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Learners' perspectives on *Stop the Bleed*: a course to improve survival during mass casualty events

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ABSTRACT

Background In response to increasing mass casualty events nationwide, the American College of Surgeons Committee on Trauma developed a bleeding control course (Stop the Bleed) to teach hemorrhage control techniques to laypeople. There is a high level of public interest in learning about injury mitigation, but no study evaluating learners' perspectives after bleeding control training. We sought to evaluate the didactic value of the bleeding control course by analyzing learners' feedback within the framework of adult learning theory.

Study design We analyzed a total of 720 open-ended surveys from 20 regional bleeding control courses taught by a level I trauma center team during a 9-month period. Major themes expressed by learners were organized into a categorical code structure. Keywords identified from free text responses were used to code comments into subthemes. These themes were organized into categories within the framework of adult learning theory.

Results The two primary themes identified from learners' feedback were empowerment and practicality. Respondents reported an overwhelmingly positive experience; 97% of participants would recommend the course to others. The course design (lecture, didactics and hands-on activities) was cited as a positive element of the course. Participants felt empowered and prepared to act and help others during mass emergency events. Actionable items for future course improvement were identified.

Conclusion Themes from learners' feedback fit within the framework of adult learning theory. These findings highlight the bleeding control course as an empowering experience and a practical and engaging approach to teaching hemorrhage mitigation to the public.

Level of evidence Level V, qualitative analysis.

INTRODUCTION

In the wake of an increasing number of mass shooting incidents nationwide, there is a clear need for improved field interventions to mitigate uncontrolled hemorrhage. External hemorrhage is a leading cause of potentially preventable death.[1] Prehospital bleeding control can be the difference between life and death, whereas longer response times lead to more preventable morbidity and mortality.[2–4] Bystanders are often the first to provide emergency assistance during mass casualty incidents where they play a vital role in increasing survivability.[5] Thus, expanding the pool of immediate responders to include bystanders during mass shooting incidents is a national public health imperative.[6]

After the Sandy Hook Elementary School shooting in 2012, the American College of Surgeons (ACS) in collaboration with representatives from government organizations produced recommendations known as the Hartford Consensus. This report emphasized the need to inform and empower the public with the tools and knowledge to stop hemorrhage during emergencies and called for increased access to bleeding control kits in public areas. The federal government launched the 'Stop the Bleed' (STB) campaign in 2015 to provide bystanders the education and training to act as immediate care responders prior to arrival of organized medical resources.[7] The American College of Surgeons Committee on Trauma in conjunction with the National Association of Emergency Medical Technicians concurrently developed the Bleeding control ('Bcon') course to improve a layperson's ability to mitigate hemorrhage from open wounds.

As the sole level 1 trauma center for Washington, Alaska, Montana and Idaho, the Harborview Medical Center (HMC) has a special responsibility to educate the public in the Pacific Northwest to mitigate harm after trauma. Whereas prior research has documented a high level of public interest in learning about injury mitigation in mass shootings,[8] no study has yet evaluated learners' perspectives qualitatively after the STB training course. Our institution began offering STB courses in 2016, thereby providing an opportunity to bridge this gap in understanding. In this study, we sought to evaluate the didactic effectiveness of this course by analyzing feedback from learners within the framework of adult learning theory.

METHODS

Context

In collaboration with the Harborview Injury Prevention and Research Center (HIPRC), the Division of Trauma/Burn/Critical Care at HMC offers STB courses for the general public on Saturdays from 09:00 to 12:00 and from 14:00 to 17:00. Registration occurs via a web-based platform (www.hiprc.org).

The 2-hour free course includes a 1-hour lecture and a 1-hour hands-on practice session. The Bcon course curriculum is provided along with an overview of the Run/Hide/Fight approach to mass shooting events as promoted by the Department of Homeland security. The didactic lecture describes the recent epidemiology of mass shooting incidents in the USA and principles of response to maximize survival in mass shootings. The hands-on portion

of the class follows the ACS guidelines of instructor to student at a ratio of no greater than 8:1 and consists of two stations: wound packing and tourniquet application. Instructors observe and evaluate students while they learn to perform wound packing, application of pressure dressings, and tourniquet placement. Small group sizes encourage discussion and allow for individual questions in an environment conducive to adult learning. Topics covered during the didactic session are reinforced at the time of the small group session. The practicum session aims to improve a layperson's self-efficacy and willingness to apply pressure, pack open wounds using moulaged models, and to apply extremity tourniquets as coached by trauma instructors. This course was designed with adult learning theory in mind.[9]

Data collection methods

We gathered self-reported demographic data (optional for participants to report) from registration and sign-in sheets from courses held between September 2017 and May 2018. We collected participant surveys from STB courses in the same time period to assess learners' perspectives on the course and identify potential areas for improvement. Survey completion was optional for course participants. The Institutional Review Board at the University of Washington approved the conduct of this retrospective study. The course survey consisted of the following six questions:

1. What did you like about the course?
2. Did this course meet your objectives?
3. What can we do to improve the course?
4. What didn't you like about the course?
5. Would you recommend the course?
6. Any additional comments?

Data processing and qualitative data analysis

We used Tableau software (Seattle, WA) to analyze participant demographic data and registration zip codes. We used the web application Dedoose (Sociocultural Research Consultants, Los Angeles, CA)[10] to manage and analyze qualitative data. We organized major themes expressed by learners into a categorical code structure. Keywords were identified from free text responses and used to code comments into subthemes. We then organized these themes into categories based on the framework of adult learning theory.

RESULTS

Units of study

We analyzed a total of 720 open-ended surveys from 20 STB classes taught at HMC and a local community center during the study period. The didactic component was taught by surgeons (59%), anesthesiologists (21%), emergency physicians (6%), as well as pathologists and family practitioners. The workshop was taught by nurses (69%), physicians (17%), emergency medical technicians, paramedics, and medical students. A total of 1626 registrants attended STB classes over the course of the study period.

Learners traveled from at least 130 zip codes attended the course, the furthest being over 100 miles away. The distribution of zip codes indicates a high concentration in King County with additional participation from Pierce, Snohomish, Kitsap, Whatcom, Skagit, San Juan, Island, Clallam, Jefferson, Thurston, and Lewis counties (figure 1).

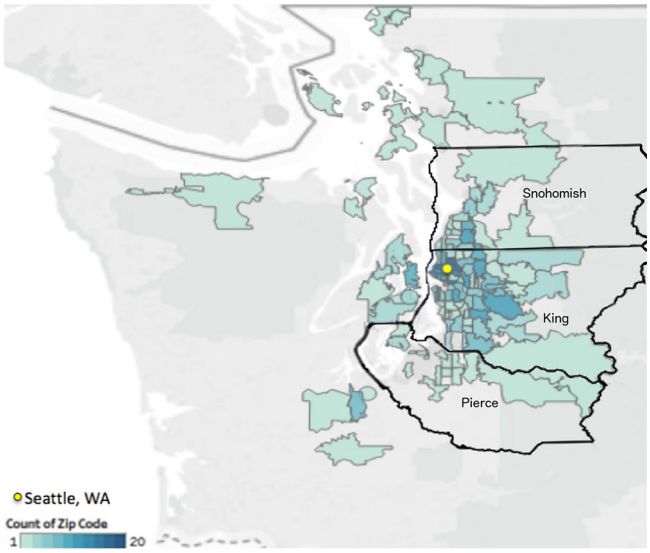

Figure 1 Participants by zip codes in Western Washington.

Overall course impressions

The majority of respondents reported a positive experience with greater than 99% of participants stating that the course met or exceeded their expectations. Over 97% of participants would recommend the course to others. A number of participants were also interested in bringing the course to their workplace or community, highlighting an opportunity to expand course offerings.

Over 30% of participants specifically mentioned the instructors in their feedback, commenting on their demeanor, knowledge and/or experiences as positive elements of the course.

Survey results

Seven hundred and twenty (44%) attendees returned the survey at the end of the session. The main themes that emerged from the collected surveys were: (1) overall course evaluation, (2) feedback on content and information, (3) course impact on empowerment and preparedness, and (4) recommendations for course improvement. Figure 2 shows that learners valued the hands-on component followed by the instructors. The lecture ranked third, followed by other domains. Most learners recommended no other improvements and 23% requested more information. Twelve percent wanted take home materials, 8% wanted more hands-on and fewer than 7% requested change in layout or timing of the session. Table 1 includes illustrative participant feedback reflecting adult learning theory domains.

Feedback on content/information

Overall, participants found the course content and design (lecture, video, didactics, and hands-on activities) to be practical and useful. Fifty-eight percent of participants specifically cited the hands-on activities as a beneficial element of the course. The lecture, video, didactics and hands-on portion were all mentioned specifically as positive elements. Of interest, participants cited the graphic video and photos as both a positive and negative part of the course. A number of learners described it as 'difficult to watch,' but 'important' to see (figure 2).

A few participants requested less 'political' content; these participants felt as though their course instructors revealed personal bias regarding gun control. Additionally, some respondents requested more varied trauma scenarios versus focusing on active shooter situations alone.

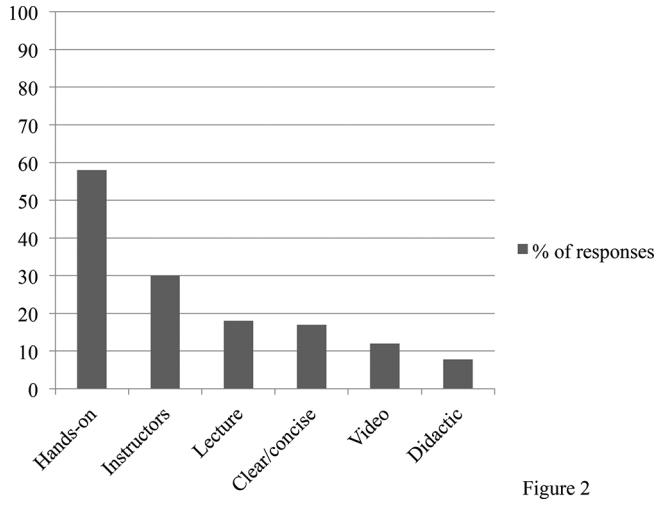

Figure 2

Figure 2 Positive elements of the Stop the Bleed (STB) course.

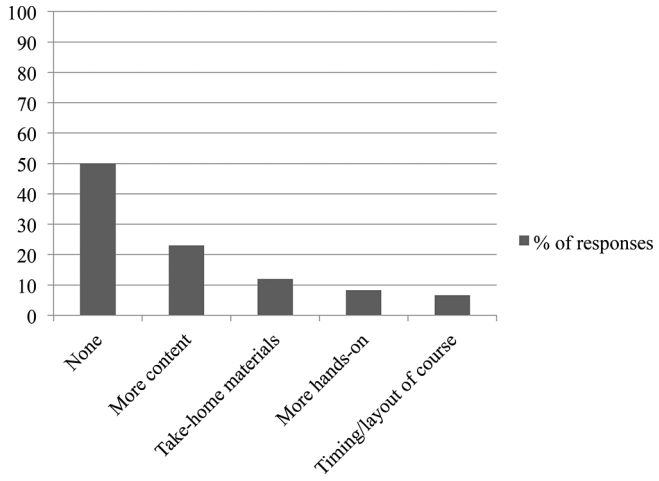

Figure 3 Recommended improvements for the Stop the Bleed (STB) course.

Course impact on empowerment/preparedness

Forty participants specifically mentioned that they felt more empowered and prepared to act and help others during a mass emergency event. Learners cited the accessibility and confidence building nature of the course content, especially for students without medical backgrounds. Participants also mentioned the positive impact of instructor emphasis on self-trust during emergency situations.

Recommendations for course improvement

Suggestions for improvement are given in figure 3 and included the following: distributing take-home materials for later reference, more time for hands-on learning, increasing the amount of course content, and addressing logistical issues.

The most common ask was for a quick outline of critical steps of hemorrhage control and tourniquet application (8.5% of respondents). Participants expressed they would like a 'cheat-sheet' that could be referenced during an emergency. Learners also suggested distributing lesson PowerPoint slides before or after the course.

A number of respondents cited a months-long waiting list for the course. Additionally, others suggested weekday classes (HMC offers two Saturday classes per month) and more frequent community offerings versus classes offered at HMC alone.

Thirty-four participants also requested information regarding access to bleeding kits: which kits to buy and where to buy them. A common suggestion was to offer hemorrhage control kits for sale after the course.

Table 1 Illustrative participant feedback by adult learning theory domain

Category/domain	Quotes
Relevance of information	'Very relevant to general population'
Practicality	'I would feel (more) comfortable in an emergency to use the skills I learned.' 'Very practical advice'
Fostering self-directed learning	'Clear, concise, heartfelt-all people involved in instruction made us feel they cared and that makes us care and feel we will be useful. Thanks to all of you!'
Active, hands-on learning	'Liked the format: lecture followed by hands-on.'

DISCUSSION

In July 2016, the HMC Trauma Program implemented the STB program with the goal to educate and train the public as well as to promote bleeding control kit placement in schools, public venues, and private businesses in our State. To date, this STB program has instructed almost 3000 people in hemorrhage control in Western Washington. By continuing to share the curriculum and mentor new instructors, the reach of STB can be expanded to include other healthcare facilities and school districts in Washington State. Many other organizations are taking action and creating programs to educate students, staff, and the general public to recognize and control bleeding.

Qualitative analysis of broad, open-ended comments in the survey responses from learners who attended the STB courses during a 9-month period revealed themes that fell within known categories of adult learning theory (see table 1), which posits that active participation is important for adult students. Malcolm Knowles developed this theoretical and practical approach to adult education with the following principles: adults should have a say in the content of their learning and should be involved in evaluating their instruction, learning should be based on experiences and have practical and relevant implications, learning should involve problem solving rather than content memorization, and finally, learning can be enhanced if it is driven by internal, rather than external motivation.[9] It is a framework widely adopted within the medical community to create courses for the education of patients and healthcare providers alike.[11 12]

With respect to hemorrhage control, prior research indicates formal hands-on training in a small group environment is the most effective method to teach laypersons to use a tourniquet.[13] Learners should also feel prepared to use these skills during an emergency. Studies have demonstrated that a short hands-on course on bleeding control technique use improved laypersons' self-efficacy and willingness to use a tourniquet during emergency situations.[14 15] Many 'Stop the Bleed' participants felt empowered and more comfortable with their ability to respond during emergency situations. Indeed, learners reported that the STB course was immediately useful and practical. Additionally, participants generally felt that they were engaged in the hands-on component and were given opportunities to provide feedback about the course. An overwhelming majority of participants responded they would recommend the

course to others; learners found the course content and experience to be positive.

The most common suggestion for improvement was a request for take-home reference materials. Creating a handout emphasizing essential takeaways from the course is an actionable item that could improve learner experiences after future courses. The next most common theme for improvement pertained to course logistics. A number of participants noted long wait times to take the STB courses from time of signing up. Over the course of the study period, the program has since made an effort to expand course times and locations; in addition to public classes offered monthly at HMC, STB has now been taught at Safeco Field in Seattle, the Washington State Capitol, the Woodland Park Zoo, and a number of other public venues. Additionally, the STB program has expanded to other hospitals and community organizations. With regard to the timing of the course, it is possible that certain groups of learners are being excluded due to limited course times. As community course offerings continue to grow, we expect that STB training will extend to a larger, more diverse learner population.

Based on collected participant feedback from HMC, course interest is high within the greater Washington State community. A national survey from 2016 confirmed that a there is a need for STB training; a majority of respondents—over 90%—stated they were physically able and willing to provide first aid for someone they did not know after a mass shooting or car crash and over 80% of respondents indicated they would be interested in attending a class to learn bleeding control techniques.[16] Geographically expanding course offerings to Central and Eastern Washington could increase the number of laypeople with the skills and confidence to assist others during mass casualty events, leading to a potential to save more lives.

Training in hemorrhage control has been researched in military and hospital settings before the need to educate the public became clear. There exist strong similarities with the modern cardiopulmonary resuscitation (CPR) program, developed in the 1960s and first taught to healthcare workers.[17] CPR training is now widely available to the general public and is required education for first responders, health professionals, and even high school graduates in 38 states and Washington, DC.[5 18] There is growing support for legislation that requires Bcon education for Washington State students as well.[19] As the number of mass shootings continues to rise, so, too, does the importance of educating the public regarding hemorrhage control. Just like a bystander with CPR training, a layperson with STB training can save a life during an emergency situation. In 2018, the Netter School of Medicine at Quinnipiac University (New Haven, CT) established itself as the first Hartford Consensus-Complaint Medical School in the USA.[20] During a recent mass shooting in Pittsburgh, PA, STB graduates were able to access public bleeding kits and properly place tourniquets for wounded victims. Georgia recently became the first state to offer hemorrhage control kits and training to every public school.[21] The impact of the STB course itself, advocacy for educational programs, and public access to bleeding control equipment is already apparent.

The study has some limitations. First, we did not collect demographic data, and course completion surveys were optional. This limits our ability to examine more granular data (gender, age, occupation, and so on) may indeed allow for tailored improvements to the 'Stop the Bleed' course specific to certain groups of learners. Including close-ended questions that address specific course content in the future may provide more quantifiable feedback that can be compared across courses taught at different sites. Finally, since qualitative analysis spanned only 9 months of our STB course taught in Western Washington, findings may not be generalizable to other geographic areas.

We cannot comment on STB skill retention.[22–24] This is important because the PATTS trial demonstrated that retention of proper tourniquet application 3–9 months after hemorrhage control training was approximately 55%.[13] However, there is no clear consensus on the frequency or content required to retain this knowledge. In the future, hemorrhage control training may become a course that requires refresher courses to ensure retention of skills.

CONCLUSIONS

Our regional STB training program has taught many participants in Western Washington during the past 3 years. Identification of themes from learners' feedback comments fit within the framework of adult learning theory. Indeed, respondents have indicated that this course, composed of didactics, hands-on component, and practical training scenarios, adequately supports them as adult learners. These findings highlight the role of the STB course as a relevant, engaging, and practical strategy to teach hemorrhage control to the public.

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