injured. In this case, the hospital's Oncology care centre was utilised. While the staffing in the area was bolstered by staff from more acute areas, it was also essential to have staff in the area who knew where things were.
- Exercising the hospital disaster plan is probably even more important than having the plan! The hospital had an exercise 1 month before the event, and there was therefore a good understanding of what was required. On the evening, relatively few staff even had to look at their action cards or disaster plans.
- With incidents involving large numbers of non-English speaking people, it is vital to obtain the services of local interpreters in sufficient numbers to minimise delays in management. A telephone interpreter service is not practical in a mass casualty situation.
- Invariably the area exercised the least by hospitals is the hospital control

Relative safety of different forms of travel	
Bus	0.03 deaths per million hours
Rail	0.05 deaths per million hours
Car	0.6 deaths per million hours
Airline Flying	1.0 deaths per million hours
Motor Cycling	9.0 deaths per million hours
Private Flying	27.0 deaths per million hours
Mountaineering	27.0 deaths per million hours
Motor Cycle Racing	35.0 deaths per million hours
Rock Climbing	40.0 deaths per million hours

Table 2: Relative safety of different forms of travel

Recent Australian bus crashes		
Oct 20 1989	Grafton	coach and semitrailer collide on Pacific Highway - 20 dead
Dec 22 1989	Kempsey	two coaches collide head on - 35 dead, 41 injured
Sept 26 1990	Mt Tamborine	bus veers off mountain road - 11 dead, 38 injured
Jan 4 1992	Tamworth	bus veered into bridge - 4 dead, 50 injured
Nov 2 1993	Wangaratta	bus and semitrailer collide on Hume Highway - 10 dead, 35 injured
Oct 24 1994	Brisbane	bus driver loses control across median strip - 12 dead, 39 injured

Table 3: Recent Australian Bus Crashes

centre. For this to work effectively, it is necessary to identify a suitable area, allocate staff and their roles, and maintain the communication flow.

- Responding effectively to a major incident in a rural setting always involves a cooperative approach - with the ambulance service, other hospitals, and recovery agencies, to name but a few.

Conclusion

While the outcome of this incident certainly could have been much worse, especially in terms of fatalities, it demonstrated the ability of rural hospitals to respond well to mass casualty incidents. The particular Australian situation means that rural hospitals may be exposed to mass casualty events, especially as the result of bus crashes, and this requires that practiced plans be in place to effectively cope with such events. While many of the lessons learnt from this incident are not unique, they do highlight that rural hospitals can, and do, respond to such incidents effectively.

References

Arnold M. S 1993, 'Road Train Rollover', *Ambulance World: Australia's Journal of Pre-hospital Emergency Care*, Spring 1993, pp. 20–23

Auf der Heide, E. 1995, 'Community medical disaster planning and evaluation guide: an interrogatory format', American College of Emergency Physicians, Dallas, Texas.

Australian Medical Workforce Advisory Committee, 'The Medical Workforce in Rural and Remote Australia', *AMWAC Report 1996,* No.8, September 1996, Sydney, pp. 2–3

Baskett P. and Weller R. 1988, (eds), *Medicine for Disasters*, Butterworth & Co., Sydney, p. 352.

Bureau of Disaster Services, Idaho, 1994, 'Perspectives on Earthquakes in Rural Areas : Workshop Report: Boise, Idaho, October 26, 27, 28'.

Combined Emergency Services Seminar Committee 1990, 'Disasters in remote areas', Latrobe University Papers, Nov 1990.

Doyle C.J. 1990, 'Mass Casualty Incident -Integration with Prehospital Care', *Emergency Medicine Clinics of North America*, Vol. 8, No. 1, February 1990, pp. 163–175.

Emergency Management Australia 1995, *Australian Emergency Manual - Disaster Medicine*, para 5.16–5.21.

Gaul M. 1992, 'Tamworth Base Hospital's Disaster Response', *The Accreditor*, Autumn 1992, pp. 4–5.

Green D. 1990, 'Report on Tamborine Bus Disaster', *Gold Coast Hospital Internal Report*, 25th September 1990, pp. 1–10.

Johnson D.R et al. 1991, 'A method to reduce rural EMS response times', *Prehospital and Disaster Medicine* Vol. 6, April - June 1991, pp. 143-147.

Noji E.J. 1994, 'Hospital Disaster Planning', Paper presented at Australian Emergency Management Institute workshop—A Healthy Disaster.

Quarantelli E.L. 1983, 'Delivery of Emergency Medical Services in Disasters —Assumptions and Realities' Irvington Publishers, New York, pp.84–85.

Richardson D. 1991, 'Hospital Disaster Planning', *Royal Brisbane Hospital document*, 4th September 1991, pp. 1–7.

Savage P.E.A 1979, *Disasters—Hospital Planning - A Manual for Doctors, Nurses and Administrators*, Pergammon Press, New York, pp. 3–4.

Somers G.T. 1997, 'The GP as first responder in a major medical emergency', *Australian Family Physician,* Vol. 26, No. 12, December 1997, pp. 1406–1409.

Thompson D. 1997, 'Planning for and responding to disasters in remote areas', *National Emergency Response*, Vol. 12, No. 2, June 1997, pp. 34–38.

Waeckerle J.F. 1991, 'Disaster Planning and Response', *The New England Journal of Medicine,* Vol. 324, No. 12, pp. 815–821.

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