Triage: a position statement

Lieutenant Colonel Timothy J. Hodgetts
OSJS MB BS FRCP FRCSEd FFAEM FRGS FIMCRCSEd DipMedEd RAMC

Defence Consultant Adviser in Emergency Medicine, UK Defence Medical Services;
Professor, Emergency Medicine and Trauma, University of Surrey

tim.hodgetts@virgin.net

Background

1. The European Union Core Group on Disaster Medicine commissioned this position statement in May 2001. The author is recognised internationally for the development of a multidisciplinary disaster medicine training programme, and has published extensively on major incident management. The principal sources for this position statement are:


Definitions

2. A major incident in health service terms is any incident where the number, severity or type of live casualties, or by its location, requires extraordinary resources.

3. Triage, in the context of a major incident, is the sorting of casualties into priorities for treatment or transport.

Aim

4. This position statement will review triage within the context of a major incident and make recommendations for current standards of best practice.

Scope

5. The following will be examined:
   ▪ The history of triage.
   ▪ Where triage is carried out.
   ▪ Triage categories.
   ▪ The development of anatomical and physiological triage tools, and their limitations.
   ▪ Triage labelling systems.

History

On the evening of this day (9 May, 1915) I also witnessed the hideous spectacle of a large casualty clearing station in the height of battle. More than 1000 men suffering from every form of horrible injury…were being sorted according to their miseries…
6. It has been said that the only thing to gain from war is the advancement of surgery.[2] It is also true for the advancement of triage. Perhaps the greatest step was taken by Baron Dominque Jean Larrey (1766-1842), who was Surgeon-in-Chief of Napoleon's Grand Army in the Russian Campaign. In 1792 Larrey introduced the ‘flying ambulance’, providing first aid himself at the wounded soldier’s side, before transport to safety and surgery. Although the term ‘triage’ was not used, he famously ignored rank and insisted on treating casualties, including any captured enemy, in order of severity.[3]

“In Who is that bold fellow?” asked the Duke of Wellington.

“It’s Larrey,” someone answered.

“Tell them not to fire in that direction; at least let us give the brave man time to gather up the wounded.” And so saying he doffed his hat.

In: Richardson R. Larrey: Surgeon to Napoleon’s Imperial Guard.[3]

7. The development of triage systems in the twentieth century has followed experience in a series of military conflicts, and civilian disasters. Following the Falklands War in 1982, Ryan highlighted the need for dynamic triage from point of wounding to field hospital surgical care, and noted the effectiveness of non-medical officers (actually dental officers) in being able to perform triage.[4]

8. Historically, the standard of preparation of hospital staff deployed to the scene of major incidents has been shown to be poor in the UK,[5-7] and likely reflects preparedness in other countries. For doctors and nurses attending the scene, it is often their first and only experience of a major incident.[8] Training, including the process of triage, is therefore essential.

**Where is triage carried out?**

9. Triage is a dynamic process. It must be repeated at every link of the casualty evacuation chain. The initial assessment may not adequately represent an evolving injury process, and clinical deterioration during evacuation will require an increase in triage priority. Equally, casualties may respond to treatment given pre-hospital allowing a reduction in the priority for evacuation. Triage is therefore a ‘snap-shot’ of the patient’s condition at the time of examination. If there is a temptation to raise the priority on the basis of potential deterioration rather than actual deterioration then the evacuation chain may be overwhelmed with a disproportionate number of high priority casualties. The exception is that some conditions result in predictable deterioration, when this apparent ‘over-triage’ is appropriate (for example, burns of the upper airway will predictably lead to airway obstruction, even if the patient is talking when examined).

10. Triage can be considered to function at three levels:
- Local
- National
- International

11. **Local triage** occurs at the incident site and throughout the evacuation chain to surrounding receiving hospitals. It has been divided into primary triage (the ‘first look’) and secondary triage (the repeated observations).[9]
12. Some national resources will be limited, even in developed countries, requiring distribution of casualties at a *national* level. Examples are the limited national burns and intensive care resources.
On 11 May 1985 a fire at Bradford City football stadium resulted in 55 deaths and 200 injuries, predominantly from burns. In this instance specialist national resources were re-deployed to the receiving hospitals local to the incident. 10% of the country’s trained plastic surgeons were used to cope with this incident.[10]

13. International triage has been demonstrated where bordering European countries offer assistance to their neighbours, and in recent military operations other than war in the Balkans when injured soldiers may be rapidly re-patriated.

On 13 May 2000 an explosion at a firework factory in Enschede, Netherlands, resulted in over 20 deaths and 562 injuries. Firefighters and ambulances from Germany were involved in the pre-hospital response, with some patients being transported to Germany for treatment.[11]

Triage hierarchies and categories

14. There are four principal triage hierarchies (Table 1). Many triage labels mix together the traditional military hierarchies with the civilian descriptive and colour-coded systems, so a broad understanding is required. The ‘T’ (‘Treatment’) system is used within NATO, although the British Army still also teach the ‘P’ (‘Priority’) system. The colour-codes cited are common international standards, but are not entirely standard. The colour orange, for example, can be found to denote ‘immediate’ or ‘urgent’ on some labels. There is substantial variation in how the ‘expectant’ category is represented (examples include a blue label; endorsing a label ‘expectant’ by hand; and folding back the corners of a green label to reveal red beneath[12]). For simplicity, the ‘T’ system alone will be used in this text.

<table>
<thead>
<tr>
<th>Military hierarchies</th>
<th>Civilian hierarchies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment (T)</td>
<td>Priority (P)</td>
</tr>
<tr>
<td>T1</td>
<td>P1</td>
</tr>
<tr>
<td>T2</td>
<td>P2</td>
</tr>
<tr>
<td>T3</td>
<td>P3</td>
</tr>
<tr>
<td>T4</td>
<td>P1 Hold</td>
</tr>
<tr>
<td>Dead</td>
<td>Dead</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Descriptive</td>
<td>Colour-code</td>
</tr>
<tr>
<td>Immediate</td>
<td>Red</td>
</tr>
<tr>
<td>Urgent</td>
<td>Yellow</td>
</tr>
<tr>
<td>Delayed / Minor</td>
<td>Green</td>
</tr>
<tr>
<td>Expectant</td>
<td>Blue*</td>
</tr>
<tr>
<td>Dead</td>
<td>Dead</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Triage Hierarchies

*blue is not used exclusively to denote this category

15. **T1**. These are patients who are likely to die within minutes to the first hour without intervention. Causes of such a predictable early death would include airway obstruction, life-threatening chest injury (for example, tension pneumothorax) and exsanguinating haemorrhage.

16. **T2**. These are patients who may die or suffer serious morbidity without treatment in the first few hours.

17. **T3**. These are patients whose outcome is likely to be unaffected by a delay in treatment of several hours.

18. Assigning triage categories based on clinical diagnoses is inherently subjective, and superimposing arbitrary time lines for evacuation and definitive treatment further clouds the issue. In simple terms, **T1** patients CANNOT WAIT; **T2** patients CAN WAIT; and **T3** patients MUST WAIT. An objective approach to this imprecise science is discussed in Triage systems.
19. **T4.** This is a reversal of normal treatment priorities, and is best explained by means of an example:

A 4-year-old child has been hit by a car and has sustained head injuries. At the scene the child is unresponsive, breathing at 4 per minute, and has a weak and rapid carotid pulse. A large head wound with compound skull fracture is apparent. The right pupil is dilated.

20. In an advanced trauma system this child will attract considerable treatment resources. But the child will die. In a multiple casualty situation the aim is to ‘do the most for the most’. If resources are diverted to this unsalvageable patient, others who could have been saved may also die. This presupposes that there will be inadequate resources for all patients—a so called ‘uncompensated’ major incident. Such an incident is unlikely in a developed country following a man-made major incident (for example, a rail-crash or terrorist bomb), but is predictable following a natural incident (for example, an earthquake) or in a military setting when medical resources cannot move forward for tactical reasons. The use of the T4 category may be also be temporary, and revoked when adequate resources become available.

21. **DEAD.** It is common practice in UK for victims of trauma with no vital signs to be transported to hospital with CPR in progress. The outcome for victims of blunt trauma with no vital signs at scene approaches 0%. The outcome for penetrating trauma is marginally better if an emergency thoracotomy is performed within 5 minutes of loss of vital signs. In a major incident all that is achieved by transporting patients with no vital signs is a change in the geographical site of death. CPR is not therefore recommended. The only exception to this rule may be the non-trauma patient who has a witnessed cardiac arrest while being attended by medical personnel: initial attempts at defibrillation are then appropriate.

22. Any individual who is trained to follow a triage algorithm can ‘diagnose’ death, and can record this with a triage label. It is usual for death to be formally ‘pronounced’ at scene by a doctor (often in the presence of a police officer). ‘Certification’ of death (the issue of a death certificate) in this context will usually only follow pathological examination to determine the exact cause of death.

**Triage systems**

23. Triage systems can be divided into anatomical, physiological, and mixed. Anatomical triage is the traditional process of assigning a priority based on the injuries that can be seen. This has a number of limitations (Box 1).

- A patient must be undressed for injuries to be seen, which is impractical pre-hospital.
- Internal injuries may not be reliably detected by clinical examination alone.
- Decisions based on observed injuries are poorly reproducible between individuals of different experience.

**Box 1:** The limitations of anatomical triage

24. Physiological systems, on the other hand, are simple to teach and practice, do not require the patient to be undressed, and are reproducible between individuals of different clinical experience (and even a non-clinical background). There are two widely taught models: the *Triage Sieve* and the *START* system (Simple Triage and Rapid Treatment).
25. The *Triage Sieve* has broad acceptability through the international Major Incident Medical Management and Support (MIMMS) course for doctors, nurses and ambulance officers.[9,18] The system is also taught to all soldiers in the British Army (Figure 1).[16,19] and to police[20] and firefighters.[21] The *Triage Sieve* involves an assessment of mobility, followed by an assessment of ‘ABC’ (airway, breathing and circulation). The simple algorithm is illustrated in Figure 2. Pulse is shown as the discriminator for circulation. An alternative is to use capillary return as it takes half the time (7 seconds compared to 15 seconds) which may be important in the rapid assessment of multiple casualties—however, capillary return is unreliable in the cold[22] or the dark, even with street lighting[23], and was removed from the *Trauma Score* adult field triage system in 1989 because of this unreliability.[24,25]

26. The *START* system (Figure 3)[13,26] has similarities with the *Triage Sieve* and begins with a mobility assessment, but has the following limitations:

i. The START system does not identify any patients in the T2 (‘urgent’) category.

ii. The START system uses the term ‘dead or dying’, which may produce confusion when applying a triage label: should the casualty be labelled DEAD or T4 (‘expectant’), remembering that the T4 category is not routinely invoked?

iii. A lower limit of respiratory rate is not included as a discriminator.

iv. The absence of a radial pulse, rather than the pulse rate, is used to determine those with an immediate circulation problem. This reflects the dogma of the established advanced trauma life support course which teaches that if the radial pulse is palpable the systolic blood pressure is more than 80mmHg.[27,28] In an observational study of intensive care patients with invasive arterial blood pressure monitoring these guidelines have been found to overestimate the systolic blood pressure present, and the use of radial pulse alone may be considered a poorly sensitive discriminator of circulatory failure.[29]

v. The inclusion of the instruction to control haemorrhage compromises the role of the triage officer. While it makes sense for the triage officer to instruct a bystander to press on a point of external haemorrhage before moving on to triage the next patient, delay to provide treatment himself will prevent the continuing process of rapid triage.

27. The *Triage Sieve* and *START* system are suitable for rapid primary triage of adult patients. The requirement for an independent triage tool for children is discussed later in this paper. Where more time and more resources are available a more refined system may be used. An accepted approach is the *Triage Sort*,[9] which is derived from the *Triage Revised Trauma Score (TRTS)*.[25]

28. The *TRTS* has three components—respiratory rate, Glasgow Coma Scale and systolic blood pressure. Each parameter is scored from 0 to 4, then added together to give a maximum of 12 (physiologically normal) and a minimum of 0 (dead). A fall of one point in any parameter is associated with 3.1% risk of dying[25] and demands an increase in the triage priority to T2; a fall in two points is roughly equivalent to a 10% probability of death and demands a T1 priority. The triage priorities that relate to the TRTS are therefore:

<table>
<thead>
<tr>
<th>TRTS</th>
<th>Triage priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>T1</td>
</tr>
<tr>
<td>13</td>
<td>T2</td>
</tr>
<tr>
<td>1-10</td>
<td>T3</td>
</tr>
<tr>
<td>0</td>
<td>Dead</td>
</tr>
</tbody>
</table>

*The MIMMS course has been established in UK since 1994, and Australia since 1995; it has been accepted as a training standard in Sweden and Netherlands, and the course manual is also translated into Japanese.*
29. The Triage Sort can be further refined by an assessment of the anatomical injury. This is appropriate if there is a sufficiently experienced clinician performing triage, and overcomes the relatively low sensitivity of TRTS (0.49) compared to its high specificity (0.92).[Champion 1989] Specifically, the priority determined on physiology may be upgraded if the anatomy of injury suggests earlier treatment is required.[18] For example, a patient with a distal traumatic amputation who has received effective first aid and fluid resuscitation may be physiologically within normal limits, yet requires 'urgent' evacuation for surgical treatment.

Decisions for transport vs decisions for treatment

30. Priorities for treatment at the scene may not parallel priorities for evacuation. There may be limited scope to treat certain medical conditions at the scene, for example myocardial infarction, yet there is much that can be done at hospital: priority for evacuation is therefore high.

31. Evacuation from the scene may not follow strict priority order.[9] T1 patients may not be adequately 'packaged' for transport when it becomes available. Lower priority patients may utilise the transport in this case, unless the transport cannot easily be replaced.

Special circumstances

A. Children

32. Most major incidents involve a proportion of children and some major incidents predominantly involve children.[30-41] The effective triage of children has been criticised.[35] If an adult physiological triage system is used, 'over-triage' will result (where an inappropriately high category is assigned). Anxiety coupled with inexperience of the normal physiological values in children may also result in over-triage. Paediatric treatment resources at hospital are often limited. It is therefore critical that triage of children at the scene is objective, to ensure children are transported in appropriate order from the scene and that hospital resources are not diverted from genuine T1 casualties. The Paediatric Triage Tape is an evidence-based system that allows objective triage of children from 1 to 10 years old (Figure 4).[42,43] The waterproof tape utilises the principle that age is directly proportional to length and weight, and the tape is divided into a series of 'triage sieves' with adjusted physiological values. A lower limit of pulse rate is given to reflect the importance of bradycardia in children following hypovolaemia[44], and capillary refill is only used to screen out normality (if it is abnormal a pulse must be taken).

B. Mass casualties

33. The term 'mass casualties', or 'MASCAL', is used by NATO to indicate the situation when treatment resources are overwhelmed. This situation may also occur in a civilian major incident, particularly following a natural phenomenon, and has been classified as an 'uncompensated' major incident.[9] There is no difference in the principles of triage in this situation other than invoking the T4 ('expectant') category. Unnecessary confusion has been introduced, for example, by recommending in UK military doctrine that the 'P' system is used in compensated major incidents and the 'T' system is used in MASCAL.

34. Schulz et al have recommended as part of an earthquake disaster response model that only victims with a 50% or more probability of survival should receive treatment in a MASCAL situation.[45] The closest approximation is those with a TRTS of 6 or more should receive treatment (TRTS 6 has a probability of survival of 63%), and those with a TRTS of 1-5 should be labelled T4
('expectant'). A TRTS of 1-3 has been suggested to identify the T4 category within the Major Incident Medical Management and Support training programme.[9]

35. The ‘secondary assessment of victim endpoint’ (SAVE) system of secondary triage has been devised for the same reason.[46] It is stated to have particular application in incidents where delay in transport to definitive care may be several days, and specifically where transport within the hypothetical “golden hour” is impossible.[47] The SAVE categories are given in Box 2.
Casualties who will die regardless of treatment
Casualties who will survive regardless of treatment
Casualties who will benefit from treatment in field conditions

Box 2: Secondary assessment of victim endpoint (SAVE) categories

C. Incidents involving hazardous chemicals

36. Chemical incidents are often more complex than conventional major incidents.[48] Secondary contamination of health workers and emergency service personnel is common.[49,50]

On 20 March 1995 the *Aum Shinrikyo* cult released the nerve agent sarin on the Tokyo subway. 5500 people sought medical attention, out of whom 1000 had effects of organophosphate poisoning. Appropriate personal protection and decontamination was not available at the hospitals. Staff at hospital were contaminated and became secondary casualties.[51]

37. The need for decontamination is the first 'triage' decision. By way of example, patients arriving at hospital may have been through a decontamination process at the scene or may have self-evacuated, in which case they may be contaminated. Additionally, patients extraneous to the incident will still be brought to the hospital and will require to be prioritised alongside the major incident casualties—but they will not be contaminated. The second triage decision is based on the need for treatment during decontamination, recognising that only simple procedures can reliably be performed when the carer is wearing chemical protective clothing (Table 2).

<table>
<thead>
<tr>
<th>Triage category</th>
<th>Patient group</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Resuscitation required during decontamination in a stretcher facility</td>
</tr>
<tr>
<td>T2</td>
<td>Treatment may be delayed until after decontamination in a stretcher facility</td>
</tr>
<tr>
<td>T3</td>
<td>May walk unaided through an ambulant decontamination facility</td>
</tr>
</tbody>
</table>

Table 2: Triage priorities for decontamination

38. Triage by the conventional methods already described will be appropriate after decontamination. Chemical injury will compound conventional injury, and the triage priority should be adjusted to accommodate this.

D. Incidents involving radiation

39. A triage system with up to five sub-categories has been proposed following exposure to radiation,[52] but has been challenged as impractical.[53] The triage decision for decontamination is the same as in a chemical incident (Table 2). Radiation injury will compound conventional injury, and the triage priority following decontamination should be adjusted accordingly. When the dose of radiation is known (because the casualty was wearing a dosimeter at the time of exposure) the adjustment to the conventional triage priority can be made from Table 3.[54]
Table 3: Changes in trauma triage priorities after exposure to a known dose of radiation

<table>
<thead>
<tr>
<th>Triage priority</th>
<th>Triage priorities with trauma and radiation (whole body dose in Gy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;1.5</td>
</tr>
<tr>
<td>T1</td>
<td>T1</td>
</tr>
<tr>
<td>T2</td>
<td>T2</td>
</tr>
<tr>
<td>T3</td>
<td>T3</td>
</tr>
</tbody>
</table>

**Triage labelling**

40. There are over 120 triage label systems in use internationally.[55] This is at best unnecessary and confusing, and at worst dangerous. The characteristics of the ideal triage label are shown in Box 3.

- Simple to use
- Priority easily changed (is “dynamic”)  
- Robust and weatherproof
- Easy to apply to patient
- Priority highly visible
- Adequate space for clinical details
- Supports triage methodologies in use (acts as aide memoire)
- Inexpensive

Box 3: The characteristics of the ideal triage label

41. One of the commonest triage labels in use world-wide, the *Mettag* label, substantially fails to meet these ideals. Most importantly, the *Mettag* label is dynamic in one direction only (only a worsening of condition can be shown). The best solution is offered by the folding triage labels, which are truly dynamic. Two such labels are commercially available in the UK: the Cambridge Cruciform Casualty Card,[12,56] and the SMART label (Figure 5). The SMART label has been introduced as the UK Defence Medical Services standard label in 2000. Both of these folding label systems incorporate prompt cards for the *Triage Sieve*, and a table to assist the calculation of the TRTS to use with the *Triage Sort*.

42. Irrespective of the label chosen, triage labels should be carried by the ambulance service to be available immediately at the site.[57]

**Conclusions**

43. The development of triage systems has largely followed experience in armed conflicts (paras 6,7).

44. Triage is a dynamic process that must be repeated at each link of the evacuation chain (para 9).

45. Triage can be considered on three levels—local, national, and international (para 10).

46. The military and civilian triage hierarchies are often used together: a broad understanding of all is required (paras 14-18).
47. The T4 category will rarely be invoked in a man-made major incident in Europe, and should not be considered one of the routine triage categories (paras 19,20).

48. CPR is generally inappropriate at the scene of a major incident: patients with no vital signs should be triaged as DEAD (para 21).

49. Anatomical triage is poorly reproducible (para 23).

50. Physiological triage is simple, safe, rapid and reproducible (para 24).

51. The Triage Sieve has advantages over START as a system of physiological triage (paras 25,26).

52. The Triage Sort allows a refinement of the Triage Sieve when there is more time and more resources (paras 27-29).

53. Priorities for evacuation from the scene may be different from those for treatment at the scene (paras 30,31).

54. Adult physiological systems cannot be used in children without modification. The Paediatric Triage Tape is an evidence-based approach to physiological triage of children (para 32).

55. TRTS can be used to identify the T4 patients in a “mass casualty” situation (para 34).

56. In incidents involving chemicals or radiation the first triage decision relates to decontamination (paras 37,39).

57. Triage labels need to be dynamic, visible, with adequate space for clinical details, and should support the Triage Sieve and the Triage Sort (para 41).

Recommendations

58. Triage is an essential component of effective major incident management. Health service personnel must be trained in this process.

59. The Triage Sieve is the most robust and widely accepted methodology for primary triage and should be encouraged as an international standard.

60. The Triage Sort refines the Triage Sieve and is recommended as an international standard for secondary triage.

61. In situations where there are overwhelming casualties and delayed evacuation from the scene the SAVE methodology is recommended as an additional triage tool.

62. The Paediatric Triage Tape is the only objective tool for the triage of children and is recommended as an international standard.

63. Broad standardisation of triage labels is desirable taking account of the ideal characteristics. Where multiple agencies that may perform triage are predicted to work together at the scene standardisation of labels is essential.
References


27. Collicott PE. *Advanced trauma life support course for physicians*. Chicago 1985, American College of Surgeons.


