

ORIGINAL ARTICLE

AUSTRALIAN DISASTER TRIAGE: A COLOUR MAZE IN THE TOWER OF BABEL

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Background: The objective of this study was to review the systems of disaster triage used by Australian State and Territory ambulance services and compare their triage taxonomy, methodology and documentation with the Australian Council on Health Care Standard's (ACHCS) National Triage Scale, which is used in all Australian hospital emergency departments.

Methods: A postal survey of the State and Territory ambulance services during October 1996 was conducted. Details of the mass casualty incident (MCI) triage systems were then compared with the ACHCS National Triage Scale. Colours specified or used on a triage tag were checked for compliance with Standards Australia AS-2700 1996 Colour Standards for General Purposes. Participants consisted of those State and Territory ambulance services which would be the initial emergency medical service responders in the event of an MCI in an Australian capital city, and the ACHCS. The main outcome measure was the homology between the respective triage taxonomies, methodologies and documentation systems.

Results: All eight State and Territory ambulance services used a numerical and colour coded system to indicate triage priority during an MCI. There were five different triage tag designs for triage documentation, six different triage taxonomies and five different triage methodologies with minimal homology between the different triage systems and the National Triage Scale used in hospitals. Only two ambulance triage systems specifically triaged emotional disturbance. Several triage tags and their patient attachments were made from perishable materials and are thus likely to fail under field conditions.

Conclusion: The multiplicity of triage systems used within Australia will result in avoidable confusion, thus hindering the medical response to an MCI, especially for incidents near State or Territory borders. There is little evidence to support the continued use of triage tags. Australia needs to develop a uniform system of patient triage as a national priority.

Key words: disaster planning, disaster triage, emergency department triage, emergency medical services, mass casualty incident.

INTRODUCTION

Patient triage is the cornerstone in the medical management of a mass casualty incident (MCI). By assigning treatment priorities to physical and psychiatric casualties, an otherwise unmanageable medical situation can be systematically broken down into manageable components.¹ Avoidable problems have arisen at past MCI when responding personnel from differing ambulance services attempted to use different triage systems at the same incident,²⁻⁴ or when the triaging system used by the ambulance service differed from that used within the receiving hospital.^{2,5} A review of Australian MCI triaging systems was undertaken to examine their susceptibility to these difficulties in the light of past experience.

METHODS

All State and Territory ambulance services were asked by postal survey to supply details of their MCI triage plans along with any planned revisions under consideration during October 1996. Follow-up telephone calls, letters and faxes were sent over the next 9 months until replies were received from all eight ambulance services which would be the initial emergency medical service responders to an MCI within an Australian capital city. The information requested included details of the triage taxonomy,

methodology and documentation. If the documentation of patient triage status was by way of a triage tag, samples of the triage tag were requested.

These systems were then compared with each other and with the Australian Council on Health Care Standard's (ACHCS) National Triage Scale for homology. When a coloured triage tag was used, or colours specified, they were checked for compliance with Standards Australia AS-2700 1996 Colour Standards for General Purposes.

RESULTS

Triage taxonomy and methodology

All State and Territory ambulance services were found to use a numerical and colour coded system to indicate triage priority (Table 1). There was minimal commonality between the triage taxonomy used by the various State and Territory ambulance services and that of the ACHCS, which is used within hospital emergency departments as a basis of assessment of quality-of-care.

The triage methodology also varied between States. Formal algorithms were used in all States and Territories except South Australia, Western Australia and the Australian Capital Territory. In those States using algorithms no two systems were identical.

The NSW Ambulance Service uses the Triage Sieve and Sort methodology.² In the Triage Sieve, patients who can walk are classed as priority three. Patients who fail to breathe spontaneously with simple airway manoeuvres are classified as dead. Patients with respiratory rates less than 10 or greater than 29 are priority one as are all patients with a capillary refill time of greater than 2 s or with a heart rate greater than 120 b.p.m. All other

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Table 1. Triage systems used within Australia ranked according to allocated numerical priority codes and grouped where they share identical triage tags

Priority	ACHCS	VIC and WA	NSW	ACT	SA and NT	QLD	TAS*
Priority Category Colour	One Resuscitation Red	Top N/A Red	First Life threatening Red	First Life threatening Red	First N/A Red	One Immediate Red	One N/A Red
Priority Category Colour	Two Emergency Orange	Second N/A Yellow	Second Serious injury Orange	Second Serious injuries Orange	Second N/A Yellow	Two Delayed Yellow	Two N/A Blue
Priority Category Colour	Three Urgent Green	Walking wounded N/A Green	Walking Walking wounded Green	Third Not survivable Blue	Third N/A Blue	Three Minor Green	Three N/A Yellow
Priority Category Colour	Four Semi-urgent Blue	N/A N/A N/A	N/A N/A N/A	Fourth Minor Green	Fourth N/A Green	N/A N/A N/A	Four N/A Green
Priority Category Colour	Five Non-urgent White	N/A Dead [‡] Black	N/A Dead White [†]	N/A Deceased White [†]	N/A Deceased White [†]	Zero Deceased Black	Zero Deceased Black

*Draft issue no. 4

†Tag with black border

‡In Victoria this group includes those individuals deemed to have non-survivable injuries. ACHCS, Australian Council on Health Care Standards; N/A, not applicable as there is no corresponding classification or code; N/S, not specified within the nomenclature.

patients are priority two. There is no assessment of the level of consciousness made in the initial 'Sieve' triage.

Triage Sort is a secondary triage based on the Triage Revised Trauma Score (TRTS), which is the sum of three score values ranging from zero to four coded to each of the three parameters of respiratory rate, systolic blood pressure and Glasgow coma scale. Those casualties with a TRTS equal to 12 are triaged as priority three, those with a TRTS equal to 11 are triaged as priority two, other casualties with TRTS between one and 10 are triaged as priority one, while those with a TRTS equal to 0 are triaged as dead.²

The Queensland Ambulance Service (QAS) uses the Simple Triage and Rapid Treatment (START).⁶ This START methodology currently uses the ability to obey commands as the neurological discriminator, the presence of a radial pulse for cardiovascular assessment, and a respiratory rate greater than 30 breaths per minute as the respiratory assessment. The QAS assesses circulatory status based upon both capillary refill and the presence of a radial pulse. The QAS neurological assessment triages as priority one patients who are 'unconscious' or who have an unspecified 'altered level of consciousness'. Patients who fail to breathe after simple airway manoeuvres are classed as being dead.

The draft algorithm for the Tasmanian Ambulance Service triages patients who can walk and talk without difficulty as priority four; all other casualties are triaged as priority two unless they have difficulty breathing, cyanosis, peripheral shutdown, Glasgow Coma Score < 14 or a not otherwise specified altered level of consciousness. These patients are triaged as priority one unless they have overwhelming terminal injuries, in which case they are triaged as priority three. Pulseless, apnoeic patients are triaged as priority zero.

The Metropolitan Ambulance Service (Victoria) nominates 22 individual conditions along with a 22 item 'Time Critical Guidelines Criteria' based on vital signs, pattern of injury, and mechanism of injury. Vital signs used are a nine point respiratory status assessment, a four point perfusion status assessment

incorporating a capillary refill time, a Glasgow Coma Score and the Triage Revised Trauma Score. Apnoeic patients are triaged as priority one and CPR is instituted on pulseless patients.

The Northern Territory St John Ambulance Service nominates 23 individual conditions in order to divide patients into four triage priorities, including an expectant category. Apnoeic patients are triaged in priority one. The ambulance services of Western Australia, South Australia and the Australian Capital Territory do not have any triage guidelines and rely on the clinical assessment of the individual ambulance officers.

Only the Northern Territory St John Ambulance Service and the Metropolitan Ambulance Service (Victoria) specifically triaged emotional disturbances.

Triage documentation

All State and Territory ambulance services documented triage priority by attaching a triage tag to the patient. The same triage tag was used by Victoria and Western Australia, another triage tag was in common use among South Australia, Northern Territory and the Australian Capital Territory, while Queensland, New South Wales and the draft tag for Tasmania were unique to those states (Table 1). In addition, there were wide variations in the actual colours used on different triage tags even when systems nominate the same colour for a particular triage designation. Only the Queensland tag used colours matching Homebush red, yellow and green in Standards Australia AS-2700 1996 Colour Standards for General Purposes. No system nominated colours specified in the standard.

DISCUSSION

Triage taxonomy

Patient triage is a dynamic process involving repeated reassessment of the patient along the evacuation chain and through the receiving hospital until the patient has received definitive treatment. The use

of simple triage decision schemes can facilitate MCI triage and reduce the stress of performing triage in a difficult environment, while providing a basis for objective audits of the medical response to an MCI.^{7,8} The separate ambulance and hospital triage taxonomies represent a failure to acknowledge that triage is a continuous process.

The multiplicity of state ambulance triage taxonomies severely hinders mutual aid arrangements across State and Territory borders. Approximately 3.31 million Australians live within 100 km of a State or Territory border where ambulance units crossing the border in response to an MCI will potentially result in two completely different triage systems being used at the site of the MCI. In addition, 88 370 Australians live within 100 km of the junction of three State borders where none of the state ambulance services uses the same triage system.*

In the 1997 Thredbo landslide, ambulance officers from three different ambulance services were on site as part of the relief effort at the Thredbo ski village. In addition, the Australian Capital Territory ambulance service deployed units in New South Wales to back up NSW Ambulance Service units sent to the Thredbo village from surrounding areas. This highlights the need to develop a national system of patient triage in order to facilitate cross-border mutual aid arrangements.

The Metropolitan Ambulance Service's (Victoria) use of specific diagnoses to define a triage category ignores the primary function of triage, which is to assign a priority but not to diagnose a patient. Detailed clinical evaluation of an individual casualty slows down the overall survey of all patients and delays locating the seriously injured for priority medical care.

Field determination of capillary refill is significantly impaired in low-light conditions⁹ and decreased ambient temperature.^{10,11} It also fails to detect mild to moderate hypovolaemia.¹² Consequently, capillary refill was abandoned when the Trauma Score was revised in 1989.¹³ Despite this, capillary refill was used to assess cardiovascular status in Victoria, Queensland and New South Wales at the time of the study.

The NSW Ambulance Service uses The Revised Trauma Score, which examines three parameters: respiratory rate, systolic blood pressure, and Glasgow Coma Scale. By assigning a code value of 0–4 to each parameter, the Triage Revised Trauma Score can then be calculated. Trauma score has not been validated as a determinant of the severity of medical illness or toxic exposure. There are difficulties

in performing indirect blood pressure measurements in a hostile environment or when a sphygmomanometer is not available.¹⁴ The Triage Revised Trauma Score failed to improve triage sensitivity during the Gulf War¹⁵ and significantly under-triaged civilian gunshot victims from a multiple shooting incident.¹⁶

The failure to follow commands is a simple prehospital test in trauma patients which identifies those patients with an increased risk of death.¹⁷ New South Wales does not include any assessment of level of consciousness in the initial triage assessment.

Triage tags

The use of disaster triage tags is controversial.^{1,18,19} There has been only one report where triage tags were considered useful in the field.¹⁶ Some authors consider triage tags might be useful^{20,21} within hospitals but practical experience from MCI has indicated otherwise.^{22,23} Numerous problems have arisen at past incidents using triage tags under field conditions (Table 2).

Only the Tasmanian draft triage tag was made from materials which were completely weatherproof. All States except Queensland and New South Wales used plastic wallets to protect triage tags from the weather. In the patient requiring frequent observations or whose condition is changing, these tags are likely to perish during inclement weather. Queensland Ambulance Service uses the only commercially produced tag, the METTAG, but has a supplementary sheet to record improvements in the patient's condition as the tag design only permits patient deteriorations to be acknowledged.

New South Wales and the Australian Capital Territory use simple elastic bands to attach a tag to the patient. Other states use simple cloth or twine ties. Insecure tag attachments may result in tags being lost or interfered with by the patient. Dislodged triage tags have the potential to become a hazard to rotary wing aircraft.

The triage classification may represent the only medical communication available to a family member with an injured relative at the site of an MCI. The information must be clear, simple and unambiguous.³⁶ Only three States, Victoria, Western Australia and New South Wales, describe the dead as 'dead'; other states use the euphemism 'deceased'. New South Wales, Victoria and Western Australia do not have a separate designation for those individuals to be classed as non-survivable. In Victoria they are labelled with the 'dead' tag.

Dead and dying patients should be kept at the site until all salvageable patients have been stabilized and transported.³⁷ Current Australian guidelines for assessing patients as being non-survivable

*1996 Census of Population and Housing. Australian Bureau of Statistics.

Table 2. Difficulties with triage tags

Design problems

- Triage tag design not able to reflect changes in patient's condition³
- Insecure patient attachment resulting in tags becoming dislodged^{20,24}
- Triage tags not being big enough to record patient information²⁰
- Tags disintegrating following exposure to body fluids or inclement weather^{3,20}
- Tags being removed or tampered with by patients in order to access medical care faster^{20,25}

Operational problems

- Tags not being available at the incident site when required^{26–28}
- Tags not being available in sufficient quantities when required²⁹
- Tags not being useful for incidents in close proximity to a hospital³⁰
- Tags becoming obscured by changes in patient posture²⁰
- Patients being tagged with multiple conflicting tags³¹
- Tags interfering with medical procedures²⁰
- Tagging patients with minor injuries being an inappropriate use of time, which could be better spent caring for injured^{19,32,33}
- Tags representing a major departure from standard operating procedures so they are not used or completed illegibly^{4,19,20,23,34,35}

during an MCI include major burns where the age is > 60 years and body surface area is > 50%.³⁸ These individuals along with those from highly toxic hazardous materials exposures can be potentially conscious and even ambulant at the time of evaluation.

Separately identifying dying patients ensures that they receive appropriate medical care at the site and provides on-site religious personnel with a focus for the direction of pastoral care. Patients triaged as being 'non-salvageable' may survive for days before they die.²⁰ The failure to clearly label the dying as a distinct group will cause confusion among non-medical emergency service personnel and will potentially cast doubt on the credibility of the medical assessment, especially if conscious ambulating individuals are labelled as 'dead'.

Victoria, Western Australia and New South Wales use the term 'walking wounded' to describe patients with a non-urgent triage priority. While the ability to walk is useful as a screening measure for patients thought to have a minor illness, it is a physical state and not an expression of treatment urgency, especially following hazardous material incidents.

The term 'walking wounded' prevents the integration of any disaster triage scheme with a hospital triage system and should be avoided. It ignores the neuropsychiatric casualties of an incident who may not be physically 'wounded' but who need support at the site and the offer of follow-up care where appropriate after the incident. Neuropsychiatric casualties represent a large component of the casualty load following terrorist bombings.³⁹⁻⁴¹ Individuals who have been involved but not physically injured during an MCI are at risk of developing significant morbidity following an MCI.⁴²⁻⁴⁴ Children are at particular risk of developing behavioural disturbances following traumatic events.⁴²

CONCLUSION

Experience from other countries has shown that using multiple patient triage systems generates avoidable confusion that can compromise the medical response to an MCI. Current Australian MCI triage arrangements present a significant hazard to casualties, especially from incidents near State and Territory borders. Thus, a universal system of MCI triage taxonomy and methodology should be developed as a national priority. There is little evidence to support the continued use of triage tags as a means of documenting triage status during an MCI.

ACKNOWLEDGEMENT

The authors would like to acknowledge the assistance of Ms Anne Newton in the formulation of the manuscript.

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