

## PERSPECTIVE

# The World Health Organization trauma checklist *versus* Trauma Team Time-out: A perspective

Mark FITZGERALD <sup>1,2</sup> Stephanie REILLY,<sup>1,2</sup> De Villiers SMIT,<sup>2,3</sup> Yesul KIM,<sup>2</sup> Joseph MATHEW,<sup>1,2,3</sup> Ellaine BOO,<sup>2</sup> Abdulrahman ALQAHTANI,<sup>4</sup> Sharfuddin CHOWDHURY,<sup>4</sup> Ahamed DAREZ,<sup>5</sup> JMA Bruno MASCARENHAS <sup>5</sup> Francis O'KEEFFE,<sup>2,6</sup> Michael NOONAN,<sup>1,2,3</sup> Chris NICKSON,<sup>7</sup> Marc MARQUEZ,<sup>3</sup> Wang An LI,<sup>8</sup> Yan Ling ZHANG,<sup>8</sup> Kim WILLIAMS<sup>1,2</sup> and Biswadev MITRA <sup>2,3,9</sup>

<sup>1</sup>Trauma Services, The Alfred Hospital, Melbourne, Victoria, Australia, <sup>2</sup>National Trauma Research Institute, Monash University, Melbourne, Victoria, Australia, <sup>3</sup>Emergency and Trauma Centre, The Alfred Hospital, Melbourne, Victoria, Australia, <sup>4</sup>Trauma Service, King Saud Medical City, Ministry of Health, Riyadh, Kingdom of Saudi Arabia, <sup>5</sup>Tamil Nadu Accident and Emergency Initiative, Government of Tamil Nadu, Chennai, India, <sup>6</sup>Emergency Services, The Mater Misericordiae University Hospital, Dublin, Ireland, <sup>7</sup>Intensive Care, The Alfred Hospital, Melbourne, Victoria, Australia, <sup>8</sup>Trauma Service, Huizhou First Hospital, Guangdong, China, and <sup>9</sup>Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

## Abstract

Time-out protocols have reportedly improved team dynamics and patients' safety in various clinical settings – particularly in the operating room. In 2016, the World Health Organization (WHO) introduced a Trauma Care checklist, which outlines steps to follow immediately after the primary and secondary surveys and prior to the team leaving the patient. The WHO Trauma Care checklist's main perceived benefit is the prompting of clinicians to complete trauma admissions as per evidence-based guidelines. The WHO Trauma Care checklist, while likely to be successful in reducing errors of

omission related to hospital admission, may be limited in its ability to reduce errors that occur in the initial 30 min of trauma reception – when most of the life-saving decisions are made. To address this limitation a Trauma Team Time-out protocol is proposed for initial trauma resuscitation, targeting the critical first 30 min of hospital reception.

**Key words:** *checklist, medical error, resuscitation, time-out, trauma, trauma team.*

## Introduction

Trauma resuscitation is fast-paced and challenging, involving numerous

handoffs, personnel and consultations. Under such pressure, team members are required to make time critical, life-saving decisions. It has been prospectively demonstrated that in the first 30 min of reception and resuscitation of severely injured patients by experienced trauma teams, a critical decision linked to a life-saving intervention is made every 72 s.<sup>1</sup> During hospital trauma resuscitation, good team communication and presence of clear leadership has been linked to expeditious care and improved patient outcomes.<sup>2</sup>

Adverse events in hospitals are common, reported to occur in approximately one in 10 patients.<sup>3</sup> Most commonly these adverse outcomes are operation or drug related, usually caused by communication breakdown between healthcare professionals.<sup>3–5</sup> In the hectic stages of trauma resuscitation, errors are common. Even in mature, advanced trauma centres, error-free resuscitations remain uncommon.<sup>1</sup>

Trauma resuscitation is unlike most other clinical situations – with a large multi-disciplinary team consisting of a variety of combinations of medical, nursing, paramedical and technical staff performing multiple procedures and evaluations simultaneously.

Standardised reception and resuscitation of the severely injured has been associated with improved decision making, coordinated care and a reduction in mortality and morbidity.<sup>1,6,7</sup> Programmes that originally

Correspondence: Professor Mark Fitzgerald, Trauma Services, The Alfred, 55 Commercial Road, Melbourne, VIC 3004, Australia. Email: m.fitzgerald@alfred.org.au

Mark Fitzgerald, MBBS, MD, Trauma Director; Stephanie Reilly, BBMedSci, MD, Trauma Doctor; De Villiers Smit, MBCh, FACEM, Emergency Director; Yesul Kim, BA, GradDipPsych, PhD, Research Coordinator; Joseph Mathew, MBBS, MS, Emergency and Trauma Physician; Ellaine Boo, BN, BASc, GradDipCritCare (ED), Trauma and Critical Care Nurse; Abdulrahman Alqahtani, MBBS, MS, Emergency Director; Sharfuddin Chowdhury, MBBS, MMed, FCS (SA), Trauma Director; Ahamed Darez, MBBS, Director; JMA Bruno Mascarenhas, MBBS, MCh, Neurosurgeon; Francis O'Keeffe, MBCh, BAO, Emergency and Trauma Physician; Michael Noonan, MBChB (Hons), BPhy (Hons), GradCertMedEd, FACEM, Emergency and Trauma Physician; Chris Nickson, BSc (Hons), BHB, MBChB, MCLinEpid (ClinTox), DipPaeds, DTM&H, GCertClinSim, Intensivist; Marc Marquez, RN, MN (Emerg), Trauma and Critical Care Nurse; Wang An Li, MMed, Emergency and Trauma Physician; Yan Ling Zhang, MMed, Trauma Director; Kim Williams, Trauma Manager; Biswadev Mitra, MBBS, MHSM, PhD, Research Director.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

Accepted 8 April 2019

**TABLE 1.** *World Health Organization trauma care checklist*

Immediately after primary and secondary surveys				
Is further airway intervention needed?	Yes, done	No		
May be needed if:				
GCS 8 or below				
Hypoxaemia or hypercarbia				
Face, neck, chest or any severe trauma				
Is there a tension pneumo-haemothorax?	Yes, chest drain placed	No		
Is the pulse oximeter placed and functioning?	Yes	NA		
Large-bore IV placed and fluids started?	Yes	Not indicated	Not available	
Full survey for (and control of) external bleeding, including:	Scalp	Perineum	Back	
Assessed for pelvic fracture by:	Exam	X-ray	CT	
Assessed for internal bleeding by:	Exam	Ultrasound	CT	Diagnostic peritoneal lavage
Is spinal immobilisation needed?	Yes, done	Not indicated		
Neurovascular status of all four limbs checked?	Yes			
Is the patient hypothermic?	Yes, warming	No		
Does the patient need (if no contraindication)	Urinary catheter	NG tube	Chest drain	None indicated
Before team leaves the patient				
Has the patient been given?	Tetanus vaccine	Analgesics	Antibiotics	None indicated
Have all tests and imaging been reviewed?	Yes	No, follow-up plan in place		
Which serial examinations are needed?	Neurological	Vascular	Abdominal	None
Relevant trauma chart or form completed	Yes	Not available		

addressed the trauma knowledge of individual clinicians are now increasingly focused on trauma team coordination and communication. Although these programmes have resulted in early and more effective delivery in trauma care, protocol-driven techniques are further warranted as trauma scenarios can substantially differ from other clinical or training settings.

In 2016, the World Health Organization (WHO) published a general Trauma Care checklist, which recommends steps to follow immediately after primary and secondary surveys and then again prior to the team leaving the patient (Table 1). It has been suggested that the WHO trauma checklist is associated with improved patient care during initial resuscitation, helps with the understanding of the function of the team, clarifies team roles, and improves the understanding of the patient presentation and pre-hospital evaluation. All contribute to

improved patient outcomes. The WHO trauma checklist's main perceived benefit is the prompting of clinicians to complete the trauma admission as per evidence-based guidelines. Furthermore, trials highlight that implementations of protocols can prevent medical errors by reinforcing existing trauma management procedures and may be a valuable tool for continued training and maintenance.<sup>1</sup>

The general WHO trauma checklist, while likely to be successful in reducing errors of omission related to hospital admission, may be limited in its ability to reduce errors associated with the initial reception and resuscitation of the severely injured. Fixation errors, poor leadership, multi-tasking and communication breakdowns are known to contribute to poor outcomes in trauma resuscitation and are most likely to occur in the initial 30 min of trauma reception, when most of the life-saving decisions are made.<sup>1</sup>

Importantly, this period of primary and secondary survey is not addressed by the WHO trauma checklist.

These key 30 min of hospital trauma reception and resuscitation provide an opportune time frame to initiate quality improvement strategies such as an enhanced time-out. During this critical window, the addition of a Trauma Team Time-out protocol that focusses on primary and secondary survey care related to trauma reception and resuscitation may address the gap in the WHO checklist. Previously mentioned variables such as leadership and timely life-saving interventions, as well as team member compliance, may then be addressed.

## Discussion

A Trauma Team Time-out protocol may add to such initiatives and reduce variability by providing

reproducible communication methods to ensure task completion. The aim of a Trauma Team Time-out protocol is to improve communication, promote team goals and create standardised care pathways – thus reducing adverse events and improving patient outcomes.<sup>8</sup>

Use of protocol-driven timeouts and checklists are well-established tools for improving team dynamics and patient outcomes – especially in critical situations where even obvious diagnostic and/or treatment tasks may be overlooked. Their effectiveness has been demonstrated with the Surgical Safety Checklist and Time-out protocol, established by the WHO and The Joint Commission on accreditation of healthcare organisations.<sup>9</sup> This checklist follows the patient through the procedure, with specific safety checkpoints prior to anaesthesia, prior to skin incision, and prior to the patient leaving the operating room. A prospective trial of the checklist demonstrated improvements in surgical outcomes, with reduced postoperative complications and reduced surgical mortality.

Since its inception, this surgical checklist has become the standard of care in operating rooms.<sup>10</sup> A key strength of the checklist is at the pre-precision time point, where it is thought to reduce the potential for wrong site surgery, wrong procedure and near misses.<sup>4</sup> Although difficult to establish a causal relationship between Time-out protocols and improvement in morbidity and mortality, checklists improve teamwork, staff retention, promote early reporting of issues or concerns and reduce complications.<sup>4,5</sup> Written checklists improve compliance with evidence-based perioperative medicine. Staff surveys have demonstrated that most staff believe surgical safety checklists improve communication and promote a shared safety responsibility within healthcare teams.

Reasons for poor compliance and utilisation of Time-out protocols in other clinical settings have been recently explored. Staff surveys of the surgical Time-out protocol have suggested that common barriers

include a lack of identified leadership, individual resistance to the checklist, checklist fatigue, a lack of collaboration in the development of the protocol and insufficient staff training prior to implementation.<sup>4,5</sup> Other examples include difficulty integrating the checklist into the conventional workflows and higher frustration experienced by the team with the perception of an increased workload. However, previous studies indicate that workload-related frustration may decrease with leadership, clear communication, training and repeated use.<sup>5,8</sup>

The proposed Trauma Team Time-out checkpoints could be considered mandatory, starting pre-

arrival and continuing to a debriefing session (Table 2).

Prior to patient arrival, team members are assigned roles, one as a team leader and others as primary roles according to ‘ABCDE’ steps. The appointment of a team leader in this scenario is important – and key to overall team performance and patient outcomes. It is critical for roles to be clarified prior to patient arrival for optimal team performance. Team members should wear identification that represents their primary assigned roles, which should be easily recognisable as well as comprehensible. This has been achieved in a variety of ways, including adhesive labels, colour coded caps or labelled tabards.

**TABLE 2.** *Trauma Team Time-out*

1. Who?	
Team introduction	<ul style="list-style-type: none"> <li>• Notification of serious inbound patient</li> <li>• Trauma team assemble prior to patient arrival</li> <li>• Team leader assigned to brief the team: specify (i) What is currently known, (ii) Plan A (expected injuries and Rx), (iii) Plan B (triggers for when to deviate from Plan A and likely causes), (iv) Role allocation (according to Plan A); ensure PPE; set up</li> </ul>
↓	
2. Why?	
Patient arrival and handover	<ul style="list-style-type: none"> <li>• Team leader to clarify MIST</li> <li>• Outline LSI (already delivered and those planned)</li> <li>• Arrival situation report: summarise primary survey, chest X-ray and extended FAST findings</li> </ul>
↓	
3. What?	
5 min MIST situation report	<ul style="list-style-type: none"> <li>• Mechanism and principle injuries repeated</li> <li>• Team leader indicates abnormal vital signs (incl. GCS)</li> <li>• Team leader prioritises LSI (incl. haemorrhage control, airway patency, ventilator support, IV access assignment)</li> <li>• Team leader notifies consultants, specialist services, surgical staff and blood bank as required</li> </ul>
↓	
4. Where?	
20 min summary and disposition decision	<ul style="list-style-type: none"> <li>• Team leader to summarise progress and disposition decision (incl. diagnosis and treatments)</li> </ul>
↓	
5. Phew!	
Team debrief	<ul style="list-style-type: none"> <li>• Team leader should ensure an immediate debrief with the team where members will provide feedback</li> </ul>

FAST, focused assessment with ultrasound for trauma; GCS, Glasgow Coma Scale; LSI, lifesaving interventions; MIST, mechanism, injury, signs and pre-hospital treatment; PPE, personal protective equipment.

Care improves with an understanding of the patient presentation and prehospital evaluation. In addition to pre-arrival preparations, pre-arrival information is important for completing primary survey task completion as well as maintenance of workflow and compliance.

On patient arrival, the Trauma Team Time-out requires allowances for verbalisation of patient details from prehospital responders and recognition of initial actionable outcomes. During resuscitation the time-out requires verification of procedures and addressing other team members throughout the process. Benefits envisioned by implementing debriefings post-trauma resuscitation include the ability to provide immediate feedback and education at bedside to all involved care providers and to utilise the collective knowledge of the assembled trauma team in identifying potential deficiencies for continuing quality improvement.

While trauma management, activation or checklist processes sometimes occurs without prehospital notifications, the proposed Trauma Team Time-out is still applicable.

As with any learned process, incorporating the Trauma Team Time-out into daily clinical routine requires adjustments to ingrained behavioural patterns.<sup>4</sup> For these reasons, initiation and formalisation of a Trauma Team Time-out protocol requires careful consideration and collaboration between trauma team members and appropriate pre-implementation training for all involved. Prospective evaluation of implementation and its associated maturation over time is essential.

## Conclusion

Time-out protocols have been reported to improve team dynamics and patient safety in various clinical settings, particularly in the surgical operating room. They disseminate critical patient information in a

systematic fashion to all team members with varied roles.

A key component of a time-out implementation is to promote clear goals, ensure timely and accurate decisions as well as to assist performance in a highly pressurised setting. The care of a trauma patient is strengthened when a team leader is assigned to an inclusive, informed team. Improved team coordination and communication during the resuscitation of severely injured patients improves patient outcomes. It is expected that the previously established benefits of the time-out protocols in surgical fields (reducing near misses, improving team dynamic and establishing safety goals) will be largely reproducible in the trauma setting.

This five-step Trauma Team Time-out protocol is proposed to fill the 'resuscitation gap' in the WHO trauma checklist – by assisting with team integration, clarifying roles and the sequence of events, unifying decision making – and in so doing reduce adverse events within the critical first 30 min of hospital trauma reception and resuscitation.

## Acknowledgements

The prospective Trauma Team Time-out programme has been funded by the Transport Accident Commission, Victoria, Australia.

## Competing interests

None declared.

## References

1. Fitzgerald M, Cameron P, Mackenzie C *et al.* Trauma resuscitation errors and computer-assisted decision support. *Arch. Surg.* 2011; **146**: 218–25.
2. Hargestam M, Lindkvist M, Jacobsson M, Brulin C, Hultin M. Trauma teams and time to early management during in situ trauma

team training. *BMJ Open* 2016; **6**: e009911.

3. de Vries EN, Ramrattan MA, Smorenburg SM, Gouma DJ, Boermeester MA. The incidence and nature of in-hospital adverse events: a systematic review. *Qual. Saf. Health Care* 2008; **17**: 216–23.
4. Lyons VE, Popejoy LL. Time-out and checklists: a survey of rural and urban operating room personnel. *J. Nurs. Care Qual.* 2017; **32**: E3–E10.
5. Gillespie BM, Chaboyer W, Wallis M, Fenwick C. Why isn't 'time out' being implemented? An exploratory study. *Qual. Saf. Health Care* 2010; **19**: 103–6.
6. Gerardo CJ, Glickman SW, Vaslef SN, Chandra A, Pietrobon R, Cairns CB. The rapid impact on mortality rates of a dedicated care team including trauma and emergency physicians at an academic medical center. *J. Emerg. Med.* 2011; **40**: 586–91.
7. Cornwell EE 3rd, Chang DC, Phillips J, Campbell KA. Enhanced trauma program commitment at a level I trauma center: effect on the process and outcome of care. *Arch. Surg.* 2003; **138**: 838–43.
8. Hicks C, Petrosiak A. The human factor: optimizing trauma team performance in dynamic clinical environments. *Emerg. Med. Clin. North Am.* 2018; **36**: 1–17.
9. World Health Organization. *WHO Guidelines Approved by the Guidelines Review Committee. WHO Guidelines for Safe Surgery 2009: Safe Surgery Saves Lives.* Geneva: World Health Organization, 2009.
10. Backster A, Teo A, Swift M, Polk HC Jr, Harken AH. Transforming the surgical 'time-out' into a comprehensive 'preparatory pause'. *J. Card. Surg.* 2007; **22**: 410–6.