What Happens After a Stop the Bleed Class? The Contrast Between Theory and Practice

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OBJECTIVE: The Department of Homeland Security launched the Stop the Bleed initiative, a campaign intended to teach bystanders hemorrhage control strategies. Despite the program's popularity, little is known about actions taken by participants afterwards. We sought to determine how often participants acquired the equipment that is necessary in applying the skills taught.

DESIGN: 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.

SETTING: Academic, urban, Level I trauma center.

PARTICIPANTS: Healthcare and nonhealthcare personnel.

RESULTS: 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.

CONCLUSIONS: Despite reporting a high likelihood of utilizing hemorrhage control skills upon completion of the B-Con class, few went on to acquire the materials needed to apply these skills among those who responded. These results may be impacted by loss of follow up and response bias. Developing strategies that allow for easy access to materials is imperative and may lead to both better implementation of the purposes of the program and improved dissemination of its principles within the community. (J Surg Ed 76:446–452. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: education, hemorrhage control, Stop the Bleed

COMPETENCIES: Patient Care

BACKGROUND

Hemorrhagic shock is one of the leading causes of preventable mortality among patients afflicted by trauma.[1] While much effort has been placed on developing strategies to improve prehospital resuscitation, there is now interest in employing bystanders to apply simple skills that may prevent further blood loss.[2] Developed in 2015, the Stop the Bleed campaign was designed to teach bystanders bleeding control tactics prior to the arrival of medical personnel.[3] An integral component of the campaign includes the American College of Surgeons Bleeding Control Basic (B-Con) classes which are held nationwide. Following a lecture, participants are given the opportunity to practice the tactile skills discussed during the class. Namely, participants practice placing tourniquets, packing wounds, and applying pressure on a prosthetic limb with biofeedback capabilities depending

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on the specific class. An overview is provided of the specific materials required to implement these skills.[4]

After training a large cohort of individuals, Sidwell et al. reported that 98% of participants stated that they would apply the skills taught in real scenarios.[5] However, this is theoretical and to the best of our knowledge, no studies have been able to determine if individuals are able to apply these skills in the longer-term. While this may be difficult to ascertain, it is possible to determine if participants acquire the materials that are necessary to implement these skills. Given the enthusiasm associated with the campaign and classes, we hypothesized that a sizable percentage of participants go on to gather these materials.

STUDY DESIGN

Bleeding Control Basic (B-Con) Classes

The study period occurred over 9 months, from May 2017 to January 2018. The two-and-a-half-hour B-Con classes were held at an urban, academic, Level I trauma center in Los Angeles, California. These included a 35-minute overview with content provided by the American College of Surgeons Committee on Trauma. All lectures were given by the same trauma education coordinator during the entire study period. The lectures were followed by three skills stations lasting 15 minutes each, where participants had the opportunity to learn and apply their technical skills related to wound packing, direct pressure, and tourniquet placement. Competency of technical skills was assessed by instructors. The extended course also included an overview of the regional trauma system as well as an additional lecture on active shooter scenarios. Courses were advertised to the lay public and employees at our institution via the internet and the intranet, respectively. Materials, such as tourniquets or kits, were not available for purchase at this site.

Surveys

All participants were given the opportunity to complete a standardized survey upon completion of the course. The survey inquired about participant background, motivation for attending the class, comfort level with the skills, likelihood of applying skills on a bystander, and likelihood of purchasing a tourniquet and packing material using a Likert scale. An additional web-based survey was sent to participants 1 month later using e-mail addresses that were provided by the participants at the time of class registration. Questions pertained to participant background and if a tourniquet, Stop the Bleed kit, or miscellaneous material, such as Kerlix, gauze, and/or Coban, were obtained. After a preliminary analysis of approximately 100 responses, the web-based instrument was revised to include additional questions to better understand the reasons why materials were not obtained. Secondary questions populated in the web-based instrument only if a given participant did not obtain the previously mentioned equipment.

Statistical Analysis and Reporting

Data are reported as percentages for categorical variables. Individuals who responded with "Very likely" or "Likely" when asked if they would obtain equipment during the initial survey were compared to those who reported purchasing the materials on the subsequent web-based survey. A Pearson's chi-squared test or Fisher's exact test was used to compare proportions where appropriate. A p value of <0.05 was considered statistically significant. The analysis was performed with the IBM SPSS statistics package (Version 24).

Consent and Institutional Approval

The need for consent was formally waived given the anonymous nature of the study. Subjects were given a written summary of the study background and protocol. This study was approved by the Cedars-Sinai Medical Center's Institutional Review Board.

RESULTS

There were 336 individuals who completed the initial survey during the 9-month study period. The majority (59.5%) had a nonmedical background (Table 1). Participants stated that the reasons they joined the class was because they had a job or hobby in which they could potentially encounter someone who is bleeding (38.4%), or that they always wanted to learn (37.2%), or due to recent events in the news and media (33.3%).

Immediately after completing the class, 67.3% were comfortable and 23.2% were somewhat comfortable with applying the skills taught (Table 2). The vast majority reported that they would apply a tourniquet (95.5%), apply pressure (97.9%), and pack a wound (96.4%) if a bystander required it. Most participants reported they would obtain either a tourniquet (74.7%) and/or packing material (76.2%).

There were 183 individuals who responded to the web-based survey 1 month following completion of the class. Of these, only a small fraction reported purchasing a tourniquet (16.4%), while 4.9% already had one (Table 3); this rate significantly differed from the 74.7% that reported that they would obtain a tourniquet immediately after completion of the class ($p < 0.01$). There was no difference between individuals with a medical background to those without (27.5% vs. 16.5%, $p = 0.11$).

TABLE 1. Participant Background Information

	Study Cohort (n = 336)
Background, % (n)	
Medical	
EMT/Paramedic	2.1 (7)
Nurse	14.0 (47)
Physician	5.7 (19)
Other healthcare personnel	18.8 (63)
Nonmedical	
Business/Finance	1.5 (5)
Education	1.2 (4)
Law enforcement	1.2 (4)
Office/administrative support	7.1 (24)
Security	2.4 (8)
Student	16.1 (54)
Other	30.1 (101)
Motivation, % (n)	
Always wanted to learn	37.2 (125)
Have a job/hobby where may encounter someone who is bleeding	38.4 (129)
Personally knew someone who was in a bleeding situation	9.2 (31)
Recent events in news/media	33.3 (112)
Other	20.8 (70)

Packing material was purchased by 50.8%, with no difference among subjects with or without a medical background (56.3% vs. 46.6%, p = 0.25). This was substantially lower compared to the 76.2% of participants who reported they would a month earlier, at the completion of the class ($p < 0.01$). Materials were mostly obtained from gathering miscellaneous items (48.1%) such as Kerlix, gauze, and Coban. Only 12.1% acquired a Stop the Bleed kit.

A subset of these respondents (56.3%) received additional questions that were intended to explore the barriers that prevented the acquisition of these materials. The most common reason for not obtaining these materials was time (63.6% for tourniquets, 51.2% for the miscellaneous packing material, and 51.2% for the Stop the Bleed kit), followed by cost, and believing that items will not be readily accessible at a time of need (Table 4). Subjects with a medical background were more likely to report not knowing where to obtain a Stop the Bleed kit (15.4% vs. 1.9%, p = 0.01), however, other reasons for not obtaining a tourniquet, miscellaneous packing material, or a Stop the Bleed kit did not differ between the cohorts.

CONCLUSIONS

The Stop the Bleed campaign is a nationwide effort that aims to teach the layperson how to achieve hemorrhage control before definitive prehospital care can be delivered.[6,7] The skills taught through the standardized curriculum rely heavily upon the acquisition or accessibility of certain equipment and materials. Despite having high levels of comfort with applying the skills taught by the Stop the Bleed class and reporting a high likelihood of implementing these skills, a low percentage of participants went on to obtain the necessary equipment. The most commonly cited barriers included time, cost, and the thought that these items would not be readily accessible when required. This study provides insight into the practices that occur after the B-Con classes from the Stop the Bleed campaign.

Despite the rising popularity and success of the campaign, several factors have surfaced that are related to the applicability of the skills being taught. Prior studies have shown somewhat promising results with training bystanders to provide prehospital trauma care,[8,9] however, these results have been tempered by a recent study by Goralnick et al. that showed that even though many individuals were able to apply tourniquets correctly immediately after the B-Con course, only half of participants retained this skill 3 to 9 months after the initial training.[10] This suggests that the immediate effectiveness of the program may be overstated, especially when long-term outcomes are considered. The use of certain materials is necessary when applying the techniques discussed in the class. Data from the Boston Marathon bombings reveal that improvised tourniquets were often employed to address hemorrhage control in the prehospital setting.[11] These tourniquets were often associated with venous bleeding or nonhemostatic, indicating their ineffectiveness. This example not only suggests that bystanders have an innate tendency to create tourniquets which may in fact be detrimental, but also highlights why commercially available tourniquets should be readily available. While one of the key teachings of the B-Con course is to apply pressure in such a scenario where a commercially available option is not present, there currently is no data to show if participants will retain this principle in the long term.

Time, cost, and accessibility were often cited as barriers to obtaining the necessary equipment in this study, and while there are multiple methods by which these barriers can be addressed, ultimately a more systemic approach is needed. To better implement the strategies advocated by the Stop the Bleed campaign, preplacement of these materials in public arenas may be more appropriate than relying on individuals to acquire the materials. Historically, legislation has played a crucial role in increasing public access to automated external defibrillators (AEDs).[12] Individual states have had limited success with implementing programs that allowed for wide access to AEDs, while changes in federal legislation

TABLE 2. Attitudes and Opinions Immediately After Class

	All Participants (*n* = 336)	Medical Background (*n* = 136)	Nonmedical Background (*n* = 200)	p value
After taking class how comfortable with applying skills learned?, % (*n*)				
Comfortable	67.3 (226)	72.8 (99)	63.5 (127)	0.10
Somewhat comfortable	23.2 (78)	19.9 (27)	25.5 (51)	0.28
Neutral	0.6 (2)	0.0 (0)	1.0 (2)	0.52
Somewhat uncomfortable	2.7 (9)	0.7 (1)	4.0 (8)	0.09
Very uncomfortable	6.3 (21)	6.6 (9)	6.0 (12)	0.82
If required, how likely to apply a tourniquet?, % (*n*)				
Very likely	62.5 (210)	66.9 (91)	59.5 (119)	0.21
Likely	33.0 (111)	29.4 (40)	35.5 (71)	0.30
Neutral	2.7 (9)	2.9 (4)	2.5 (5)	>0.99
Unlikely	1.2 (4)	0.0 (0)	2.0 (4)	0.15
Very unlikely	0.6 (2)	0.7 (1)	0.5 (1)	>0.99
If required, how likely to apply pressure?, % (*n*)				
Very likely	78.6 (264)	78.7 (107)	78.5 (157)	0.97
Likely	19.3 (65)	19.1 (26)	19.5 (39)	0.93
Neutral	1.8 (6)	1.5 (2)	2.0 (4)	>0.99
Unlikely	0.0 (0)	0.0 (0)	0.0 (0)	>0.99
Very unlikely	0.3 (1)	0.7 (1)	0.0 (0)	0.40
If required, how likely to pack a wound?, % (*n*)				
Very likely	73.5 (247)	76.5 (104)	71.5 (143)	0.37
Likely	22.9 (77)	19.9 (27)	25.0 (50)	0.33
Neutral	3.0 (10)	2.9 (4)	3.0 (6)	>0.99
Unlikely	0.3 (1)	0.0 (0)	0.5 (1)	>0.99
Very unlikely	0.3 (1)	0.7 (1)	0.0 (0)	0.40
How likely to obtain a tourniquet?, % (*n*)				
Very likely	39.9 (134)	38.2 (52)	41.0 (82)	0.69
Likely	34.8 (117)	30.9 (42)	37.5 (75)	0.26
Neutral	18.2 (61)	20.6 (28)	16.5 (33)	0.42
Unlikely	3.6 (12)	4.4 (6)	3.0 (6)	0.56
Very unlikely	3.6 (12)	5.9 (8)	2.0 (4)	0.07
How likely to obtain packing material?, % (*n*)				
Very likely	42.0 (141)	39.7 (54)	43.5 (87)	0.56
Likely	34.2 (115)	32.4 (44)	35.5 (71)	0.63
Neutral	16.7 (56)	17.6 (24)	16.0 (32)	0.80
Unlikely	3.6 (12)	4.4 (6)	3.0 (6)	0.56
Very unlikely	3.6 (12)	5.9 (8)	2.0 (4)	0.07

have been associated with long-standing implications.[13] Similarly, there has been variability with how successful regionalized efforts have been in the dissemination of bleeding control kits. The state of Georgia, for example, accomplished placing has been able to place bleeding control kits in all public schools statewide.[14] On the contrary, there have been examples of regional efforts that do not prevail.[15] More centralized efforts may lead to greater success in increasing the availability of these kits.

There are several limitations to this study. First, there was a low response rate for the web-based survey, which lends itself to response-bias. It is possible that the individuals who responded to the web-based survey differed from those who completed the initial survey, as the web-based survey was sent to individuals who registered to the class and not necessarily those who participated in the primary survey. The results of this study should be interpreted with caution due to the loss of follow up

TABLE 3. Actions One Month After Class

	All Participants (*n* = 183)	Medical Background (*n* = 80)	Nonmedical Background (*n* = 103)	p value
Did you purchase a tourniquet after taking the class?, % (*n*)				
Yes	16.4 (30)	18.8 (15)	14.6 (15)	0.58
No, already have one	4.9 (9)	8.8 (7)	1.9 (2)	0.04
No, but still planning to	59.6 (109)	47.5 (38)	68.9 (71)	0.01
No, and don't plan to	19.1 (35)	25.0 (20)	14.6 (15)	0.11
Did you have packing material after taking the class?, % (*n*)				
Yes	50.8 (93)	56.3 (45)	46.6 (48)	0.25
No	49.2 (90)	43.8 (35)	53.4 (55)	
Did you get Kerlix, gauze, and/or Coban after taking the class?, % (*n*)				
Yes	14.2 (26)	15.0 (12)	13.6 (14)	0.95
No, already have one	33.9 (62)	40.0 (32)	29.1 (30)	0.17
No, but still planning to	35.5 (65)	27.5 (22)	41.7 (43)	0.07
No, and don't plan to	16.4 (30)	17.5 (14)	15.5 (16)	0.88
Did you purchase a Stop the Bleed kit after taking the class?, % (*n*)				
Yes	7.7 (14)	10.0 (8)	5.8 (6)	0.44
No, already have one	4.4 (8)	6.3 (5)	2.9 (3)	0.30
No, but still planning to	54.6 (100)	45.0 (36)	62.1 (64)	0.03
No, and don't plan to	33.3 (61)	38.8 (31)	29.1 (30)	0.23

TABLE 4. Reasons for Not Obtaining Materials

Reasons for Not Obtaining a Tourniquet, % (*n*)	All Respondents (*n* = 77)	Medical Background (*n* = 28)	Nonmedical Background (*n* = 49)	p value
Cost	18.2 (14)	10.7 (3)	22.4 (11)	0.33
Don't know where to get one	7.8 (6)	7.1 (2)	8.2 (4)	>0.99
Don't think I'll have it available during a time of need	27.3 (21)	21.4 (6)	30.6 (15)	0.55
Don't think I'll need it	5.2 (4)	3.6 (1)	6.1 (3)	>0.99
Haven't had the time	63.6 (49)	67.9 (19)	61.2 (30)	0.74
Other	7.8 (6)	10.7 (3)	6.1 (3)	0.66
Reasons for Not Obtaining Kerlix, Gauze, and/or Coban after Taking the Class, % (*n*)	**All Respondents (*n* = 56)**	**Medical Background (*n* = 18)**	**Nonmedical Background (*n* = 38)**	**p value**
Cost	19.6 (11)	11.1 (2)	23.7 (9)	0.47
Don't know where to get them	7.1 (4)	11.1 (2)	5.3 (2)	0.59
Don't think I'll have them available during a time of need	17.9 (10)	16.7 (3)	18.4 (7)	>0.99
Don't think I'll need them	3.6 (2)	0.0 (0)	5.3 (2)	>0.99
Haven't had the time	64.3 (36)	72.2 (13)	60.5 (23)	0.58
Other	7.1 (4)	5.6 (1)	7.9 (3)	>0.99
Reasons for Not Obtaining a Stop the Bleed Kit, % (*n*)	**All Respondents (*n* = 84)**	**Medical Background (*n* = 31)**	**Nonmedical Background (*n* = 53)**	**p value**
Cost	26.2 (22)	12.8 (5)	32.1 (17)	0.18
Don't know where to get one	8.3 (7)	15.4 (6)	1.9 (1)	0.01
Don't think I'll have it available during a time of need	16.7 (14)	12.8 (5)	17.0 (9)	0.92
Don't think I'll need it	6.0 (5)	2.6 (1)	7.5 (4)	0.65
Haven't had the time	51.2 (43)	46.2 (18)	47.2 (25)	0.46
Other	8.3 (7)	5.1 (2)	9.4 (5)	>0.99

and the potential bias this lends itself to. Second, due to the limited representation of subjects coming from institutional settings, such as law enforcement, where materials and supplies may otherwise be readily available, we were not able to analyze the data to see if outcomes differed for those with a meaningful institutional affiliation. It is conceivable that individuals with strong institutional affiliations are not as compelled to personally obtain materials as they are otherwise accessible at their occupations. However, despite having what is presumed weaker institutional affiliations compared to those with a medical background, acquisition rates remained low among nonmedical personnel, implying that lack of institutional affiliation was not strongly associated with increasing rates of acquisition.

In conclusion, we noted that B-Con course participants were less likely to obtain the necessary equipment needed to apply the skills taught by the class than anticipated. Cost, time, and accessibility of items during an event were the most commonly cited barriers. Developing strategies that allow for easy access to materials is imperative and may lead to both better implementation of the purposes of the program and improved dissemination of its principles within the community.

AUTHOR CONTRIBUTIONS

Study conception and design: Navpreet K. Dhillon, MD; Daniel R. Margulies, MD; Eric J. Ley, MD; Galinos Barmparas, MD.

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SUPPLEMENTARY INFORMATION

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