The Cape Triage Score – a triage system for South Africa

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The Cape Triage Score (CTS) has been derived by the Cape Triage Group (CTG) for use in emergency units throughout South Africa. It can also be used in the pre-hospital setting, although it is not designed for mass casualty situations. The CTS comprises a physiologically based scoring system and a list of discriminators, designed to triage patients into one of five priority groups for medical attention. Three versions have been developed, for adults, children and infants. As part of the ongoing assessment process the CTG would value feedback from the readers of this *Journal*.

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The need to prioritise the care of South African patients in both the pre-hospital and emergency unit (EU) setting is obvious. Such prioritisation is termed triage – the process of sorting patients according to medical need. As there is no nationally accepted triage system in South Africa, the need to design and implement such a system was identified.

Many international triage systems exist, but none of these systems are appropriate for use in South Africa. In-hospital triage systems include the Manchester Triage,[1] the Canadian Triage Assessment Scale (CTAS)[2] and the Australian Triage Score (ATS).[3] Implementation of each of these triage tools requires extensive training, making their widespread adoption in South Africa problematic. Furthermore, the time taken to triage each patient exceeds requirements for the South African setting, where patient numbers are greater and the pathology often more advanced. Pre-hospital triage tools are common to many different countries; however, they lack the sensitivity and specificity to make them safe for emergency unit use. Furthermore, some are validated only for trauma triage,[3-6] while others are too detailed to be of roadside use.[1-3] Accurate pre-hospital triage is essential for appropriate utilisation of resources, accurate notification of receiving hospitals, quality management and audit of the ambulance service. This is particularly pertinent when requesting aero-medical support.

Absence of a triage system leads to prolonged waiting times, poor management of clinical risk and increased morbidity and mortality. In order to maximise the efficient use of resources and to minimise risk to the patient, an effective triage system with high sensitivity and specificity is required. Without objective clinical parameters, variations in patient assessment are inevitable. The terms 'stable' and 'unstable' fail to reflect the patient's clinical condition accurately.

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The Cape Triage Group (CTG) was convened in April 2004 by the Joint Emergency Medicine Division, Universities of Cape Town and Stellenbosch, in order to design a triage system suitable for local use. The CTG is multidisciplinary and comprises doctors, nurses and paramedics representing the state and private sectors. The CTG set goals that included defining vital sign parameters, while ensuring that the triage system remained user-friendly in order to enable rapid and accurate sorting of emergency patients.

Current triage systems in South Africa

In-hospital (i.e. EU/trauma unit) triage is practised by a minority of units, although this is inconsistent as no national triage system is in place. The pre-hospital use of triage in South Africa varies from region to region, with patients categorised into one of four priorities (represented by colours and/or numbers). Although triage is taught to ambulance personnel, it is not practised consistently. The systems taught at South African ambulance training colleges are presented in Table I.

Development of the triage tool

The CTG has designed an effective triage tool intended for utilisation in both the pre-hospital and EU settings. Considering practical issues such as labels for patients, stickers for folders and colour zones in EUs, it was decided that a colour-based system would be implemented. The colour categories are as follows: (*i*) red – immediate priority (resuscitation cases); (*ii*) orange – very urgent priority (potentially life/limb-threatening pathology); (*iii*) yellow – urgent priority (significant pathology); (*iv*) green – delayed priority (minor injuries/illness); and (*v*) blue – dead.

The orange category reduces the number of patients in the potentially large yellow category while limiting the red category to resuscitation cases. For the sake of simplicity, the orange category will not be used in the pre-hospital setting.

The CTS derivation process has been through both expert opinion and in-hospital prospective studies. Three versions have been developed, based on a prospective study of the CTS on 22 500 patients in a public hospital setting, and 2 000 patients in private hospitals. The adult version is intended for

Table I. Triage systems currently taught at South African ambulance training colleges

College	Red (P1)	Yellow (P2)	Green (P3)	Blue (dead)
Cape Technikon, Cape Town	Primary survey compromised	Maintaining own primary survey. Injury/illness requires treatment within 60 minutes	Injury/illness that should not compromise the primary survey within 60 minutes	The obviously dead
Wits Technikon, Gauteng	Primary survey compromised	Maintaining own primary survey. Injury/illness requires treatment within 60 minutes	Injury/illness that should not compromise the primary survey within 60 minutes	The obviously dead
Durban Institute of Technology, KZN	Life-threatening emergencies	Non-life-threatening emergencies requiring hospital treatment	Minor injury/illness Walking wounded	The obviously dead
Lebone Ambulance College (Pretoria)	Treatable life-threatening injuries/illness	Serious non-life-threatening injuries	Minor, easily managed injury/illness that may not require ambulance transportation	The obviously dead
Natal Ambulance College, KZN	Life-threatening emergencies	Seriously injured patients	Moderate injuries	The obviously dead
Emergency Medical Services College, Cape Town	Primary survey is compromised or there is an injury that will lead to permanent disability	Maintaining own primary survey. Injury/illness requires treatment within 60 minutes	Injury/illness that will not compromise primary survey within 60 minutes	Mortal injury

those over 12 years of age or 150 cm in height, the child version has been developed for those 95 - 150 cm or 3 - 12 years old, and the infant version for those under 95 cm or less than 3 years of age. The pre-hospital use of the CTS will be studied prospectively in 2006.

A two-tiered approach to triaging is utilised, using both a physiological scoring system and a series of discriminators.

The physiological scoring system

Physiological assessment was chosen as a major component of the system as it is a core element of triage.[7,8] The Medical Early Warning Score (MEWS) utilises systolic blood pressure, heart rate, temperature, respiratory rate and AVPU (a measure of level of consciousness, viz. **A**lert/**V**erbal/**P**ain/**U**nresponsive) as parameters. MEWS has been used to successfully identify physiological deterioration of medical inpatients,[9] where MEWS scores of 5 or more were associated with increased risk of death, ICU and high dependency unit admission. The MEWS score identifies patients who need medical intervention.

The UK-based Intensive Care Outreach Services (ICORS) found that summarising abnormal physiology into the MEWS was a particularly useful tool in identifying medical patients in need of ICU admission.[10] Using the MEWS as a referral tool reduced ICU admissions and length of hospitalisation.[11]

However, the MEWS has limitations with regard to triage in that it is medically biased. Trauma patients (who were often previously healthy and therefore have greater physiological reserve) may have severe injuries and yet have a low MEWS if they have unchanged physiology. The addition of both a mobility parameter and a trauma factor increases the severity score for trauma patients, as well as for medical patients who are physiologically normal but have time-critical conditions, e.g. ischaemic stroke. These parameters have therefore been added to the MEWS score by the CTG in order to improve its triage capabilities, and the resulting system has been renamed the Triage Early Warning Score (TEWS). Fig. 1 shows the adult version of the TEWS; similar scores have been developed by the CTG for children and infants.

ADULT TRIAGE SCORE								
	3	2	1	0	1	2	3	
Mobility				Walking	With help	Stretcher/ immobile		Mobility
RR		Less than 9		9 - 14	15 - 20	21 - 29	More than 29	RR
HR		Less than 41	41 - 50	51 - 100	101 - 110	111 - 129	More than 129	HR
SBP	Less than 71	71 - 80	81 - 100	101 - 199		More than 199		SBP
Temp.		Less than 35		35 - 38.4		38.5 or more		Temp.
AVPU				**A**lert	Reacts to **V**oice	Reacts to **P**ain	**U**nresponsive	AVPU
Trauma				No	Yes			Trauma
Over 12 years/taller than 150 cm								

*Fig. 1. Triage Early Warning Score (TEWS) (RR = respiratory rate, HR = heart rate, SBP = systolic blood pressure, AVPU = **A**lert, **V**erbal, **P**ain, **U**nconscious).*

TEWS has the following advantages: (*i*) it enables early, accurate assessment of the emergency patient; (*ii*) it translates measurable parameters into a number; (*iii*) minimal equipment is required (a blood pressure cuff and a low-reading thermometer); (*iv*) it encompasses both trauma and medical emergencies; (*v*) it facilitates uniform assessment, as well as communication between medical staff enabling appropriate patient disposition; and (*vi*) it is user-friendly in both the pre-hospital and EU settings.

Discriminators

Triage systems use discriminators as a core component of the decision-making process.[1-3] Once again, the CTS comprises an adult, child and infant version with slightly different discriminators. The CTG has used the following discriminators.

Mechanism of injury

Mechanism of injury has been limited to high energy transfer. Mechanism of injury scores have been shown to be highly sensitive at identifying patients with severe trauma; however, they have also been shown to have high rates of overtriage[12] (the tool incorrectly identifies minor injury or illness as being more serious).

Presentation

This includes symptoms such as chest pain and abdominal pain; it also includes 'eyeball diagnoses' such as seizures and dislocations, which are clear at triage.

Pain

As with many triage scores,[1-3] pain is regarded as an important indicator of priority. It is recorded as severe, moderate, or mild.

Senior health care professional's discretion

Experienced health care professionals can improve the triage process by adding their opinion to other parameters.[13] In the CTG protocol, a senior health care professional may alter the triage coding, either up- or downgrading the triage status.

Application of the triage system

The TEWS score is calculated by first measuring the physiological parameters. The discriminators are then assessed, and a triage colour category is allocated. Patients are triaged as follows:

1. Vital signs – measure, and score each against the TEWS scoring sheet, to produce a total TEWS. This score corresponds

<table>
<tr><th>Colour</th><th>Red</th><th>Orange</th><th>Yellow</th><th>Green</th><th>Blue</th></tr>
<tr><td>TEWS</td><td>7 or more</td><td>5 - 6</td><td>3 - 4</td><td>0 - 2</td><td>Dead</td></tr>
<tr><td>Target time to treat</td><td>Immediate</td><td>Less than 10 min</td><td>Less than 60 min</td><td>Less than 240 min</td><td rowspan="20">Dead</td></tr>
<tr><td>Mechanism of injury</td><td></td><td>High energy transfer</td><td></td><td></td></tr>
<tr><td rowspan="18">Presentation</td><td rowspan="4"></td><td>Shortness of breath – acute</td><td rowspan="3"></td><td rowspan="18">All other patients</td></tr>
<tr><td>Coughing blood</td></tr>
<tr><td>Chest pain</td></tr>
<tr><td>Haemorrhage – uncontrolled</td><td>Haemorrhage – controlled</td></tr>
<tr><td>Seizure – current</td><td>Seizure – post ictal</td><td rowspan="5"></td></tr>
<tr><td rowspan="5"></td><td>Focal neurology – acute</td></tr>
<tr><td>Level of consciousness reduced</td></tr>
<tr><td>Psychosis/aggression</td></tr>
<tr><td>Threatened limb</td></tr>
<tr><td>Dislocation – other joint</td><td>Dislocation – finger or toe</td></tr>
<tr><td>Fracture – compound</td><td>Fracture – closed</td></tr>
<tr><td rowspan="4">Burn – face/ inhalation</td><td>Burn over 20%</td><td rowspan="4">Burn – other</td></tr>
<tr><td>Burn – electrical</td></tr>
<tr><td>Burn – circumferential</td></tr>
<tr><td>Burn – chemical</td></tr>
<tr><td></td><td>Poisoning/overdose</td><td>Abdominal pain</td></tr>
<tr><td>Hypoglycaemia - glucose less than 3</td><td>Diabetic – glucose over 11 & ketonuria</td><td>Diabetic – glucose over 17 (no ketonuria)</td></tr>
<tr><td rowspan="3"></td><td>Vomiting – fresh blood</td><td>Vomiting – persistent</td></tr>
<tr><td rowspan="2">Pregnancy and abdominal trauma or pain</td><td>Pregnancy and trauma</td></tr>
<tr><td>Pregnancy and PV bleed</td></tr>
<tr><td>Pain</td><td></td><td>Severe</td><td>Moderate</td><td>Mild</td></tr>
<tr><td></td><td colspan="4">Senior health care professional's discretion</td></tr>
</table>

Fig. 2. The CTG discriminator list (adult version).

with a triage category (0 - 2 green, 3 - 4 yellow, 5 - 6 orange, > 6 red).

2. Mechanism of injury – determine if relevant.

3. Presentation – consider any relevant symptoms or eyeball diagnoses.

4. Pain – consider the patient's pain.

5. Senior health care professional's discretion – consider.

The triage category is selected from a five-colour coding sheet (Fig. 2).

If the discriminators (mechanism of injury, presentation, pain) categorise a patient in a higher triage category than the TEWS score, then this higher category is regarded as the correct category. The discriminators are used as a safety net for patients who have normal vital signs, but potentially significant pathology.

This triage system is not intended for mass casualty situations. It is standard practice throughout much of the world to use a simpler triage system for mass casualty situations and a more complex system for 'everyday' use. Mass casualty systems must be easy to learn and to use, fast to implement, and accurate.[14] Examples of mass casualty systems include the Triage Sieve[14] (used throughout the UK, Netherlands, Sweden, parts of India and Australia, and NATO military organisations), Careflight[15] (Australia) and START[16] (USA). Many ambulance services in the UK triage using the Triage Revised Trauma Score[4] on a day-to-day basis, but revert to the Triage Sieve in the event of a mass casualty situation.

Conclusion

There is an obvious need for a triage system in South Africa. This article details such a system that fulfils local requirements. The CTS has three versions, for adults, children and infants, and has been derived as part of three Masters in Philosophy (MPhil) in Emergency Medicine dissertations and one doctorate (PhD) degree. They have been tested extensively in both the state and private EU settings in Cape Town. A pre-hospital validation will begin shortly.

The system was implemented in the Western Cape on 1 January 2006. A training programme was developed by the CTG and ran through November and December 2005.

Maximum benefit to all will be achieved if a triage system is accepted and implemented nationally; we wish to launch a national triage working group, with the aim of eventually having a South African Triage System. As part of the ongoing assessment of the CTS, and the development of the national system, we would value the input of our peers. We therefore invite readers' comments.

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