

Abstract: Simulated Injury Videos as a Tool to Improve Paramedic Student Tourniquet Use

Authors: Daniel Lollar, MD, FACS, Rebekah Sayre, BS, Adam Lachappelle, MS, NREMT-P, Sarah Parker, PhD

Background: Stop the Bleed is a national initiative to train bystanders and first responders to provide immediate care to hemorrhaging patients. This initiative has emphasized using tourniquets to prevent exsanguination after severe extremity trauma. Tourniquet application can cause significant pain and nerve damage, especially with the prolonged transport times. Therefore, the need to decrease the unnecessary application of tourniquets and better prepare novices in managing complex wounds is needed. We utilized a method of iterative video training based on the concepts of perceptual learning to create a high-fidelity simulation for paramedic students.

Methods: Using a silicone molding system and simulated blood, a series of wounds were created. These molds were then applied over tubing to a model's arm or leg and differing amounts of blood flow were simulated. Brief video clips were created with differing amounts of hemorrhage. These video clips were then assembled in a Google document.

Results: A total of 71 video clips combining varying elements of wound size, wound location and hemorrhage were created.

Future Directions: Using this compendium of simulated wounds, the first step is to validate which wounds should be managed with a tourniquet. We plan to submit the videos to an expert panel composed of 5 practicing trauma surgeons and evaluate responses using a Kappa score. Kappa scores 0.4 or greater will be considered for a testing group of 30 videos.

Once identified, the 30 validated videos will be entered into E-Prime 2.0 software. 40 paramedic students will be recruited, 20 for a control group and 20 for the video intervention group. In addition to the standard hemostasis education with the program, the control group will spend 30 minutes reviewing the slide set for a Stop the Bleed training session. The intervention group will review 45 clips which will be viewed and a decision to apply a tourniquet or apply direct pressure will be sought. Immediate feedback with the correct response will be provided by the video program.

Comparison between the two approaches will be evaluated in all participants during high-fidelity simulation hemorrhage scenarios. Each participant will be asked to manage a simulated bleeding wound and subsequently be evaluated by accuracy of the decision to utilize a tourniquet, estimated amount of blood loss, time to hemorrhage control and the six parameters of the SURG-TLX measure: mental demand, physical demand, temporal demand, task complexity, situational stress and distractions.

Results will be compared using mixed effects logistic regression for binary answers and fixed effects regression for categorical data.