Improving trauma care for critically bleeding patients.

The Health Quality and Safety Commission (Commission) and National Trauma Network (Network) partnered to lead the development of a bundle of care[1] for clinical staff to manage the care of critically haemorrhaging trauma patients. The bundle aims to improve the treatment of traumatic haemorrhage and eliminate avoidable deaths.

This work was led by an expert advisory group, supported by evidence-based practices and designed to be adaptable for local services with varying resource access.

Since the release of the bundle of care (national guidance and massive transfusion protocol), the Commission assisted six hospitals in their uptake for improvements in their local services. These six hospitals were: Hawkes Bay, Nelson, Palmerston North, Tauranga, Timaru, and Whangarei.

The six site visits have demonstrated common strengths and challenges, and highlighted opportunities to improve the care of critically bleeding patients across a range of service provision levels that can be shared wider to other services nationwide.

Pre-hospital activation

The guidance recommends an integrated pathway of patient movement from the site of injury to definitive haemorrhage control in an operating room or radiology suite. All hospitals supported this view and insight from various members of multidisciplinary teams was included when working with the Commission to optimise this pathway within their service. The term 'Code Crimson' is used throughout the guidance to refer to this recommended integrated care pathway.

An early communication link between pre-hospital staff and the emergency department (ED) is paramount to minimise system delays. Pre-hospital Code Crimson activation is not yet embedded into clinical practice, and all services expressed enthusiasm in working with the ambulance sector to formalise this process in future. The early identification of Code Crimson patients, based on an agreed criteria (the assessment of blood consumption (ABC) score), would trigger process steps aimed at reducing delays. This includes early notification to hospital blood banks to initiate the thawing of plasma and other critical products before the patient arrives in the ED and accelerating the release of staff and procedural capacity to allow for the expediated movement of patients to the operating theatre or radiology suite for definitive haemorrhage control.

This may be especially important for smaller centres and after-hours, where specialist staff and availability of operating theatres may be variable. The delays experienced with preparing operating theatres, radiology reporting and coagulopathy tests could be mitigated through early notification and coordinated communications between teams.

Support from senior staff

The importance of cross-service cooperation is emphasised in decision making. The bundle encourages the involvement of senior decision makers early on.

Smaller centres found relationships with senior and specialist staff were well integrated and beneficial in the care for these patients. For instance, consultant surgeons, anaesthetists and senior ED staff are key members of the trauma service and participate in the regular review and improvement of processes in care for this complex patient group. For hospitals that refer a

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significant amount of their major trauma patients to tertiary centres, this early decision making around transport would have a substantial impact.

Senior staff are also key players in challenging ingrained thinking around care of major trauma patients. In many cases, the accepted trauma management priorities are stabilisation in ED and obtaining a rapid whole-body CT scan prior to finalising a treatment plan. This focus must shift towards damage control resuscitation and the rapid transfer of the critically haemorrhaging patient to an area for definitive haemorrhage control without unnecessary delay pending laboratory results or imaging studies. Additionally, changing the culture of reluctance of junior medical staff to contact specialist consultants after-hours was also highlighted as critical to facilitate optimal care and limit decision-making delays. Overseas studies have confirmed bundles involving early senior staff decision making lead to reduced delay to operating room treatment and improved survival. How this is achieved in individual hospitals was a key part of the hospital rollout discussion.

Beyond specialist medical and surgical staff, services also recognised the value of bringing in duty managers, nursing staff and others to identify further opportunities for improvement throughout the system.

Availability and use of blood and other products

Blood product availability varies across New Zealand hospitals, with some staging or first care hospitals holding only emergency supplies of blood products on site compared to designated major trauma centres.

The guidance advocates for a resuscitative strategy that prioritises the early administration of blood products and limits unnecessary crystalloid administration to minimise exsanguination and coagulopathy. This includes a specific Code Crimson Massive Transfusion Protocol (MTP) that promotes early fibrinogen supplementation. All six sites identified the impracticality of developing a separate Code Crimson MTP within their service, and suggested working with their individual blood banks to modify their existing MTP to facilitate targeted fibrinogen support in the case of a critical haemorrhaging trauma patient. Additionally, there is the potential for fibrinogen supplementation to become more accessible for smaller centres with the increasing use of fibrinogen concentrate across New Zealand. Agreement has been achieved with the combined Hospital Transfusion Committee group of a national MTP that fits the requirements of the Code Crimson trauma patient. Standardisation of blood availability is occurring due to this project.

Administration of the antifibrinolytic agent tranexamic acid (TXA) is a treatment priority for the critically bleeding patient, and optimisation of TXA dosage and administration was identified by several sites as an easily achievable change in practice. Ideally 1g TXA is given intravenously in the pre-hospital setting, with consideration of a further 1g if the patient arrives at hospital within three hours of injury with ongoing haemorrhage. This second dose of TXA, as well as modifying the route of administration from infusion to bolus, are based on current available evidence. Minimising hyperfibrinolysis is particularly critical at staging hospitals, which are often limited in their ability to support damage control resuscitation in catastrophic haemorrhage by the supply blood products held on site.

Training staff – include simulation training

Major trauma designated hospitals receive and manage more cases of critical haemorrhage, with more familiarity and opportunity to resource the care pathway.

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All six sites recognised targeted education as complementary training to these real-life events. One example is the Trauma Networkz training, which provides in-situ simulation-based learning for trauma teams. As this continues with the inclusion of critical haemorrhage injuries; DHBs can test improvements and build staffing capability and confidence in low frequency and high stress events. This could include the use of specialist equipment like fluid warmers and rapid infusers.

Beyond training in clinical care, optimising communication with key hospital staff was also recognised as crucial. This could be working with blood banks to reduce wastage, working with ambulance staff to determine early activation strategies, and working with point of care teams on early testing and administration of key agents as needed. An example of this is all critical laboratory results and important coagulation parameters (haemoglobin, platelet count, INR test and fibrinogen).

Going forward

As each service has differing resources, rather than a national audit, suggested performance indicators are provided in the appendix of the guidance. To complement, we have created a resource to be used for local site audit of patient care. An infrastructure audit has also been developed for local systems to consider practical ways to embed the guidance into practice when managing the care of the critically haemorrhaging patient.

Additionally, two checklists have been developed to assist staff running critical haemorrhage simulations in emergency departments. Simulation training is a useful tool for building confidence and capability in staff expected to manage infrequent but high-stress events.

Please note this guidance and local protocols should be reviewed at a minimum every three years.

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