

Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

TRAUMA

Efficacy of Novel Commercial Tourniquet Systems in Extremity Hemorrhage Control - An Ultrasound and Generated Force Study

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Introduction: Tourniquets (TQ) save lives. Although military-approved TQ are more effective than improvised TQ in controlling exsanguinating extremity hemorrhage, their bulk may preclude every day carry (EDC) by civilian lay-providers.

Aim: The purpose of the current study was to compare the efficacy of 3 novel commercial TQ to a military-approved TQ.

Methods: A convenience sample of EM residents was utilized. Four different TQ were evaluated: Gen 7 Combat Application Tourniquet (CAT; control), Stretch Wrap and Tuck Tourniquet (SWAT-T), Gen 2 Rapid Application Tourniquet System (RATS), and Tourni-Key (TK). Popliteal artery occlusion was determined using a ZONARE ZS3 ultrasound. Steady-state maximal generated force was measured for 30 seconds with a thin-film force sensor (Singletract). Opinions were solicited at the conclusion of the study.

Results: Nine residents participated in the study (7 male, 2 female). Success rates for complete arterial occlusion were 89% CAT, 67% SWAT-T, 89% RATS, and 78% TK (H 0.89, $p = 0.83$). Mean (\pm SD) times to achieve occlusion were 10.4 ± 1.7 sec CAT, 23.1 ± 9.0 sec SWAT-T, 11.1 ± 3.8 sec RATS, and 20.0 ± 7.1 sec TK (F 9.71, $p < 0.001$). Steady-state maximal forces were 29.9 ± 1.2 N CAT, 23.4 ± 0.8 N SWAT-T, 33.0 ± 1.3 N RATS, and 41.9 ± 1.3 N TK. Participants felt that the CAT was easiest to apply (61%), followed by the RATS (33%). Participants were most likely to select the TK (44%) for EDC, followed by the RATS (33%).

Discussion: In this small convenience sampling, all novel TQ systems were non-inferior to the military-approved CAT TQ. Mean application times were less than 30 seconds. The size and unique nature of these novel TQs may make them more conducive to lay-provider EDC, thereby improving the response to high threat events.

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Efficacy of Video-Based Instructions for Laypeople Bleeding Control Education

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Introduction: The Stop the Bleed campaign in the United States aims to teach bleeding control techniques, such as tourniquets, to the public. Educational consortium guidelines advocate using brief web- or video-based material. Another option is posters or flyers distributed at, for example, workplaces or public spaces.

Aim: The aim of the current study was to evaluate the relative efficacy between a flyer and a video to teach tourniquet application skills to members of the public in Sweden.

Methods: A total of 38 participants (27 male, 11 female) from the general public completed the study. Their ages ranged from 19 to 73 (M=32, SD=14). None had prior experience with tourniquet applications. One group (n=18) received tourniquet instructions on a flyer and one (n=20) received a 5-minute video instruction. Both groups completed pre- and post-questionnaires and a practical tourniquet application test.

Results: Independent samples t-tests showed that the video-based instructions resulted in fewer application errors (M=1.40 out of 10, SD=1.19) compared to the flyer group (M=3.61, SD=2.40), $t(36)=3.651$, $p=0.001$, and higher post-task satisfaction (M=3.89 out of 5, SD=0.74 compared to M=3.39, SD=1.15). However, the flyer-group was faster (M=86.22 seconds, SD=27.28) compared to the video group (M=112.25, SD=42.22), $t(36)=2.229$, $p=0.032$.

Discussion: Video instructions appear superior to flyers in terms of teaching correct tourniquet application to the general public. The longer total application time includes steps taken after bleeding control has been achieved (e.g. securing tourniquet straps and time notation), which may have contributed to the application time difference. The results support the educational guidelines that suggest video-based instructions for teaching basic tourniquet skills to laypeople are more effective.

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A Framework for Planning for High-Volume High-Acuity Traumatic Mass Casualty Incidents

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Introduction: In response to the Pulse Nightclub and Las Vegas mass shootings, staff from our Emergency Department (ED) at University Medical Center New Orleans designed a mass casualty incident (MCI) protocol aimed at preparing the entire hospital for high-volume, high-acuity incidents of unprecedented proportions. As we researched this effort, we discovered that no publically available framework currently exists to assist hospitals with creating their own comprehensive, functional MCI protocol.

Aim: To develop a framework to assist hospitals with creating MCI plans tailored to fit the needs of their individual facility.

Methods: Our hospital spent several years creating and refining an MCI protocol that is both comprehensive in addressing each service's needs and efficient for the staff expected to use it. Upon achieving the desired outcome of a well-functioning and tested protocol, the main contributors of the project met to create a consensus document on how we would approach the task with the benefit of hindsight.

Results: Our document is meant to serve as a framework for hospitals looking to build their own plan. It is not a template, but rather a guide on how to build an individualized plan that includes critical components that are key for success. It breaks the process down into manageable steps that are presented in an order that maximizes efficiency and includes important points to consider for each step. It encourages the user to tailor the protocol to their own unique needs.

Discussion: By sharing a framework based on our own best practices and lessons learned, we hope to make it easier for other hospitals to create MCI protocols and to open a dialogue with hospitals that have additional or differing opinions to share. Most importantly, we hope to inspire hospitals to work together as we race to prepare for worst-case scenarios of increasing magnitude.

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Hemorrhage-control Tourniquets: How Intuitive are They?

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Introduction: According to the Federal Bureau of Investigation (FBI), there were fifty active shooter incidents in 2016 and 2017. In the first five months of 2018, there have been 23 school shootings where someone was injured or killed. Hemorrhage-control tourniquets have proven their life-saving capability in the military and civilian EMS. Now, they are being advocated for use by civilians – the true “first responders.” Since Combat Application Tourniquets (CATs) are strap-and-windlass devices, the question remains whether a naïve population can intuitively apply them efficaciously.

Aim: To determine the efficacy (speed, correct placement) of a CAT by an interprofessional group of healthcare students naïve to tourniquet hemorrhage control.

Methods: Consenting students attempted to apply a CAT to a standardized patient with a simulated hemorrhaging brachial artery. No instruction was given except for the directions included in the package. Timing began upon removal of the tourniquet from the package and ended when the participants stated they completed their attempt. Errors in application were documented. Afterward, students received education and an opportunity to properly re-apply the tourniquet. The completion times of the students were compared to ten emergency medical technicians (EMT-P), serving as subject matter experts. Errors in application were categorized.

Results: 50 students from the following professions participated: Medicine, Nursing, Public Health, and Respiratory Therapy. The mean time of tourniquet application was 96.16 seconds (range: 25.12-226.31). This was statistically different from the EMT-Ps' time of 42.83 seconds (range: 23.89-82.94). Additionally, only five (10%) placed the tourniquet correctly. Errors included improper location and windlass misuse or non-use. The instructions were frequently critiqued for being difficult to read and containing confusing graphics.

Discussion: Provision of commercial tourniquets in public access areas must be accompanied by civilian education and the creation of CAT instructions that are simplistic, comprehensible, and suitably graphic.

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Lessons from the Brussels Terrorist Attack

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Introduction: On March 22, 2016, the capital of Europe was hit by two terrorist attacks. As terrorism becomes more and more violent, it is critical to learn and share experiences in order to enhance effectiveness in saving lives.

Methods: A field perspective and experience feedback from the Emergency Medical Response.

Results: The first attack hit the departure hall of the airport, which, due to its strategic role, relies upon a dedicated emergency plan. However, it focuses on airplane crashes and not on explosions in a crowded terminal. The second attack hit the subway at rush hour. An attack in such a confined environment is particularly challenging for the rescue teams, as injuries are worsened, access hindered, and exits numerous.

Eleven medical teams were sent in order to perform triage and provide vital care. The medical response was organized by two disaster response teams. Advanced Medical Posts were set up and the mass casualty plans of all hospitals were activated. Managing war injuries for civilian teams was challenging. On-site care consisted essentially in prehospital damage control and burn care in order to ensure rapid evacuations for haemostatic surgery. 313 victims were dispatched to thirty hospitals. Another challenge was safety. Several threats were apparent and explosives were found on both sites. Lessons from Paris had prompted a review of our multiple sites Emergency Plan. One single way of communication was used and the evacuations