Evidence Table: Stop the Bleed: Sarah and Kei

Author, Date	Issue Related to EBP	Design Type	Study Design and Study Outcome Measures	Study Setting and Study Population	Study Intervention	Key Findings
Dhillon NK, Dodd BA, Hotz H, et al. , 2019	Determined how often participants acquired the equipment that is necessary in applying the skills taught.	Standardized Survey Instrument	A standardized survey instrument was distributed to all American College of Surgeons Bleeding Control Basic (B-Con) class participants from 05/2017 to 01/2018. The instrument queried about the likelihood of applying skills and obtaining materials. A web-based survey was administered one month later inquiring whether materials were obtained and barriers that would prohibit acquisition.	Academic, urban, Level I trauma center.	No intervention, they just gave surveys.	There were 336 and 183 participants who completed the initial and subsequent web-based survey, respectively. Participants indicated a high likelihood of applying a tourniquet (95.5%), applying pressure (97.9%), and packing a wound (96.4%), if required. Additionally, 74.7% and 76.2% reported a high likelihood of obtaining a tourniquet and packing material, respectively. However, only 21.3% and 50.8% obtained a tourniquet and packing material, respectively, 1 month later. Cost, time, and accessibility of items during a time of need were cited to be common reasons for not obtaining these materials.
Weinman S., 2020	Discusses a method for retention and that 6 months seems to be ideal to do a refresher training session.	Observational study	One hundred fourteen volunteers agreed to participate. A random sample of 57 was selected and 46 participated. Upon return 6 months later, each participant demonstrated tourniquet application. An observer compared the application process with steps on a checklist. Each step completed correctly was tallied, and the total score for all 10 steps was computed as a percentage correct between 0% and 100%.	This study took place at 2 locations, the headquarters of the Somerville Emergency Medical Services in Somerville, New Jersey, and the Somerset County Emergency Services Training Academy in Hillsborough, New Jersey.	No intervention: they just observed how well people's skills remained 6 months post-training	(30%) attained a score of 100%, and 28 volunteers (61%) achieved a passing score. Bleeding was stopped or reduced to non-life-threatening levels by 34 participants (74%). Participants with passing scores were more likely to stop or reduce the bleeding than those with failing scores (97% vs 35%; $\chi 2 = 20.99$, df = 1, P < 0.001). Of the 17 volunteers who failed, 18% stopped the bleeding, 18% slowed bleeding to a non-life-threatening level, and 64% were unable to control bleeding. This study demonstrates that 6 months after training, 30% of participants taking part in the STB program had a perfect recall of the CTQ skill test, and 74% were able to control bleeding to a non–life-threatening level; however, 39% of participants were unable to pass the CTQ skill test, and 26% of the participants were unable to control life-threatening bleeding. Given the fact that these data are consistent with the outcomes of other medical-skill retention studies, I recommend that the American College of Surgeons develop a refresher training curriculum and recommend refresher training sessions at least 6 months following initial training, as annual training may be insufficient to maintain CTQ application skills.
Goolsby CA, Strauss-Riggs K, Klimczak V, et al., 2018	We can improve efficacy and retention by combining brief web-based training and "just-in-time training"	Prospective, non blinded, randomized study.	Subjects were randomized into: 1) an experimental group that received preexposure education using a website and 2) a control group that did not receive pre exposure education. Both groups received JiT instructions. The primary outcome was the proportion of subjects that successfully applied a tourniquet to a simulated amputation. Secondary outcomes included mean time to application, mean placement position, ability to distinguish bleeding requiring a tourniquet from bleeding requiring direct pressure only, and self-reported comfort and willingness to apply a tourniquet.	Layperson participants from the Washington, DC area	They were sorted into an experimental group and a control group.	Participants in the preexposure group applied tourniquets successfully 75% of the time compared to 50% success for participants with JiT alone ($p < 0.05$, risk ratio = 1.48, 95% confidence interval = 1.21–1.82). Participants place tourniquets in a timely fashion, are willing to use them, and can recognize wounds requiring tourniquets. Brief, Web-based training, combined with JiT education, may help as many as 75% of laypeople properly apply a tourniquet. These findings suggest that this approach may help teach the public to Stop the Bleed.
Goolsby C, Branting A, Chen E, Mack E, Olsen C., 2015	Determined supplemental material in addition to training is necessary. These skills are not necessarily "self-explanatory".	Randomized pilot study conducted in August 2014.	The participant stood in front of a waist-down mannequin that had an exposed leg. An observer read a scenario card aloud that described a mass casualty event. The observer then asked the participant to apply a Combat Application Tourniquet (C-A-T) to the mannequin. Test participants received a 4 9 6-inch card, with JiT instructions, in addition to their C-A-T; controls received no instructions. Participants were randomized in a 3:1 ratio of instructions to no instructions. The study's primary outcome was the proportion of successfully applied tourniquets by participants receiving JiT instructions compared to participants not receiving instructions. Secondary outcomes included the time for successful tourniquet placement, reasons for failed tourniquet application, and participants' self-reported willingness and comfort using tourniquets in real-life settings.	The study occurred at the Uniformed Services University campus in Bethesda, Maryland. A total of 194 volunteers without prior military service or medical training completed the study.	In a 3:1 ratio, some participants received JiT instructions, while controls received no instructions.	Just-in-time instructions more than doubled successful tourniquet placement. Participants supplied with JiT instructions placed a tourniquet successfully 44.14% of the time, compared to 20.41% of the time for controls without instructions (risk ratio = 2.16; 95% confidence interval = 1.21 to 3.87; p = 0.003). Just-in-time instructions increase laypeople's successful application of C-A-T. This pilot study provides evidence that JiT instructions may assist the lay public in providing effective point-of-injury hemorrhage control.
Goralnick E, Chaudhary MA, McCarty JC, et al., 2018	Determined which method of training was superior. Also determined that refresher training needed.	Randomized clinical trial	In this randomized clinical trial, 465 participants were randomized to 4 arms to evaluate tourniquet application, and 303 (65.25) were assessed for retention 3 to 9 months after completing their training.	465 laypersons was conducted at a professional sports stadium in Massachusetts with capacity for 66 000 people	Participants were randomized into 4 arms: instructional flashcards, audio kits with embedded flashcards, B-Con, and control. All participants received B-Con training to later assess retention.	Bleeding control training (88% correct application) was superior to control (16%) while flashcards (20%)and audio kits (23%) were not, and 3 to 9 months after training, 256 (55%) correctly applied a tourniquet. In-person hemorrhage control training for laypersons is currently the most efficacious means of enabling bystanders to act to control hemorrhage. Laypersons can successfully perform tourniquet application after undergoing a 1-hour course. However, only 54.5% retain this skill after 3 to 9 months, suggesting that investigating refresher training or improved point-of-care instructions is critical.
Zwislewski A, Nanassy AD, Meyer LK, et al., 2019	Determines whether or not guided-practice was beneficial or not.	Pre/Post Survey	Non-medical potential first responders (PFR; N = 298) participated in STB training comprised of a lecture and hands-on component. PFRs completed a bleeding control knowledge-based pre-and post-assessment. Following the lecture, participants were divided into experimental and control groups during which hands-on practice was manipulated to determine the impact of guided practice on wound packing and tourniquet application. Wound packing and tourniquet application assessments were performed and scores compared between the experimental and control groups.	The Pennsylvania Department of Transportation (Penn DOT) hosted five STB courses at Philadelphia area locations as a part of a larger workshop for the Occupational Safety and Health Admin-istration's (OSHA) Workplace Violence Awareness Month. All employees attending the workshop had the opportunity to participate in the evaluation. The STB training sessions were hosted in warehouses for the potential first responders (PFR) at fivedifferent Penn DOT locations. Training and data collection occurred over the period of one month from April 2018 to May 2018 during which 314 non-medical PFRs took part. Institutional Review Board approval was obtained for this study.	Prior to arrival Penn DOT locations were randomized into experimental or control conditions. The experimental group received hands-on wound packing and tourniquet guided practice in small groups led by program volunteers composed of medical and non-medical professionals. Following a demonstration from the instructor, the experimental group was able to practice wound packing on a Hemorrhage Control Trainer (Z-Medica/QuikClot, Wallingford, CT; see Fig. 1) and self- and buddy-rescue application with a Combat Application Tourniquet (CAT; C-A-T Resources, Inc. Rock Hill, SC; see Fig. 2). Once the experimental group felt comfortable with their ability to pack a wound and apply a tourniquet, each instructor had the employees demonstrate wound packing and tourniquet application and noted which steps were performed correctly on the wound packing and tourniquet application psychomotor assessment. The control group only obtained knowledge about bleeding control, wound packing, and tourniquet application from the STB lecture prior to their attempt at applying a tourniquet or packing a wound. The control group differed from the experimental group by not having received hands- on guided practice or demonstration prior to the wound packing and tourniquet application psychomotor assessments. Following the conclusion of the skill-based assessment, the control group participated in the same hands-on practice as the experimental group to ensure all employees received sufficient training.	Findings from this study suggest that the STB program increases knowledge about hemorrhage control. Non-medical PRFs who receive hands-on training with guided practice perform better on tourniquet application and wound packing assessments. Results suggest that institutions hosting and providing training should continue to perform demonstrations and hands-ontrainings in small groups as a part of the STB program to ensure proper tourniquet application and wound packing actions are performed in hopes to prevent future deaths from life threatening hemorrhage.

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Schroll R, Smith A, Martin MS, et al., 2020	Identified that participants are interested in more hands-on time during training and training videos in addition to the inperson training.	Anonymously self-reported confidence	Course participants anonymously self-reported confidence in six major areas. A five-point Likert scale was used to quantitate participant's self-reported performance. Results were stratified into medical rescuers (MR) and LRs. Students' ability to perform STB skills were objectively assessed using an internally validated 15-point objective assessment tool. Data were pooled and analyzed using Student's t-test and chi-Squared test with $P < 0.05$ considered significant. Results are presented as average with standard deviation (SD) unless otherwise stated.	Participants in STB courses from July 2017 to November 2018 were included in the study. Individuals were recruited using institution-wide email from two participating US medical schools, outreach to physicians and resident at participating institutions, and printed materials distributed within the community.	No intervention, just survey, all participants had same conditions.	A total of 1974 participants were included in the study. Precourse confidence was lowest for both groups in management of active severe bleeding and ability to pack a bleeding wound. Postcourse confidence improved significantly for both groups in all 6 core areas measured ($P < 0.001$). The most significant increases were reported in the two previous areas of lowest precourse confidence-management of active severe bleedingd Objective assessment of LR skills at the end of the course demonstrated combined 99.3% proficiency on postcourse objective assessments. This study provides quantitative evidence that Stop the Bleed training is effective, with both LRs and MRs demonstrating improved confidence and skill proficiency after a 1-h course. Future program development should focus on building a pool of in-structors, continued training of LRs, and determining how often skills should be recertified.
Melmer P, et al., 2019	Shows how it might be hard for EMS to come under certain situations and the importance of the general public having the knowledge to stop the bleed.	Meta-analysis	N/A	N/A	N/A	Team Collaboration: The broad support and operational plans outside the hospital include emergency medical service (EMS), local law enforcement, government agencies, and city officials. This multidisciplinary team (MDT) collaboration strengthens the emergency response to optimize the delivery of life-saving care. Operating room personnel should anticipate an acute surge of patients. Triage: The goal is to identify and prioritize the injured before emergency transport. Traditional mass casualty triage systems involve Sort, Assess, Lifesaving Intervention, Treatment/Transport (SALT) Triage systems commonly assign each victim to green (minimal), yellow (delayed), red (immediate), or black (dead) categories. First responders should transfer stable patients to an ancillary or non-hospital facility for immediate resource allocation to critical patients. Blood Banks: While crystalloid (intravenous solution) was initially the product used in resuscitation, blood products are now considered the gold standard in DCR even in pre-hospital settings. Blood must be group O until the patient's blood type is known. Blood products have a limited shelf life. Limited by its availability (the highest demand for blood is during the initial 4 hrs when the most gravely injured patients are brought to the hospital)
Khajehaminian MR et al., 2018	Shows how it might be hard for EMS to come under certain situations and the importance of the general public having the knowledge to stop the bleed.	Systematic literature review	Gathered sources and put them together in table based off a criteria The included studies were chased based on a variety of research methodologies. Neither a publication date nor language limitations were imposed.	N/A	N/A	Objectives: Investigating the criteria for causality distribution in trauma-related MCIs Reviewing the existing models of casualty distribution in trauma-related MCIs Results: Most of the studies published in disaster medicine are qualitative while those with quantitative design are descriptive in nature. It could be concluded that variables controlling and data accessing are so difficult. In this study, one third of the documents were descriptive studies. Although they have valuable information, they don't provide strong evidence for decision-making. Several studies were also included in this study with powerful research methodologies and also they provide invaluable evidence about casualty distribution.
Timbie JW, et al., 2013	Shows how it might be hard for EMS to come under certain situations and the importance of the general public having the knowledge to stop the bleed.	Systematic literature review	Data extraction, quality assessment, and strength of evidence ratings were conducted by a single researcher and reviewed by a second; discrepancies were reconciled by the two reviewers. Due to heterogeneity in outcome measures, they qualitatively synthesized findings within categories of strategies.	N/A	N/A	Conduct a systematic review on the most effective resource management and allocation strategies during MCEs policymakers might use to manage and allocate scarce resources during an MCE: managing or reducing less urgent demand for healthcare services optimizing use of existing resources augmenting existing resources implementing crisis standards of care
Kim J, et al., 2020	Shows how hard it is for nursing students and the troubles of teaching it to the general public. It would also save more lives if the people in immediate danger were taken care of by the public	Randomized controlled trials	Method: The participants were provided with the simulation scenario template and 10 extra casualties for a pre-exercise lasting 20 min. Later, they engaged in a 20-minute group discussion. Simulation practice began with the commander announcing the response to an MCI. For 15 min, participants performed triage, treatment, and transfer of 50 patient cases with multiple injuries. After the simulation, there was a 25-minute debriefing.Then, the level of teamwork and satisfaction with the simulation experience were analyzed.	Setting: Disaster Simulation Lab and debriefing room Population: Nursing Students	N/A	Triage accuracy: The results showed that the accuracy rate of the 50 cases was 26.0%. Among incorrect answers, 73.0% were related to undertriage and 27.0% to overtriage Teamwork: The overall mean score of self-evaluation of teamwork measured after the intervention was 5.96 ± 0.31 out of 7.
Ross EM, et al., 2020	Is putting on a tourniquet intuitive or do you need training?	Randomized controlled trials	Data collection occurred over 7 months from September 2016 to March 2017. We collected comfort levels and attitudes about tourniquets with the pre study questionnaire. They were provided with the following scenario: "This person has an injury that has continued to bleed despite direct pressure on the wound. It has been determined they need a tourniquet. A tourniquet has been pulled from the public access bleeding control kit and someone hands it to you. Please place the tourniquet so that it will stop the bleeding. Please let me know when you believe your placement is complete.'' The researcher would then hand the participant their designated tourniquet and start a timer. The time would be stopped once the participant reported being done placing the tourniquet. The tourniquet placement would then be assessed for correct position, placement technique, and adequate tightness.	Population: There were 236 participants that voluntarily applied for the class at multiple venues within Bexar County and Frio County, Texas. A participant was excluded for age younger than 17 years, history of prior military service, a history of any formal medical training resulting in medical certification (such as emergency medical technician, physician, nurse), or a history of previous formal tourniquet training. Setting: testing was performed in a private location where no other participants could observe, to avoid peer observational pressure and observational learning from other participants.	Application of different tourniquets: CAT, SWAT-T, and RMT-T	Results: The overall success rate for tourniquet placement was 16.9%. The rates of successful tourniquet application for the RMT, SWAT-T, and CAT were 23.4%, 10.6%, and 16.9%, respectively The most common causes of application failure were: inadequate tightness (74.1% [120/162]), improper placement technique (44.4% [72/162]), and incorrect positioning (16.7% [27/162]) in all three tourniquet devices. When comparing application time, the SWAT-T (38.7 s, 95% CI 43–34.5 s) was significantly faster than the CAT (47.6 s, 95% CI 52–43.3 s) and the RMT (60.3 s, 95% CI 69.4–51.3 s) ($p < 0.001$) (Table 2). However, the speed was not associated with placement success ($p = 0.401$).