BRIEF REPORT

Effectiveness of a University's Active Shooter Preparedness Program:

An Evaluation

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Abstract: *Background:* Comparing 2018 to 2022, active shooter incidents (ASIs) increased by over 66% from 30 to 50 shootings, respectively. There are limited data on the effectiveness of currently available active shooter preparedness programs. This quality improvement (QI) project evaluated the effectiveness of the 2022 active shooter training (AST) for staff and faculty of a large southeastern university's School of Nursing (SON). *Methods*: Survey participants were SON faculty and staff recruited via emails sent pre- and post-AST. An online survey was used to obtain the participants' demographics, knowledge regarding the recommended actions for responding to ASI, and confidence in their ability to react appropriately. Data were analyzed using descriptive statistics. *Findings*: Information was obtained from 141 survey responses (80 pre- and 61 post-survey responses). Overall, group confidence in the ability to react to ASIs increased from pre- to post-training. Correct responses to knowledge-based questions based on the training increased by 7.8% in the post-training survey. Post-survey respondents indicated a 33.6% increased accurate response to the question, "What is the correct response to an active shooter?" *Conclusion*: The SON AST effectively improved the readiness and confidence of the trainees in case of such a future shooting incident. Future AST should integrate didactic and simulation aspects into programs for further efficacy. *Application to Practice*: Active shooter incident instruction in the workplace and further evaluation of the effectiveness of training programs should become a national priority. Occupational health nurses are well suited to help evaluate and improve AST effectiveness.

Keywords: active shooter preparedness, higher learning institution, emergency preparedness, ALERRT®

Background

The United States Department of Justice (DOJ) Federal Bureau of Investigation (FBI, 2023) affirms that there were 50 active shootings in 2022, which is an increase of 66% of the 30 active shootings in 2018. Four of the events occurred at educational institutions, causing the deaths of 20 students and 3 employees, and injuring 29 more individuals (U.S. Department of Justice Federal Bureau of Investigation, 2023). Between 2000 and 2018, 2,430 persons were killed or wounded in an active shooter incident (ASI; Lowe, 2022). The FBI defines an ASI as one or more persons vigorously attempting to kill others in a populous area (U.S. Department of Justice Federal Bureau of Investigation, 2023). Per the Rockefeller Institute of Government (RIG, 2024), situations in which active shooters actively target populated areas intending to cause mass casualties have become increasingly prevalent in the U.S. Only 12 incidents of ASIs were recorded between 1966 and 1975, whereas there were 170 incidents between 2013 and 2022 (RIG, 2024).

Per Lowe (2022), 43.7% of ASIs occurred in workplace or business settings and almost 24.9% occurred in healthcare and educational settings. From 2000 to 2018, 86% of ASIs occurred inside structures rather than outside areas (Zhu et al., 2020). Governmental agencies have routinely recommended workplace ASI training to improve preparedness and appropriate emergency response (Occupational Safety and Health Administration [OSHA], n.d.; U.S. Department of Justice Federal Bureau of Investigation, n.d.). Unfortunately, higher education institutions often lack the recommended training for such situations (Clark et al., 2019; Holzweiss & Walker, 2018). Skurka et al. (2018) noted that American universities, with over 20 million students and 1.5 million teaching staff, have a role in preparing their faculty and students with the proper emergency preparedness knowledge and resources. Part of the difficulty in preparing for

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Applying Research to Occupational Health Practice

The recent increase in active shooter incidents across the U.S. has prompted workplaces to focus on training employees to respond in these difficult situations. However, studies evaluating the efficacy of AST among employees of higher learning institutions are scarce. Improving employees' knowledge of proper procedures and confidence levels in reaction to an active shooter benefits the trained employee. It could also help prevent injuries to untrained bystanders. The findings and framework of this QI project highlight the need for continual evaluation and advancement of AST for employees to improve preparedness and mitigate the profound effects of these tragic situations. Occupational health nurses are uniquely positioned to evaluate and improve facilities' current AST in addition to facilitating and implementing new training if needed. The OHN can investigate what training is provided to students, if any, and recommend that training be done.

an active shooter is that the event usually starts and ends rapidly without forewarning (Schwerin et al., 2022). Active shooter incidents end 50% of the time before police or security arrive at the location (Martindale & Blair, 2019), thus illustrating the vital importance of proper training prior to an ASI.

Although workplace ASI preparation can include environmental, engineering, and security countermeasures, simulation and didactic training programs are commonly used for employee education. A previous study involving workplace preparedness showed that participation in active shooter coursework followed by an active shooter simulation resulted in 92% of the staff feeling more confident in their ability to appropriately react to an ASI (Sanchez et al., 2018). Clark et al. (2019) surveyed 366 university-level educators about their perceived sureness in guarding their students in an active shooter event. The study showed that the educators most confident in active shooter preparedness worked for universities that performed active shooter simulations, had an active shooter protocol, and offered didactic training. A study by Skurka et al. (2018) involved 419 college undergraduate students watching an approximately 2-minute-long video demonstrating the Run, Hide, Fight Response to active shooter events. The results showed increased students' knowledge of suggested behavioral responses and improved attitudes on how to react to campus emergencies, even with just a short video.

Currently, there are multiple active shooter response training programs available in the U.S. market, including *Run Hide Fight*® (RHF), *Alert Lockdown Inform Counter Evacuate*®, and Advanced Law Enforcement Rapid Response Training (ALERRT®; Martindale & Blair, 2019). However, there is minimal research regarding the effectiveness of these active shooter training (AST) programs in preparing faculty and staff and the various methods of training used (e.g., didactic, simulation, or a combination) in a university setting (Clark et al., 2019; Kellom & Nubani, 2018). This highlights the need for further evaluation of the effectiveness of the ASI training programs currently in use. The aim of this Quality Improvement (QI) project was to evaluate the effectiveness of AST among the staff and faculty at a School of Nursing (SON) within a large public university in the southeast through implementation of a group online survey.

Methods

In October 2022, a SON within a large public university in the southeast engaged its police department to perform AST for the faculty and staff. The SON is part of an extensive southeastern U.S. university educational system and employs approximately 400 faculty and staff. The SON is headquartered on the university campus and has a dedicated university police department that is nationally accredited by the Commission on Accreditation for Law Enforcement Agencies. The SON AST's effectiveness was evaluated using a group pre- and post-survey study design. This QI project was approved by the Institutional Review Board and was determined to fit within the parameters of an evidence-based QI project.

Study Population and Recruitment/Sampling

Survey participants were university SON faculty and staff members (n=368). The study was limited to participants who were 19 years of age and older, English-speaking, and employed by the SON. The survey participants were recruited via school email sent by the SON Program Manager to faculty and staff university emails. The email sent to the participants included information about the QI project, participant information, and a QR link for the survey. Participants were not compensated, and consent was implied by submitting voluntary and anonymous surveys.

Instrument

The online survey (Supplemental Appendix A) was divided into three sections: demographics, self-assessment and concerns regarding ASI in the workplace, and knowledge-based questions. The demographic section included seven questions on primary language, age, role (faculty or staff), sex, race, ethnicity, and years of service at the SON. The self-assessment and ASI concern section included three questions: (1) participants' perceived confidence in responding to an ASI, rated on a 5-point Likert scale (1=extremely confident to 5=not at all confident); (2) their opinion on the importance of AST for faculty and staff, rated on a 5-point Likert scale (1=strongly agree to 5=strongly disagree); and (3) whether they had thought about an ASI in the past year, also rated on a 5-point Likert scale (1=strongly agree to 5=strongly disagree). Additionally, 14 knowledge-based questions were incorporated

into the survey, based on the ALERRT® training material and the university police emergency protocols, to determine the participants' understanding of the course concepts and appropriate responses to an ASI on the university campus. The accuracy and relevancy of the knowledge-based questions were reviewed and approved by an ALERRT® trained officer before being sent to participants.

Intervention

The university police department AST was developed based on the Texas State University's ALERRT® program. The ALERRT® program was named the national standard in 2013 by the FBI and is supported through state and federal grant funding (COPS Office of Public Affairs, 2021; Martindale et al., 2017). Historically, ALERRT® training was aimed toward law enforcement officers nationwide to respond to active shooter threats but has since added a component of instruction called the CRASE (Civilian Response to Active Shooter Events) program intended for a civilian response (Martindale & Blair, 2019; University of Montana, 2023). The principle of ALERRT®'s civilian course is *Avoid Deny Defend*® (ADD; Blair & Duron, 2023; Martindale & Blair, 2019). The concept of ADD involves educating civilians first to avoid shooters when able, then deny entry by the shooter to the current site if civilians are unable to avoid the shooter, and as a last resort, physically defend themselves against the shooter with any means necessary (Martindale & Blair, 2019; Martindale et al., 2017).

A police sergeant with the university police department provided the AST that was required for all university SON faculty and staff. The session lasted approximately 1.5 hours and consisted of a PowerPoint presentation and video scenarios demonstrating active shooter defense tactics, such as awareness of surroundings and developing preexisting response plans. Sergeant Hart reviewed safety features specific to the SON building, including lockdown doors and how to directly call the university police, as calling 911 goes to the city police department and then to the university. Furthermore, attendees were shown what to expect upon police arrival at the scene of the incident, how to safely respond to directives, and the typical characteristics of an active shooter incident, such as unpredictability and quick escalation.

Study Protocol

The online survey consisted of the 24 questions, previously described accessed electronically through an email link. Pre and post intervention surveys were the same. Pre-intervention surveys were disseminated via email using the Qualtrics platform, October 5, 2022 to October 12, 2022. An ALERRT®-trained university police officer provided the didactic AST at the SON on October 13, 2022. Post-intervention surveys were then disseminated to the SON faculty and staff members, October 15, 2022 to November 1, 2022, using the same process as the pre-intervention survey.

Data Analysis

Survey responses were collected using the Qualtrics^{XM} platform, and data analysis was performed using Microsoft Excel. Descriptive analytics through Microsoft Excel were used to analyze and synthesize the survey data. Means and standard deviations were calculated for age. Frequencies and percentages were computed for the participants' demographics (e.g., role, sex, race, and ethnicity), knowledge of law-enforcement recommended actions in response to ASIs, confidence in participant ability to react appropriately to the ASI, and correct/incorrect responses to knowledge-based questions pre- and post-training. The percentage of correct answers was calculated by dividing the correct responses by the total responses for each pre- and post-test question. Similarly, the percentage of incorrect answers was calculated by dividing the incorrect responses by the total responses for each question within the pre- or post-test. The pre- and post-percentage of correct responses for the 14 knowledge-based questions was calculated by totaling the correct response percentage and dividing by the total percentage possible. The overall correct responses to the knowledge-based questions were calculated by taking the post-test percentage correctly and subtracting the pre-test percentage correctly.

Results

The dataset contained responses from pre-training respondents (n=80) and post-training respondents (n=61). Table 1 shows demographic data. The ages for the pre-training respondents ranged from 23 to 76 years (M=47.08; SD=12.31), compared to 25 to 76 (M=48.31; SD=12.79) for the post-training respondents. Responses showed 82.5% (n=66) of pre-training respondents and 83.6% (n=51) of post-training respondents identified as female. Predominantly, the participants identified as white so all areas say white with pre-training respondents 70.0% (n=56) and post-training respondents 72.1% (n=44).

Of the 80 participants who completed the pre-training survey, 51.3% (n=41) were classified as faculty, and 47.5% (n=38) were staff members. Comparatively, 44.3% (n=27) of the 61 respondents who completed the post-training survey were classified as faculty, and 55.7% (n=34) were staff members.

Of the pre-training participants surveyed, 88% believed that all faculty and staff should undergo AST, which increased to 93% in the post-training survey. Overall confidence in participant ability to react to an ASI (affirmative responses to somewhat, slightly, moderate, and extreme confidence) increased from 73.9% to 92.4% among pre- and post-respondents (Figure 1). Table 2 shows pre-post survey responses to knowledge-based questions based on the ALERRT® training. Correctly answered knowledge-based questions had an overall increase of 7.29 (55.99%–63.27%) from pre- to post-training respondents. Specifically, post-survey respondents showed a 33.6% increased accurate response to the question, "What is the correct response to an active shooter?" (Table 2).

Table 1. Demographic/Informational Table

Survey		Pre-training survey		Post-training survey	
		n	*M* (*SD*)	*n*	*M* (*SD*)
Age		80	47.08 (12.31)	61	48.31 (12.79)
	Characteristic	***N***	**Percentage**	***N***	**Percentage**
Role	Staff	38	47.50	34	55.74
	Faculty	41	51.25	27	44.26
Sex	Male	11	13.75	10	16.39
	Female	66	82.50	51	83.61
	Prefer not to answer	3	3.75	0	0.00
Race	American Indian/ Native Alaskan	1	1.25	1	1.64
	Asian	0	0.00	1	1.64
	Black/African American	15	18.75	12	19.67
	White	56	70.00	44	72.13
	Prefer not to answer	8	10.00	3	4.29
Ethnicity	Hispanic or Latino	2	2.50	0	0.00
	Not Hispanic or Latino	68	85.00	57	93.44
	Prefer not to answer	10	12.50	4	6.56

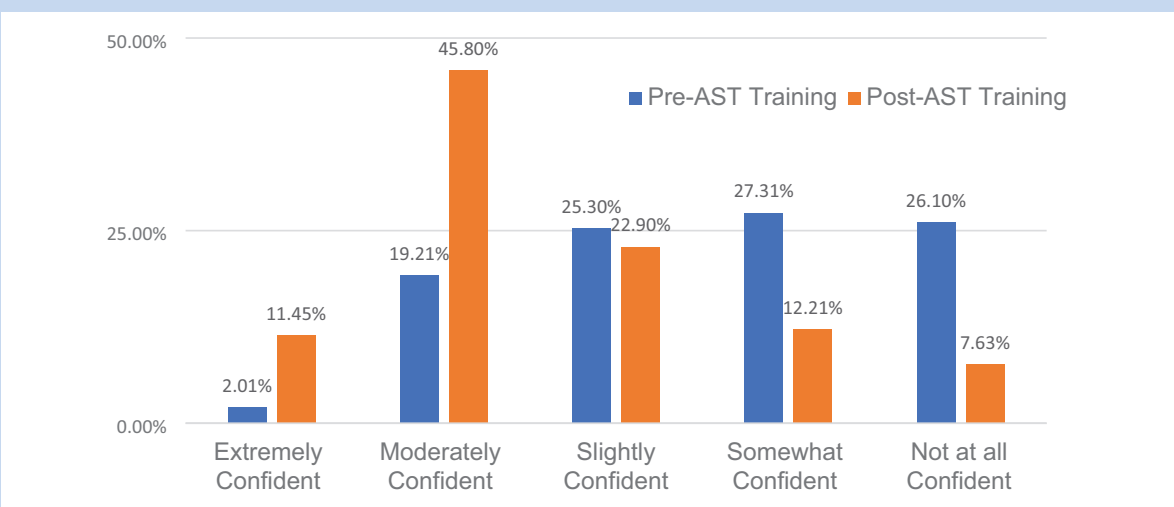

Figure 1. Confidence in ability to react to an active shooter incident

Table 2. Numbers of Correct and Incorrect Responses to Knowledge-Based Questions

Survey question	Pre-training survey			Post-training survey		
	Total	Correct	Incorrect	Total	Correct	Incorrect
Q11. An active shooter event involves one or more persons engaged in killing or attempting to kill multiple people in an area occupied by multiple unrelated individuals.	76	70 (92.1%)	6 (7.9%)	59	57 (96.6%)	2 (3.4%)
Q12. What is the best number to call for the quickest response to an emergency situation on campus such as an active shooter?	76	39 (51.3%)	37 (48.7%)	59	46 (78.0%)	13 (22.0%)
Q13. What is the correct response to an active shooter?	76	8 (10.5%)	68 (89.5%)	59	26 (44.1%)	33 (55.9%)
Q14. When police arrive to the scene, what actions should you take, since they may not have identified the shooter yet (check all that apply)?	80	43 (53.8%)	37 (46.3%)	61	36 (59.0%)	25 (41.0%)
Q15. The profile of an active shooter includes (check all that apply):	79	58 (73.4%)	21 (26.6%)	61	52 (85.2%)	9 (14.8%)
Q16. Sensory side effects of high stress levels include:	76	72 (94.7%)	4 (5.3%)	59	54 (91.5%)	5 (8.5%)
Q17. True or False: People who are more physically fit can generally handle stress better.	76	20 (26.3%)	56 (73.7%)	59	31 (52.5%)	28 (47.5%)
Q18. In the last decade, which location had the most active shooter events?	76	12 (15.8%)	64 (84.2%)	59	40 (67.8%)	19 (32.2%)
Q19. True or False: Instead of denying the disaster is happening, it is more common for people to panic in an active shooter situation.	76	68 (89.5%)	8 (10.5%)	59	36 (61.0%)	23 (39.0%)
Q20. Which option is usually the best response in an active shooter situation?	76	67 (88.2%)	9 (11.8%)	59	58 (98.3%)	1 (1.7%)
Q21. True or False: Increases in a person's heart rate during duress is beneficial for making decisions.	76	43 (56.6%)	33 (43.4%)	59	30 (50.8%)	29 (49.2%)
Q22. What is the best choice if your thinking is compromised by fear in an active shooting situation?	76	67 (88.2%)	9 (11.8%)	59	20 (33.9%)	39 (66.1%)
Q23. Which option best describes combat breathing?	76	32 (42.1%)	44 (57.9%)	58	38 (65.5%)	20 (34.5%)
Q24. Which options are important steps in preparing for an active shooter situation (check all that apply)?	80	1 (1.3%)	79 (98.8%)	61	1 (1.6%)	60 (98.4%)

Discussion

Active shooter didactic training sessions are intended to increase awareness and preparation for active shooter events in the workplace. Findings from our study revealed that the SON staff and faculty's overall confidence level increased almost 20% after the ALERRT® didactic training session. There was a decrease in correct responses to number questions 16, 19, 21, 22 in the post-survey group. The decrease could occur for several reasons, including insufficient training content, the complexity of the content delivered, learner fatigue or the learner's lack of engagement or understanding of the course content. To prevent the decrease in correct responses in the future, the course facilitator could take precautions such as simplifying the content or breaking it into smaller, more manageable segments, reinforcing key points during training, and considering adding a more interactive training component that requires role-playing to ensure engagement and active learning.

The correct response for the knowledge-based question, "What is the correct response to an active shooter?" increased markedly from 88.2% to 98.3% among pre- and post-respondents. The findings are comparable with the few current research studies on the effectiveness of AST at a university workplace. Studies by Clark et al. (2019) and Skurka et al. (2018) showed multiple styles of AST can be beneficial for university workplace employees' attitudes and perceived preparedness. Having students watch a 2-minute video or professors go through a more complex training both resulted in positive findings that demonstrate AST is more effective for active shooter preparedness when compared to no training (Clark et al., 2019; Skurka et al., 2018).

While studies of active shooter preparedness among college staff and faculty are limited, more studies demonstrate the effectiveness of AST among healthcare workers that can be translated to most workplaces. A study by Sanchez et al. (2018) demonstrated that the active shooter simulation helped troubleshoot many potential obstacles encountered during these scenarios, particularly in healthcare settings. For example, 204 emergency department staff members participated in 5 to 7-minute scenarios in which everyone had assigned roles to create a real-life active shooter environment. Despite undergoing didactic training before the simulation, many staff members froze, expressed difficulty leaving their patients, and considered staying behind to help their peers (Sanchez et al., 2018). However, the study showed that the vast majority of the staff affirmed that the training better equipped them to react to an active shooter event than before the training.

Studying the effectiveness of AST can also highlight the importance of tailoring the training to specific audiences. Multiple studies focused on AST in healthcare and the ethical dilemma of prioritizing their own wellbeing among medical staff during ASIs. A study by Janairo et al. (2021) illustrated how physicians believed they had an inherent role in safeguarding patients even at significant risk to themselves. Another study on preparing hospital staff for a possible ASI demonstrated that many participants wondered about their lawful obligations to protect patients (Kim et al., 2021). Similarly noted in our study, the police sergeant conducting the AST stated he tailored his coaching to the nursing school staff and faculty on reframing themselves as civilians who avoid danger instead of nurses who respond to care for the injured.

Strengths

The findings of this QI project, comparable to recent studies, demonstrated that AST at a higher learning institution resulted in improvements in overall confidence levels in reacting to an active shooter as well as advancing knowledge of appropriate procedures for such an event (Clark et al., 2019; Skurka et al., 2018). The results also demonstrated that the ALERRT® program helped improve attitudes toward the importance of AST. Furthermore, the results validated that even primary didactic AST is better than not having any AST and potentially could improve outcomes in a workplace setting in the case of an ASI.

Limitations

The surveys were anonymous, and participants were not assigned a unique identifier. Because of the lack of identification, individual comparisons between pre- and post-training were not feasible. We suggest future studies allow for participants to be evaluated individually on their pre- and post-intervention answers to allow for more inferential analysis.

Another limitation of the QI project was the small sample size n=80 pre-survey, n=61 post-survey, and participant response rate. The email invitations were sent to 368 SON staff and faculty. The pre- and post-training survey response rates were 21% and 16%, respectively. The low level of responses equates to a higher than optimal margin of error rates. The pre- and post-training surveys were only sent to participants once via email, which is a limitation. Alternatively, using paper surveys or QR codes should be considered in the future to increase response rates. Sharing QR codes to electronic surveys before and after the training could allow for easier data collection. Also, the use of incentives such as monetary or gift cards could increase response rates. The survey also had two questions (respondents' age and years of service), allowing for a free text response. Some answers were not entered in a logical alphanumeric format and could not be used from the data collection. Using a pre-set range of years can ensure more precise data collection.

Implications for Occupational Health Nursing Practice

Mass shooting events in school-based settings, including Columbine, Sandy Hook, Uvalde, University of Arizona, University of Alabama Huntsville, and the University of North Carolina, continue to shape the U.S. public's awareness of the dangers of ASIs. Workplace safety is a crucial focus to occupational health nurses, and they must shift focus as new hazards arise. Employers

must implement interventions to mitigate these situations and minimize their impact (OSHA, n.d.). Occupational health nurses are uniquely positioned to promote, facilitate, and improve AST. They have experience working with multidisciplinary teams and can help design and implement the AST to the staff (Lowe, 2022). In addition, occupational health nurses should encourage the administration in workplaces to improve the quality and consistency of AST. This QI project supported the need for didactic AST to help prepare employees in a university workplace setting. Based on resources, workplace administration should consider including didactic and simulation training for their employees.

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Conflict of Interest

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Ethical Approval

This quality improvement (QI) project was approved by the institutional IRB Committee as an evidence-based QI project.

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Supplemental Material

Supplemental material for this article is available online.

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