

and could be modified and implemented locally to improve patient flow in the ED (and the rest of the health system).

Keywords: quality improvement and patient safety, positive deviance, complex adaptive systems

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A systematic review and meta-analysis of tourniquet devices for speed of application, successful hemostasis and patient tolerance

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Introduction: Tourniquets are a mainstay of hemorrhage management. However, there is insufficient evidence to guide device selection. This review analyses the literature on tourniquets, for the following outcomes: lower-extremity arterial hemostasis, application speed, and pain. **Methods:** Studies were limited to English. Non-human studies, case series, and intra-operative applications were excluded. A systematic review of MEDLINE, PubMed, Google Scholar, and the Cochrane Database from 1992 to Dec 2017 was performed. Article citations were also assessed. **Results:** Twenty-one studies met criteria, testing 28 tourniquet devices. The most popular devices for arterial hemostasis were the Combat Application Tourniquet (C-A-T) (662 applications), Special Operations Forces Tactical Tourniquet (SOFTT) (307 applications), blood pressure cuff (80 applications), rubber tubing (58 applications) and the Emergency Medical Tourniquet (EMT) (52 applications). The blood pressure cuff achieved the highest (weighted averages) rate of 99% (95% CI 93 to 100) based on four studies of 80 applications. Followed by the EMT which achieved 83% (95% CI 72 to 93), based on three studies of 52 applications ($p < 0.01$). The fastest device to apply, taking 17 seconds (95% CI 11 to 23), was surgical tubing, based on two studies totalling 30 applications. The next fastest was the blood pressure cuff, requiring 20 seconds (95% CI 18 to 22), based on two studies totaling 58 applications (though there was no statistical difference in application time, $p = 0.08$). Tolerance could not be analyzed, due to heterogeneity of outcome measures. **Conclusion:** This is the first meta-analysis of tourniquet outcomes. The literature lacks a standard approach to device application. The quality of evidence is of very low due to the small sample sizes, lack of blinding, selective outcome reporting and result inconsistency. Common medical equipment appear to outperform commercial tourniquets for arterial hemostasis and speed of application; however, they are some of the least studied devices.

Keywords: trauma, tourniquet, hemorrhage control

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Blood on board: the development of a prehospital blood transfusion program in a Canadian helicopter emergency medical service

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Introduction: Prehospital blood transfusion has been adopted by many civilian helicopter emergency medical service (HEMS) agencies and early outcomes are positive. Shock Trauma Air Rescue Service (STARS) operates six bases in Western Canada and in 2013 implemented a prehospital transfusion program. We describe the processes and standard work ensuring safe storage, administration, and stewardship of this precious resource. Our aim was to produce a sustainable and

safe blood storage system that could be carried on each mission flown. **Methods:** Close collaboration with transfusion services and adherence to Canadian Transfusion Standards was key at each step of development. An inexpensive, reusable, temperature controlled thermal packing device was obtained along with an electronic temperature logger. Conditioning of the device and temperature maintenance (1 6C) was tested to ensure safe storage conditions. Online training programs were developed for air medical crew (AMC) as well as transport physicians (TPs) regarding administration indications, safety, and stewardship processes. Blood traceability and usage was monitored on an ongoing basis for quality assurance. **Results:** Two units of O negative packed red blood cells (pRBCs) are now carried on each flight. The blood box is conditioned and prepared by transfusion services for routine exchange every 72 hours. If pRBCs are administered the blood bank is immediately notified for preparation of another cooler. Unused blood is returned to blood bank circulation. **Conclusion:** The introduction of the STARS blood on board program supports the provision of emergent transfusion to selected patients in the pre-hospital environment. Our standard work and stewardship processes minimize wastage of blood products while keeping it readily available for critically ill and injured patients. Subsequent work will aim to describe characteristics and patient centred outcomes.

Keywords: quality improvement and patient safety, prehospital blood transfusion, helicopter emergency medical service

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Bounceback reports-improving patient care

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Introduction: Seeking patient outcome feedback (POF), defined as obtaining information on a patients clinical course beyond ones care, is crucial to the learning process. However, the lack of POF is a major pitfall of emergency medicine. Emergency department (ED) bouncebacks, which are characterized as patients with unplanned returns to the ED after being discharged, are an important type of POF to study because they represent a potential misdiagnosis or mismanagement and can highlight areas for physician self-improvement. Currently, most hospitals do not relay details about ED bouncebacks back to the treating physician, unless a grave error occurred. This studys purpose is to provide weekly reports to all physicians in the ED on patients who have unplanned returns within 7 days of discharge from the ED, and evaluate the impact this has on the physicians practice on seeking POF. **Methods:** A new weekly report was distributed to physicians working at an academic hospital outlining the patients who have returned within 7 days of discharge from the ED, their new presenting complaint and final disposition. An online survey was also administered to all ED staff evaluating the amount of POF they sought pre and post report, and their attitude towards the new reports. **Results:** 22 responses were received, for a response rate of 85%. The majority of respondents follow the reports (73%) and actively seek POF by looking up patients charts and results(70%). Additionally, 58% state that they seek POF more often since receiving these reports, for both the bouncebacks and their other patients. Furthermore, 37% claimed that the reports helped improve the appropriateness of their referrals and 32% stated it helped increase their confidence in their clinical practice. The majority of physicians (87%) found the reports to be helpful and would like to continue receiving it. **Conclusion:** Weekly bounceback reports are a high-yield tool for increasing POF sought in the ED and have benefits for both the physician and the department as a whole. They can be used to not only identify patients who may have had an error in their management, but