# Australian disaster triage: a colour maze in the Tower of Babel

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## 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 (Vayer *et al* 1986). Avoidable problems have arisen at past MCIs when responding personnel from differing ambulance services attempted to use different triage systems at the same incident (Hodgetts et al 1995, Barton et al 1991, Rooney *et al* 1989), or when the triaging system used by the ambulance service differed from that used within the receiving hospital (Hodgetts *et al* 1995; Morris *et al* 1986). 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 nine months until replies were received from all eight ambulance services who 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 the ACHCS Standards 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 Color Standards For General Purposes.

## Results

### Triage taxonomy and methodology

All State and Territory ambulance services were found to use a numerical & color coded system to indicate triage priority *(table 1)*. There was minimal commonality between the triage taxonomy used by the various State & 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 except South Australia, Western Australia & Australian Capital Territory. In those States using algorithms no two systems were identical.

The NSW Ambulance Service uses the Triage Sieve & Sort methodology (Hodgetts 1995). In the Triage Sieve, patients who can walk are classed as priority 3. Patients who fail to breathe spontaneously with simple airway maneuvers are classified as dead. Patients with respiratory rates less than 10 or greater than 29 are priority 1 as are all patients with a capillary refill time of greater than 2 seconds or with a heart rate greater than 120 beats per minute. All other patients are priority 2. 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 = 12 are triaged as priority 3, those with a TRTS = 11 are triaged as priority 2, other casualties with TRTS between 1 and 10 are triaged as priority 1, while those with a TRTS = 0 are triaged as dead (Hodgetts *et al* 1995).

Queensland Ambulance Service (QAS) uses the Simple Triage and Rapid Treatment (START) (Benson *et al* 1996). START methodology currently uses the ability to obey command as the neurological discriminator, the presence 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 1 patients who are 'unconscious' or have an unspecified 'altered level of consciousness'. Patients who fail to breathe after simple airway maneuvers are classed as being dead.

The draft algorithm for the Tasmanian Ambulance Service triages patients who can walk & talk without difficulty as priority 4, all other casualties are triaged as priority 2 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 1 unless they have overwhelming terminal injuries in which case they are triaged as priority 3. Pulseless, apnoeic patients are triaged as priority 0.

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 9 point respiratory status assessment, a 4 point perfusion status assessment incorporating a capillary refill time, a Glasgow Coma Score & the Triage Revised Trauma Score. Apnoeic patients are triaged as priority 1 and CPR is instituted on pulseless patients.

The Northern Territory St John Ambulance Service nominates 23 individual conditions to divide patients into 4 triage priorities including an expectant category. Apnoeic patients are triaged in priority 1. The ambulance services of Western Australia, South Australia & the Australian Capital Territory do not have any triage guidelines and rely on an individual ambulance officer's clinical assessment.

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

## Victoria and Western Australia


The triage tag used by Victoria and Western Australia is intended to be folded so that only the appropriate colour and category shows on one side, with space for recording on the other. The back of this multi-fold tag is blank.

## South Australia, Northern Territory & ACT


The triage tag used by South Australia, Northern Territory and ACT is double sided, and is intended to be folded so that only the appropriate colour and category shows on one side, with the recording space visible on the other.

## Queensland


The triage tag used by Queensland is also double sided. The triage designations showing at the bottom can be torn off.

## New South Wales


New South Wales has four separate tags. Ist and 2nd Priority, and Walking are double-sided. The 'Dead' tag is blank on the back.

## Tasmania


The draft Tasmanian tags consist of five separate tags. The front only is shown here as the back is almost identical.

*Figure 1:* Triage tags in use in Australia.

| Priority | ACHCS | VIC. & WA | NSW | ACT | SA & NT | QLD. | *TAS |
|---|---|---|---|---|---|---|---|
| **Priority** | One | Top | First | First | First | One | One |
| Category | Resuscitation | N/A | Life threatening | Life threatening | N/A | Immediate | N/A |
| Color | Red | Red | Red | Red | Red | Red | Red |
| **Priority** | Two | Second | Second | Second | Second | Two | Two |
| Category | Emergency | N/A | Serious Injury | Serious injuries | N/A | Delayed | N/A |
| Color | Orange | Yellow | Orange | Orange | Yellow | Yellow | Blue |
| **Priority** | Three | Walking Wounded | Walking | Third | Third | Three | Three |
| Category | Urgent | N/A | Walking Wounded | Not survivable | N/A | Minor | N/A |
| Color | Green | Green | Green | Blue | Blue | Green | Yellow |
| **Priority** | Four | N/A | N/A | Fourth | Fourth | N/A | Four |
| Category | Semi-urgent | N/A | N/A | Minor | N/A | N/A | N/A |
| Color | Blue | N/A | N/A | Green | Green | N/A | Green |
| **Priority** | Five | N/A | N/A | N/A | N/A | Zero | Zero |
| Category | Non-Urgent | **Dead | Dead | Deceased | Deceased | Deceased | Deceased |
| Color | White | Black | ***White | ***White | ***White | Black | Black |

*TAS draft issue No. 4
**White tag with black border
***Dead - in Victoria this group includes those individuals deemed to have non-survivable injuries

Abbreviations:
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

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

### Triage documentation

All State and Territory ambulance services documented triage priority by attaching a triage tag to the patient *(figure 1)*. The same triage tag was used by Victoria & Western Australia, another triage tag was in common use by South Australia, Northern Territory & 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 colors used on different triage tags even when systems nominate the same color for a particular triage designation. Only the Queensland tag used colours matching Homebush red, yellow and green in Standards Australia AS-2700 1996 Color 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 (Xenakis *et al* 1985; Ryan 1984), while providing a basis for objective audits of the medical response to an MCI. The separate ambulance and hospital triage taxonomies represents a failure to acknowledge 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 use the same triage system.[1]

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 ACT ambulance service deployed units in NSW to backup NSW Ambulance Service units sent to the Thredbo village from surrounding areas. This highlights the need to develop a National system of patient triage to facilitate cross border mutual aid arrangements.

The Metropolitan Ambulance Service (Victoria) use of specific diagnoses to define a triage category ignores the primary function of triage which is to assign a priority, not 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 conditions (Brown *et al* 1994), decreased ambient temperature (Gorelick 1993; Schriger *et al* 1988) and fails to detect mild to moderate hypovolaemia (Schriger 1991). Consequently, capillary refill was abandoned when the Trauma Score was

Note

1. 1996 Census of Population and Housing. Australian Bureau of Statistics.

revised in 1989 (Champion *et al* 1989). Despite this, capillary refill was used to assess cardiovascular status in Victoria, Queensland & NSW 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 (Prasad *et al* 1994) or when a sphygmomanometer is not available. The Triage Revised Trauma Score failed to improve triage sensitivity during the Gulf War (Burkle *et al* 1994), and significantly under triaged civilian gun shot victims from a multiple shooting incident (Beyersdorf *et al* 1996).

The failure to follow commands is a simple prehospital test in trauma patients which identifies those patients with an increased risk of death (Meredtith *et al* 1995). NSW does not include any assessment of level of consciousness in the initial triage assessment.

## Triage tags

The use of disaster triage tags is controversial (Vayer *et al* 1986; Rutherford 1989; Kennedy *et al* 1996). There has been only one report where triage tags were considered useful in the field (Beyersdorf *et al* 1996). Some authors consider triage tags might be useful (Coupland *et al* 1992; Mackway-Jones *et al* 1989) within hospitals but practical experience from MCIs have indicated otherwise (Klein *et al* 1991, Rutherford 1973). 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 that were completely weather proof. 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 have a supplementary sheet to record improvements in the patients condition as the tag design only permits patient deterioration's to be acknowledged.

NSW and ACT 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 & unambiguous (Ptacek *et al* 1996). Only three states Victoria, Western Australia & New South Wales describe the dead as 'dead' while others states use the euphemism of 'deceased'. New South Wales, Victoria & Western Australia do not have a separate designation for those individuals to classed as non-survivable. In Victoria they are labeled with the dead tag.

Dead and dying patients should be kept at the site until all salvageable patients have been stabilized and transported (Fryberg *et al* 1988). Current Australian guidelines (Emergency Management Australia 1995) for assessing patients as being non-survivable during an MCI include major burns where age >60 years & body surface area >50%. These individuals along with those from highly toxic hazardous materials exposures can be potentially conscious & even ambulant at the time of evaluation.

Separately identifying dying patients ensures they receive appropriate medical care at the site and provides a focus for any on site religious personnel from which to direct pastoral care. Patients triaged as being 'non-salvageable' may survive for days before they die (Coupland *et al* 1992). The failure to clearly label the dying as a distinct group will cause confusion amongst non medical emergency service personnel and will potentially cast doubt on the credibility of the medical assessment especially if conscious ambulating individuals are labeled as 'dead'.

Victoria, Western Australia & New South Wales use the term 'walking wounded' to describe patients with a non-urgent triage priority. While the ability to walk is a 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 need support at the site and the offer of follow-up care where appropriate after the

### Design Problems

- Triage tag design not able to reflect changes in patient's condition (Barton et al 1991)
- Insecure patient attachment resulting in tags becoming dislodged (Coupland et al 1992; DeMars et al 1980).
- Triage tags not being big enough to record patient information (Coupland et al 1992).
- Tags disintegrating following exposure to body fluids or inclement weather (Barton et al 1991; Coupland et al 1992).
- Tags being removed, or tampered with by patients to access medical care faster (Coupland et al 1992; Mitchell et al 1986).

### Operational Problems

- Tags not being available at the incident site when required (Hodgetts et al 1993, Nicholas et al 1998; Orr et al 1983).
- Tags not being available in sufficient quantities when required (Ricci et al 1991).
- Tags not being useful for incidents in close proximity to a hospital (Ebbs et al 1992).
- Tags becoming obscured by changes in patient posture (Coupland et al 1992).
- Patients being tagged with multiple conflicting tags (Gerace 1979).
- Tags interfering with medical procedures (Coupland et al 1992).
- Tagging patients with minor injuries being an inappropriate use of time, which could be better spent caring for the injured (Kennedy et at 1996; Waeckerle 1991; Doyle 1990).
- Tags represent a major departure from standard operating procedures so they are not used or are completed illegibly (Rooney et al 1989; Kennedy et al 1996; Coupland et al 1992; Klein et al 1991; Miller 1980; Stevens et al 1990).

*Table 2:* difficulties with triage tags

incident. Neuropsychiatric causalities represent a large component of the casualty load following terrorist bombings (Carely *et al*1996; Hadden *et al* 1978; Pyper *et al* 1982). Individuals who have been involved but not physically injured during a MCI are at risk of developing significant morbidity following an MCI (Burckle 1996; Lindeman 1948; Krug *et al* 1998). Children are at particular risk of developing behavioral disturbance following traumatic events (Burckle 1996).

## Conclusion

Experience from overseas 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, and 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 a mass casualty incident.

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