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School Nursing Emergency Response Study: A National Convergent Parallel Mixed Methods Cross-sectional Survey

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Original Research

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Abstract

Objective: This convergent parallel mixed-methods cross-sectional national survey informs us of current disaster trainings and perceived preparedness of school nurses and their anticipated roles.

Background: Disasters are increasing while training to handle the emergency care is not prioritized. School nurse education is outdated, consisting of one quality program focusing on triage in disasters.

Methods: A convergent parallel mixed-methods survey, with closed- and open-ended questions, was distributed online to elementary, middle school, and high school nurses.

Results: Quantitative results identified cardiopulmonary resuscitation, active shooter, and fire training as the most prevalent training with floods and earthquakes lacking training. Thematic analysis provided views on past disaster experience, previous nursing experience, first aid and triage, desire to be included on safety committees, need for mandatory scheduled disaster training, and benefits of debriefing.

Conclusions: School nurse disaster management is essential to protect our children. School administrators need to appreciate this multi-faceted resource and provide up-to-date comprehensive mandatory training.

Introduction

Climate disasters in the United States (U.S.) are increasing,[1] along with upward trends in school mass shootings.[2] Data demonstrates 25% to 30% of disaster-related injuries are sustained by children.[3] Children survivors exhibit physical and psychological setbacks that cause academic proficiency deficits.[3-5] This requires the school nurse to be trained and have an integral role in planning for disasters, responding to disasters, and supporting the student's recovery.[6] Their role includes planning staff education, injury prevention, evacuation, and triage, warranting their presence on crisis planning committees.[6] School nurse disaster preparedness is now a research priority of the National Association of School Nurses (NASN)[7] and the Federal Emergency Management Agency (FEMA).[8]

The United States Department of Education (USDOE) mandates that schools enact disaster plans in coordination with federal, regional, state, local, and district entities. These plans lack standardized guidelines across state lines.[9] The USDOE recommends a core planning team consisting of teachers, administrators, cafeteria employees, community partners, and parents,[10] but lacks school nurses.[10] This omission requires serious examination since the scope of school nursing practice entails crisis prevention, preparation, management, and recovery. School nurses are extensively trained health professionals, who hold a distinct position within school districts in assessing, managing, and adapting to difficult situations.[7] Access and functional needs identification is essential in constructing a safe and effective disaster plan. There is a critical gap in the literature on evidence-based training utilizing the expertise of school nurses to bolster student's readiness to learn because they feel safe.[11]

A search of current literature was conducted using CINAHL, PubMed, and Google Search. Search terms included disaster training for elementary school nurses, school nurses and disaster training, disaster preparation for school nurses, disasters, and elementary school nurses, school nurse roles in a disaster, role of elementary school nurses after a disaster, trainings for school nurses, certifications for school nurses, disaster certifications for school nurses, weather disasters in the U.S., types of disasters in the U.S., nurse's role in active shooter emergency. Search was limited to academic peer-reviewed journal articles, governmental organizations, and nursing organization literature. One hundred fifty-three articles were reviewed for content. Years included are 2019–2024. Six seminal articles were included and found to be of value. There was limited research on disaster training for school nurses. The review of extant literature

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identified 2 studies on disaster training for school nurses. One article reported on the effects of and the role of school nurses in disasters.

Articles describing participation in regional disaster exercises ranged from 15% to 24%. Guidance from school safety experts delineated how to conduct armed assailant drills.[12] School nurses' perceptions were varied with responses of: "well prepared" for natural hazards resulting in disasters (n = 56%) to "not prepared" (n = 25%) but lacking in chemical/biological and pandemic events. These studies were conducted prior to the COVID-19 pandemic. With the lack of current studies, the previous 10 years were included in the search. Ugalde et al.[13] surveyed school nurses in 2014 with results describing a lack of confidence for nurses with less than five years' experience. Horton identified gaps in the literature, including school nurses' perceptions towards disasters, self-efficacy and confidence about their training, and willingness to respond in a disaster.

The purpose of this study was to identify the types of disaster-related trainings received by school nurses across the U.S., and understand their opinions of the trainings, and beliefs about the roles of school nurses during disasters. This study aimed to address the following questions: What is the nature of disaster training for school nurses in the U.S.? How do school nurses in the U.S. perceive their role in responding to emergencies and disasters? To what extent do school nurses' beliefs about emergency response align with best practices?

Current Disaster Training

The only disaster training for school nurses found was School Emergency Triage Training.[14] FEMA[15] provides a Sample School Emergency Operations Plan but it has not been revised since 2011 and a document called The School Nurse's Role in Incidents from 2009.[8] Clearly updated training needs to include the increase in school shootings and potential pandemics.

Methods

Theory Guided Research

Psychological Capital Theory (PsyCap) guided the development of research questions. The theory suggests that with adequate resources, an individual can achieve personal goals (hope), acquire confidence to address challenges (efficacy), develop resilience to overcome setbacks (resiliency), and strive for future success (optimism).[16] These PsyCap constructs influence organizational support and job performance,[17] maintain levels of engagement,[18] and enhance cognitive abilities and psychological characteristics in health care personnel dealing with challenging circumstances.[19,20] Psychological Capital Theory was used to examine the relationship between the theory's components as they relate to "traumatic stress levels" of health care personnel, such as nurses, following a disaster event.[21] As Duan et al.[22] attest, it is important to assess a nurse's willingness to participate in disaster events.

Design

This is a national descriptive convergent parallel mixed-methods cross-sectional survey design.[23] Institutional Review Board approval is from the University of Missouri, Kansas City #2095928. Appropriate human subjects' protection and consenting occurred.

Setting and Sample

Two main recruiting sources included the NASN research email list-serv and the National Association of State School Nurse Consultants who sent the survey link to constituents. Participants were school nurses who opted to take the survey. Six hundred and seven school nurses responded to the online survey. This study aimed to provide insight into the types of and beliefs about disaster-related trainings completed by school nurses in the U.S., not hypothesis testing; as such, a traditional power analysis was not warranted.[24] The estimated response rate was up to 30.4%.

Data Collection

School nurses received an invitation in May and September 2023 to participate with a link to an online Qualtrics^{XM} questionnaire,[25] comprised of closed- and open-ended questions. Participants followed a link provided, consented to participation, and anonymously completed a brief questionnaire with items measuring disaster training, experiences with disasters, and roles during a disaster. School nurses received 2 reminders after the first email. The September mailing requested no repeat participation. No remuneration was given for participation.

The qualitative and quantitative data were collected concurrently via the questionnaire. Analyses were completed separately with the qualitative data analyzed by 2 authors and the quantitative data analyzed by the other 2 authors to avoid bias. The results of both were then analyzed by all authors to evaluate the convergence of findings between the qualitative and quantitative strands of inquiry.

Data Analysis

The qualitative questions were analyzed for themes by three researchers. The researchers were registered nurses with doctoral degrees with 2 having school nursing experience. All qualitative researchers were employed at academic institutions, and one was employed as a full-time school nurse. Themes were identified, discussed, and chosen for representation of school nurse opinions. Emphatic, representative statements were also identified and coded. These statements were identified when the participant used adjectives to convey feelings such as "sorely needed" and when they "capitalized" all words in their response. To prevent bias, quantitative analysis by a fourth individual was not analyzed until the qualitative thematic analysis was completed, discussed, and agreed upon. Disagreements were discussed until consensus was reached. Stratton[26] and Tong et al.[27] were used as quality guidelines.

Instrumentation

No valid and reliable tools were found to measure school nurse disaster training. We developed a questionnaire using the Qualtrics^{XM} platform for data collection. The questionnaire consisted of 19 quantitative questions, 13 of which were demographic questions including type of school, years as a school nurse, type of community, full or part time, contract or school district employed, public versus private, elementary, middle, high school, and education/certification. Free and reduced lunch percentages were obtained to assess economic status of the school students. Clarifying qualitative questions were used twice to explain a dichotomous answer. We leveraged one matrix-style question to allow nurses to select the types of training received and whether the training was mandatory

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or voluntary. Six additional qualitative questions were presented if the respondent indicated they had previous disaster experience.

Analysis of Data

To analyze the quantitative data, exploratory descriptive statistics and critical examinations of visuals were performed. Specifically, to answer the first question, the data focused on types of natural hazards resulting in disaster training and the impetus for completing those trainings were descriptively analyzed and visually represented. The data focused on the thoroughness of those trainings were descriptively analyzed. To answer the second question, the perceived role that school nurses reported they would take in a natural hazard resulting in disaster response was descriptively analyzed, their prior engagement in natural hazard resulting in disaster responses, and their reported confidence to handle a natural hazard resulting in disaster. To analyze the data obtained from the qualitative, open-ended questions, thematic analysis of the responses was performed to identify commonalities in alignment with the research questions guiding the study. Finally, findings from both the quantitative and qualitative strands of inquiry were evaluated for convergence.

Results

To effectively present the findings from this convergent parallel mixed-methods design, the demographic characteristics of the sample are presented first, followed by the results from the quantitative and qualitative strands, grouped according to each research question guiding the study.

Participant Demographics

Participants included 607 currently employed school nurses. Responses were collected from school nurses from 45 states, with more than 10 responding from each of the following states: New York (n = 181; 29.82%), Wisconsin (n = 115; 18.95%), Maine (n = 51; 8.40%), Minnesota (n = 33; 5.44%), Texas (n = 17; 2.80%), Massachusetts (n = 14; 2.31%), Illinois (n = 13; 2.14%), and New Jersey (n = 12; 1.98%). Most of the respondents identified as female (n = 544; 89.62%) and white (n = 527; 86.82%), with fewer identifying as Hispanic (n = 17; 2.80%), African American (n = 7; 1.15%), and Asian (n = 2; 0.33%). Respondents ranged in age from 23 to 71 years of age, with an average age of 47.82 years (SD = 10.33). Most of the school nurses had a bachelor's degree (n = 316; 52.06%), with fewer reporting an associate degree (n = 112; 18.45%), master's degree (n = 87; 14.33%), or doctoral degree (n = 9; 1.48%). Concerning certifications, 24.38% reported having a state nursing certification (n = 148), with fewer reporting a national nursing certificate (n = 83; 13.67%), state teaching certification (n = 16; 2.64%), and national teaching certification (n = 1; 0.16%).

Most school nurses worked full time (n = 500; 82.37%) in a public-school setting (n = 502; 82.70%). A plurality of the school nurses worked in rural schools (n = 225; 37.07%), with fewer working in suburban (n = 223; 36.74%) and urban (n = 104; 17.13%) schools. The school nurses in this study worked in schools with students from diverse socioeconomic backgrounds, with approximately 19.60% working in schools with less than 25% of the students receiving free and reduced lunches (n = 119), 27.35% working in schools with 25%-50% of the students receiving free and reduced lunches (n = 166), 17.79% working in schools with 50%-75% of the students receiving free and reduced lunches (n = 108), and 24.55% working in schools with greater than 75% of the students receiving free and reduced lunches (n = 149). Respondents indicated having worked in the setting between 0 and 37 years, with an average of 7.94 years in the setting (SD = 6.95; Median = 6; IQR = 3 to 11).

Nature of School Disaster Training

Both quantitative and qualitative findings addressed our first research question, focused on the nature of disaster trainings for school nurses in the U.S.

Quantitative Findings

School nurses reported varying levels of training across 17 selected disasters and modalities (i.e., class-based, simulation, online), with different reasons for engaging in the training (i.e., mandatory, voluntary). Table 1 summarizes the received training and reasons for engagement in the training for natural hazard resulting in disaster (e.g., earthquakes); Table 2 summarizes the received training and reasons for engagement in the training for man-made disasters (e.g., active shooters); Table 3 summarizes the received training and reasons for engagement in the training for basic provisions of care, e.g., Cardiopulmonary Resuscitation (CPR).

The 5 most reported trainings included topics on CPR (n_{total} = 458; 75.45%), fires (n_{total} = 391; 64.42%), active shooters (n_{total} = 371; 61.12%), pandemics (n_{total} = 300; 49.42%), and tornados (n_{total} = 224; 36.90%). Although some of the trainings appeared to be balanced between mandatory and voluntary reasons for completion (e.g., hurricanes at 32.14% mandatory and 35.71% voluntary), many of the training topics were consistently completed for one reason or the other. Fires, tornados, active shooters, CPR, and bombings were the 5 most common mandatory trainings reported. Conversely, landslides, floods, vehicular accidents, ice storms, and School Emergency Triage Training (SETT) were the 5 most common voluntary trainings reported. Tables 1, 2, and 3 illustrate the prevalence of received training for natural hazard resulting in disaster, man-made disasters, and the basic provision of care, respectively. Additionally, these percents are disaggregated by modality.

A plurality of school nurses responded that the trainings were "fair" (n = 180; 29.65%) or worse (i.e., "poor", n = 112; 18.45%). Fewer school nurses identified these trainings as "good" (n = 105; 17.30%), "very good" (n = 53; 8.73%), or "excellent" (n = 8; 1.32%). Despite a large proportion of school nurses not finding the trainings to be thorough, a plurality of them reported that the trainings they received were probably (n = 157; 25.86%) or definitely (n = 73; 12.03%) current and evidence based. A much smaller group reported the trainings as being probably (n = 77; 12.69%) or definitely (n = 43; 7.08%) not current or evidence based. Approximately 17.63% (n = 107) were unsure of their training's alignment with evidence or currency.

Qualitative Findings

Past disaster training and experiences

Over 50% of the school nurse participants brought their disaster training and experiences from other employment settings. Two hundred and eighty-five participants (47%) responded that they had a past lived experience with a disaster of any kind. One hundred and forty participants (49%) of the 285 described disasters other than the COVID pandemic or a single incident emergency (e.g., cardiac arrest, anaphylaxis). For example, many

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Table 1. Frequencies and percentages of training for natural disasters

	Total		Class		Online		Simulation		Mandatory	Voluntary
Disaster	N	%	N	%	N	%	N	%	%	%
Earthquakes	56	9.23	13	2.14	30	4.94	22	3.62	41.07	37.50
Fires	391	64.42	111	18.29	72	11.86	279	45.96	67.52	4.35
Floods	45	7.41	12	1.98	31	5.11	7	1.15	24.44	55.56
Hurricanes	48	7.91	14	2.31	27	4.45	15	2.47	37.5	41.67
Ice Storms	62	10.21	16	2.64	41	6.75	13	2.14	20.97	48.39
Landslides	13	2.14	3	0.49	10	1.65	3	0.49	7.69	46.15
Pandemics	300	49.42	109	17.96	216	35.58	63	10.38	30.33	37.00
Tornados	224	36.90	66	10.87	49	8.07	145	23.89	64.73	12.05

Table 2. Frequencies and percentages of training for man-made disasters

	Total		Class		Online		Simulation		Mandatory	Voluntary
Disaster	N	%	N	%	N	%	N	%	%	%
Active Shooters	371	61.12	155	25.54	144	23.72	195	32.13	68.19	11.86
Bioterrorism	89	14.66	31	5.11	63	10.38	12	1.98	35.96	33.71
Bombings	148	24.38	51	8.4	81	13.34	43	7.08	46.62	20.95
Gas Leaks/Explosions	70	11.53	23	3.79	41	6.75	16	2.64	37.14	32.86
Vehicular Emergencies	60	9.88	23	3.79	42	6.92	16	2.64	8.33	58.33

Table 3. Frequencies and percentages of training for basic provision of care

	Total		Class		Online		Simulation		Mandatory	Voluntary
Disaster	N	%	N	%	N	%	N	%	%	%
Cardiopulmonary Resuscitation (CPR)	458	75.45	331	54.53	147	24.22	239	39.37	62.45	11.14
Community Emergencies (CERT)	142	23.39	48	7.91	89	14.66	39	6.43	24.65	45.07
School Emergency Triage Training (SETT)	180	29.65	70	11.53	99	16.31	48	7.91	20.56	46.67

mentioned hurricanes, floods, tornados, gas leaks, and multi-vehicle accidents.

Most of the past nursing experience was from public health, acute and long-term care, military, and emergency medical services (EMS). Past disaster training and experience was the first theme identified. The majority of schools lacked hands-on training outside of fire/evacuation drills, active shooter/lockdown drills, and medical emergencies. Some evidence of these themes included one individual (Person_#49) stating, "I worked in a hospital for 8 years and had disaster relief training there." Another (Person_#23) stated, "there was a tornado that came through the small town I worked in back in 2008. It ripped the roof off the south side of the buildings. It was a nursing home, and we had to move quickly to get everyone off that wing." Another (Person_#144) claimed, "when working in public health, I assisted with flooding emergencies." Finally, another (Person_#130) stated, "high winds caused a wall to collapse on students eating in the cafeteria."

Past nursing experience

Three hundred and twenty participants (52%) responded that they had some degree of disaster training or experience from their current or past employment as a registered nurse. Two hundred and two (63%) of these 320 respondents felt comfortable drawing upon the disaster training that they had in other employment settings plus their nursing experience in general. One respondent (Person_#328) commented, "my feeling that in the school setting, the nurse has the professionalism and leadership qualities that lend themselves to emergencies and are typically the only person who has experience in any type of emergency working in the building."

School nurse perception of role

Both quantitative and qualitative findings addressed our second research question, focused on the roles that school nurses anticipate taking in response to emergencies and disasters.

Quantitative Findings

Less than half of the school nurses reported being previously involved in a disaster (n = 274; 45.14%). A majority of the sample had reported no disaster experience, still only 1.29% (n = 12) indicated that they did not perceive themselves as capable of handling a disaster. Instead, they were more likely to report being

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"somewhat capable" (n = 180; 29.65%), "moderately capable" (n = 190; 31.30%), or "very capable" (n = 85; 14.00%). These perceived capabilities were provided in the context of their anticipated role(s) during an emergency. Most school nurses anticipated that they would serve to triage (n = 355; 58.48%) and treat (n = 345; 56.84%) individuals. Fewer anticipated serving in a leadership role (n = 72; 11.86%). Although some anticipated serving in "other" roles (n = 45; 7.41%), common themes suggested these individuals did not have a clear plan but would provide support or assistance where necessary.

Qualitative Findings

First aid and triage

The first theme to emerge under research question two was that the school nurse response is often triaging victims and providing direct medical care. Forty-one of 140 participants (29%) saw no change in their perceived role during a disaster. Many nurses felt that leading as part of the command center was outside of their role in the school and was better executed by an administrator. One participant (Person_#17) stated, "because I am a Department of One in my district, I foresee administration leading the charge for disaster response and I would likely help with triaging as needed." Another (Person_#27) responded, "as the school nurse I am the go-to medical person but not necessarily the leader of the school response."

Desire to be on emergency planning committees

The second theme to emerge for research question two was that school nurses perceived involvement in emergency planning as active members on safety committees as a priority. Out of 140 participants who answered the role question, 21(15%) stated they were on the school safety team. While these school nurses participated in the safety team, it was not always clear if their past disaster training was recognized or utilized to the maximum extent. One participant (Person_#8) responded, "as a member of the safety team in the building, I serve as the floor warden for my floor. Years ago, we experienced a mild but unexpected earthquake and had to activate the emergency process to get people out of the building safely." Another (Person_#200) stated, "I understand my role in the school by the discussion in our safety committee meetings and questions I receive outside of meetings. I am working with administration on developing buckets with first aid supplies and other for each room in the school in case we have an extended lock down."

School nurse beliefs alignment with best practices

Only qualitative findings addressed our third research question, focused on the extent to which school nurses' beliefs about emergency response align with best practices.

Qualitative Findings

The participants recognized a need for mandatory emergency and disaster training scheduled on a regular basis. School nurses who had experienced previous disasters recognized the benefits of debriefing with colleagues, friends, or family members as a best practice. A chance to debrief professionally was not always available. One hundred and ninety-three participants (32%) responded to the inquiry on debriefing. Of the 193 respondents, 119 (61%) participants indicated that they had a chance to debrief post incident or if they had not debriefed, stated an opportunity to do so would have been beneficial.

Need for mandatory disaster training

The 187 participants who answered the training question overwhelmingly (100%) stated that more "hands on" training is needed and stated that disaster and emergency training should be mandatory. One participant (Person_#75) stated, "I am part of the Emergency response team at school. Although we haven't had specific training in any one area, we do discuss what to do in case of an emergency." Another (Person_#108) responded, "we have not had an active shooter drill in my building; the lack of actual hands-on training is evident. Any knowledge I have obtained has been voluntary." Another (Person_#143) wrote "from a school standpoint, I don't feel like I have received any training. I do not feel prepared to handle emergency situations outside of minor student-related ones."

Benefits of debriefing

On the benefits of debriefing, one participant (Person_#1) mentioned, "I was pretty anxious for a few days but spent lots of time with friends and coworkers outside of school and did a lot of reflecting and it helped a lot." Another (Person_#125) mentioned, "processing is always done at home. There is very little support for nurses in school setting for emotional response."

Discussion

Overwhelmingly in both the quantitative and qualitative results, the school nurses resounded with a desire to have specific disaster training. Current capabilities were linked to previous employment as an emergency room nurse, emergency medical training prior to school nursing, or previous exposure to disaster event training before they became a school nurse, which prepared them for an emergency in the school setting. As summarized in Tables 1, 2, and 3, school nurses lacked training in vehicular accidents, landslides, ice storms, hurricanes, gas leaks, floods, earthquakes, and bioterrorism. As PsyCap suggests, if school nurses had this training they could acquire confidence to address challenges, develop resilience to overcome setbacks, and strive for success. Their willingness was further demonstrated in Tables 1, 2, and 3 by the number of voluntary classes taken and the qualitative responses of desiring more training.

Disregard for the importance of school nurses' roles by administrators was frequently remarked upon. They felt that they were undervalued and needed to have a seat at the planning meetings for preparations. Building on the work of Ugalde et al.[13] whose Texas study of 275 nurses found that nurses with less than 5 years' experience were less confident. The results found that not the years of experience, but the type of experience and previous employment training produced responses of feeling capable. Interestingly, the school nurses from New York had a very low training opportunity score on floods even though it is their highest risk disaster with a recent 2023 declaration of emergency for flooding.[28]

Many of the school nurses felt that the training was lacking in quality once they became school nurses. Several commented that drills and simulations were needed. Reported in Tables 1, 2, and 3, hands-on simulation occurred with CPR, tornados, shooters, and fire drills. Positive responses to SETT training with a role delineation of triage and treatment rather than administration during disaster events were communicated in the surveys.

A need for debriefing was also a strong suggestion. Formal debriefings with fire or law enforcement, first responders were greatly appreciated but occurred infrequently. Personal debriefing with friends and family assisted with after-event emotions. No

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debriefing occurred in many cases. A desire for formal debriefing was requested with opportunity to improve response in the future.

Limitations

This cross-sectional, descriptive study relied on self-reported data, of which the accuracy, generalizability, and relevance are known to be influenced by multiple factors.[26,29] Although data from 607 school nurses is adequate to accomplish the intended goals, biases may have influenced responses. Some school nurses may have opted to not participate in the study due to not having the time to participate (e.g., non-response type issues). Some school nurses may have inflated the number of disaster-related trainings they received due to concerns about appearance (e.g., response bias type issues). Also, some might have relied on a different frame of reference than expected of respondents (e.g., measurement issues); specifically, some school nurses reflected on their trainings prior to becoming a school nurse, which expanded their access to disaster-related trainings. There are also recognized limitations in representation of respondents; states in the western U.S. did not respond as much as those in the central and eastern U.S., giving a geographical bias to the results. Future studies should increase representativeness of school nurses from states in the western U.S.

Conclusion

In a disaster, school nurses are obligated to assess, plan, treat, and help with the recovery of students. This study demonstrates that lack of quality makes the nurses feel unprepared for their role in a disaster. The SETT training is currently the only formal training offered with outdated documents from FEMA. Nurses in the study who did report taking disaster training previously were trained in a hospital setting hoping it translates to the school setting.

The USDOE and NASN strongly recommend that all schools have emergency disaster plans[12]. School nurses need to be included in the mitigation, planning, response, and recovery of a disaster. Training is necessary to accomplish this. NASN highlights the leadership skills of school nurses in the *Emergency Preparedness Position Statement* and the updated School *Nursing Practice Framework*™.[30] Children are a vulnerable population that require trained healthcare professionals during.

Further research identifying the barriers and school nurses' experience obtaining geographically appropriate disaster training is recommended. Increasing access to standardized emergency training may increase school nurses' motivation to attend as well as their confidence during a disaster.

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