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Determining the Education and Research Priorities in Pediatric Trauma Nursing: A Delphi Study

Linda Roney, EdD, RN-BC, CPEN, CNE ■ Christine McKenna, MSN, CRNP, TCRN

ABSTRACT

Trauma has a greater impact on morbidity and mortality than all other disease processes in the pediatric population; yet, there is a gap in the literature related to the scientific basis for educating and researching future practice. The purpose of this research study was to utilize the Delphi technique to identify the current education and research priorities for pediatric trauma nursing as described by the members of the Society of Trauma Nurses. Consensus on the education and research priorities was derived from a sample ($n = 25$) of trauma nursing experts. The pediatric trauma nursing education priorities are the following: (1) initial resuscitation; (2) assessment; and (3) evidence-based practice. The pediatric trauma nursing research priorities are the following: (1) impact of nursing care on outcomes; (2) initial resuscitation; and (3) critical care. Future efforts in educational program development and research study should focus on these priorities.

Key Words

Education, Pediatric trauma education, Pediatric trauma nursing, Pediatric trauma research, Research

This is an exciting time in pediatric trauma nursing. Now, more than ever, others outside of the direct trauma care community and related professional organizations are focusing attention on the care of injured children. In 2016, Representative Richard Hudson and Representative G. K. Butterfield (NC-01) commissioned the Pediatric Trauma Caucus to raise awareness and find bipartisan solutions to address the rate at which children across the United States are dying from traumatic injuries (Hudson, 2017). Current data support that about 33 children die each day in the United States due to a preven injury, resulting in approximately 12,175 children birth to 19 years of age dying each year from an unintentional injury (Centers for Disease Control and Prevention, 2015).

In response to the charge by Representatives Hudson and Butterfield, the Government Accountability Office (GAO), the independent, nonpartisan agency that investigates Congressional spending, completed a comprehensive investigation to explore the following: (1) What is known about the availability of trauma centers for children treated at different types of facilities and (2) How, if at all, federal agencies are involved in supporting pediatric trauma care and how these activities are coordinated (U.S. Government Accountability Office, n.d.). As part of its discovery, the GAO analyzed 2015 data on trauma centers from the American Trauma Society's Information Exchange Program, reviewed peer-reviewed academic literature on the outcomes for pediatric trauma patients, and interviewed key stakeholder group representatives (including Society of Trauma Nurses [STN]) and federal agency officials who are involved in work related to hospital-based pediatric trauma care (U.S. Government Accountability Office, 2017). The findings were published in the March 2017 report: *Pediatric Trauma Centers: Availability, Outcomes, and Federal Support Related to Trauma Care* (U.S. Government Accountability Office, 2017).

PURPOSE

Many who are engaged in the world of pediatric trauma nursing would agree with the findings of the report, *Pediatric Trauma Centers: Availability, Outcomes, and Federal Support Related to Trauma Care,* including the need to identify outcomes other than mortality when assessing the quality and outcomes of pediatric trauma care (U.S. Government Accountability Office, 2017). In the report, current resources, including continuing education, training opportunities, certification, and other supports that are currently available to assist those who care for pediatric trauma patients, are presented. Because STN is the premier trauma nursing organization (STN, 2018), prior to the Pediatric Trauma Caucus, two members of the Pediatric Committee of STN (L.R., C.M.) embarked on a journey to identify what the upcoming priorities for education and research should be for pediatric trauma nursing. In the past, members of STN have described trauma nursing requirements for nurses who care for injured children and nurses' perceptions of the need for more pediatric

Author Affiliations: Egan School of Nursing and Health Studies, Fairfield University, Fairfield, Connecticut (Dr Roney); and Division of Pediatric General and Thoracic Surgery, Children's Hospital of Pittsburgh of UPMC, Pittsburgh, Pennsylvania (Ms McKenna).

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Correspondence: Linda Roney, EdD, RN-BC, CPEN, CNE, Fairfield University School of Nursing, 1073 North Benson Rd, Fairfield, CT 06824 (lroney@fairfield.edu).

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trauma education (Haley & Schweer, 2007) but the topical priorities for this type of education or priorities for pediatric trauma nursing research had not been explored in the found literature. The purpose of this study was to identify the upcoming research and education priorities related to the nursing care of pediatric trauma patients as described by the current members of STN.

RESEARCH QUESTION

Because many of the members of STN are trauma program administrators and clinicians, their reflections were essential to gaining understanding of the current education and research priorities in the field of pediatric trauma nursing. The following research question guided this study: *What do the members of the Society of Trauma Nurses perceive to be the education and research priorities for pediatric trauma nursing?*

METHODS

Population/Sample Size

The researchers identified the members of STN as the experts from whom consensus would be derived in this current study. Because membership in this professional organization is voluntary, those who participate have a special interest in being connected to an organization and others who are interested in ensuring the optimal care of injured patients (STN, 2018). With at least 17.4 million children across the United States not able to reach a pediatric trauma center within an hour by air or ground transportation (Nance, Carr, & Branas, 2009), we recognized that most care of injured children is initiated outside of a pediatric trauma center. For that reason, all individuals who were members of STN (n = 1,440) at the time the survey was initiated (July 2014) received an electronic e-mail invitation to participate in the first round of this research study regardless of their practice setting as identified in the STN member database.

The inclusion criteria for participation in this study included current membership in STN and having a valid e-mail address registered with STN to receive the electronic invitation. Only those who completed the first found of surveying received an electronic invitation to participate in the second round of surveying. For the third round of surveying, only those who completed both Rounds 1 and 2 of the surveys received an electronic invitation to participate in the final round of this research study.

Design

The Delphi technique is a hybrid research process that involves quantitative and qualitative approaches with multiple iterations designed to transform individual expert opinion to group consensus (Hasson, Keeney, & McKennon, 2000). The technique uses a group of experts in a specific field who anonymously reply to surveys and then receive feedback in the form of summarized group responses ("Delphi Method," 2018). Consensus is reached as participants are required to first respond to a survey and then through subsequent survey rounds provide feedback based on group consensus from the previous round of surveying (Yeung, Woods, Dubrowski, Hodges, & Carnahan, 2015). The goal of using the Delphi technique is to narrow the range of responses and arrive at something closer to expert consensus ("Delphi Method," 2018). There are many advantages to using this research method, which include the following: the ability to conduct a study in a geographically dispersed area without physically bringing participants together; discussion of broad and complex problems; and translation of scientific knowledge and professional experience into informed judgment to support effective decision making (Akins, Tolson, & Cole, 2005). There is considerable variability in the number of participants in Delphi technique studies within health care publications as well as no standards established in any methodologically accep way related to sampling or sample size. Many published health care studies have as few as 10 participants (Akins et al., 2005). Delphi studies with small numbers of participants from a defined field of study with similar training and knowledge of their field can yield s results (Boulkedid, Abdoul, Loustau, Sibony, & Alberti, 2011).

The Delphi technique has been used extensively in nursing research and specifically in trauma nursing research to develop a trauma care syllabus for intensive care unit nurses (Whiting & Cole, 2016), to establish regional standards in trauma nursing education (Haley et al., 2017), and to gain consensus for trauma nursing research priorities with adult patients (Bayley, Richmond, Noroian, & Allen, 1994). Two of the members of the Pediatric Committee of STN (L.R., C.M.) approached the Pediatric Committee about the idea for this current study and received their support. After securing institutional review board approval, the researchers received permission from STN to complete this study with their members.

Procedures for Data Collection

A Delphi survey was completed in three rounds to survey the members of STN about their perceptions of upcoming research and education priorities related to the nursing care of pediatric trauma patients. For each round, an invitation and a survey instrument were provided to the project coordinator at STN who disseminated the electronic survey invitation/link to the survey for Round 1, Round 2, and Round 3. Participation in the previous round was a requirement for participation in subsequent rounds. Following the closure of data collection for each round, the researchers (L.R., C.M.) reviewed and analyzed the raw data independently and then together until agreement was reached about the content analysis from that particular round.

Three Rounds of Survey Invitations

For the first round, a letter of research involvement and the survey instrument were provided to the project coordinator at STN who then disseminated the electronic survey invitations and the link to the survey instrument to the 1,440 members of STN. This first round of surveying asked participants what they believed were the three priority themes in both education and research in pediatric trauma nursing. Two weeks after the initial invitation, an electronic reminder was sent by the project coordinator at STN to those who had not yet completed the first survey, inviting them to consider participation in this study.

The researchers collected and sorted the responses to the first round of the survey. All thematic responses that received five or more individual participant responses in the first round of surveying were compiled into two lists (education and research priorities). A second-round survey was developed to ask participants to rank their top five most important research and education priorities based on the responses to the first round of surveying. A letter of research involvement and the second-round survey instrument were provided to the project coordinator at STN who then disseminated the electronic survey invitations and the link to the participants who had completed Round 1 of the Delphi survey. Two weeks after the initial invitation, an electronic reminder was sent by the project coordinator at STN to those who had participated in the first round but not yet completed the second-round survey. This reminder asked them to consider participating in the second round of this study.

For Round 3, a letter of research involvement and the third-round survey instrument were provided by the researchers to the project coordinator at STN who then disseminated the electronic survey invitations and the link to the survey instrument only to those who completed both the first and second round surveys. In this third round, participants were asked to rank the top three educational and research priorities derived from expert opinion in Round 2. Two weeks after this invitation was sent, an electronic reminder was sent by the project coordinator at STN to those who had participated in the first and second rounds but had not yet completed the third-round survey. This reminder asked them to consider participating in this final round of the Delphi study.

RESULTS

Round 1

Invitations to participate in this current study were sent to 1,440 STN members. Responses to Round 1 were received from 78 nurses representing trauma programs in 47 states, yielding a total of 373 education and 209 research items. The individual responses were cleaned, sorted, and organized into themes. Content analysis of Round 1 produced 22 educational and 26 research priorities. Education priorities (Table 1) and research priorities (Table 2) that received five or more responses were kept to move forward to Round 2 of surveying.

TABLE 1 Summary of All Individual Responses of Educational Priorities Receiving Five or More Response in Round 1

Educational Priorities	Total Responses From All Participants (*n*)	Frequency (% Respondents Who Noted This Theme)
Initial resuscitation	40	51
Neuro (head and spine)	26	33
Adult vs. kids/growth and development	22	28
Injury and violence prevention	15	19
Shock/SIRS	13	17
Child abuse	19	24
Assessment	8	10
Evidence-based practice/best practices	8	10
Customer service and family-centered care	7	9
Pain/sedation	7	9
Simulation and trauma procedures	6	8
Massive transfusion protocol	5	6

Note. SIRS = systemic inflammatory response syndrome.

TABLE 2 Summary of All Individual Responses of Research Priorities Receiving Five or More Responses in Round 1

Research Priorities	Total Responses From All Participants (*n*)	Frequency (% Respondents Who Noted This Theme)
Injury prevention/mechanism of injury	27	35
Initial resuscitation	26	33
Neuro (head and spine)	24	31
Supporting children and families in times of stress	17	22
Trauma team research	11	14
Differences between care of adult and pediatric trauma patients	10	13
Team concepts and communication	10	13
Imaging and radiation exposure	9	12
Impact of care on outcomes	9	12
Critical care	8	10
Abdominal trauma	7	9
Nurses' attitudes and responses to care of the pediatric trauma patient	6	8
Child abuse	5	6
Rehabilitation and recovery	5	6
Pain and sedation	5	6

Round 2

A total of 25 members participated in both the first and second rounds of this study. The sum of all responses was calculated by the researchers. Ranked totals were calculated, and the lowest scores were the highest priorities for this study (Table 3). Participants were provided with the opportunity to comment on why they prioritized the educational needs as they did in this round. Selected participant feedback included the following statements: "These are low frequency, high-risk events…"; "If the initial assessment and treatment of a pediatric trauma patient is incorrect or something is missed, it complicates everything and extends recovery time"; "This is what I see in my practice and feel it needs to be addressed"; and "The basics of care are important but we need to start focusing on what makes nursing care of pediatric trauma patients stellar."

TABLE 3 Round 2 Education and Research Priorities in Rank Order

Ranking	Education	Research
1	Initial assessment	Impact of care on outcomes
2	Assessment	Initial resuscitation
3	Evidence-based practice	Critical care
4	Differences between adults and children	Child abuse
5	Child abuse	Imaging
6		Injury prevention
7		Abdominal trauma
8		Difference between adults and children
9		Team concepts

Round 3

A total of 25 participants participated in Round 1, Round 2, and Round 3 of this study, which reflects 100% retention of participants between Rounds 2 and 3. The group of participants who completed all three rounds of the Delphi survey was very experienced, with a mean of 26.2 years as a registered nurse and 8.48 years in their current professional role. Current job roles are presented in Table 4. Participants had the following educational preparation: hospital diploma ($n = 1$); associate degree ($n = 2$); bachelor's degree ($n = 11$); master's degree ($n = 10$); and doctorate degree ($n = 1$). All participants stated that they had applied current research to their practice ($n = 25$; 100%); the majority stated that they had recruited participants for a research study ($n = 15$; 62.5%), a third ($n = 8$) had not recruited participants for a research study ($n = 8$; 33.3%), and one of the participants did not respond to state their experience with participant recruitment. Most of the participants in this current study

TABLE 4 Job Roles of Participants Who Completed All Three Rounds of Surveying

	n
Administrator	1
Charge nurse	1
Clinical nurse specialist	1
Research nurse	1
Trauma registrar	1
Clinical/staff nurse	2
Patient care coordinator	2
Injury prevention coordinator/educator	3
Trauma program coordinator/manager/director	13

(n = 13; 54.1%) have served as the principal investigator or coinvestigator of a research study, some had not (n = 10; 41.6%), and one of the participants did not provide information about their past role as an investigator in a research study. Participants from all U.S. Census Bureau Regions (U.S. Census Bureau, n.d.) responded to all three rounds of this Delphi survey including the following: Northeast (n = 6); South (n = 7); Midwest (n = 8); and West (n = 3). Participants provided information about their employer's hospital type, trauma center designation, and verification status (Table 5).

TABLE 5 Participant Hospital Type and Designation

Participant Hospital Type	
Community hospital	36%
Free standing children's hospital	32%
University hospital	16%
Children's hospital within a larger medical center	8%
Nonteaching hospital	8%
Participant Trauma Center Designation	
Adult Trauma Center	**Pediatric Trauma Center**
Verified by the American College of Surgeons Level 1 (n = 5) Level 2 (n = 5)	Verified by the American College of Surgeons Level 1 (n = 6) Level 2 (n = 4) Level 3 (n = 1)
Designated by state Level 1 (n = 6)	Designated by state Level 1 (n = 6)

Note. Some participants provided designation information in multiple categories.

On the basis of participants' feedback from Round 2, a total of 25 participants received an e-mail invitation in which they were asked to rank the top three educational priorities from the following list derived from expert opinion in Round 2: *Assessment, Child Abuse, Differences Between Adults and Children, Evidence-Based Practice*, and *Initial Resuscitation and Stabilization.* The participants were also asked to rank the top three research priorities from the following list derived from expert opinion in Round 2*: Abdominal Trauma, Child Abuse, Critical Care, Differences Between Children and Adults, Imaging, Impact of Care on Outcomes, Initial Resuscitation, Injury Prevention,* and *Team Concepts.* The results of Round 3, which are the top three educational and research priorities, are presented in Table 6.

DISCUSSION

The participants in this study defined and prioritized the current education and research priorities in pediatric trauma nursing utilizing the Delphi technique. Delphi study participants are purposefully selected to apply their knowledge and experience to a certain topic that is related to a problem under investigation (Akins et al., 2005). In this study, participants were members of STN. Consensus was reached through the three rounds of surveying with those with a vested professional interest in pediatric trauma. Most of the participants in this study hold a trauma program administrative role (coordinator, manager, or director), making them, as well as all of the participants, well prepared to consider the priorities for education and research. Nurse-led research is a well-recognized method of directly impacting patient care outcomes, and successful implementation of the translation of research into practice is dependent on those working in the settings where change needs to be made (Curtis, Fry, Shaban, & Considine, 2017). In this study, only one participant self-identified as a nurse researcher; however, this is a role that is not yet very common in all types and levels of trauma

TABLE 6 Final Pediatric Trauma Education and Research Priorities as Identified by the Members of the Society of Trauma Nurses in This Current Study

Education priorities 1. Initial resuscitation 2. Assessment 3. Evidence-based practice
Research priorities 1. Impact of nursing care on outcomes 2. Initial resuscitation 3. Critical care

programs. The voices of all of the participants collectively represented the continuum of pediatric trauma nursing care from injury prevention to rehabilitation. Through this Delphi process, they were able to identify the next steps for pediatric trauma education and research because they intimately know the issues and concerns in pediatric trauma nursing today. They helped identify what needs to be addressed next in an effort to give direction to a complex problem that needs a lot of attention. Nurse researchers, as well as others who have interest and training in scientific nursing inquiry, can consider these findings as they plan their future research projects.

Delphi studies with small numbers of participants from a defined field of study with similar training and knowledge of their field will yield stable results (Boulkedid et al., 2011). We believe that this was the case in this study. All participants were nurses (registered nurses or advanced practice nurses) and currently held a role in a trauma program. Although the total number of participants who completed all three rounds of this research study was fewer than we had hoped, consensus was reached in both the areas of education and research priorities for pediatric trauma nursing. In the past 4 years, only 14 pediatric trauma nursing studies have been published in the *Journal of Trauma Nursing* (Schroeter, 2018), making any scholarly attempt to identify ways to keep children from becoming injured and optimize the care of injured children a crucial step to addressing this gap in our field. With 33 children dying each day in the United States due to a preven injury, trauma nurses caring for pediatric trauma patients are central to addressing this problem.

The identified education priorities of (1) initial resuscitation, (2) assessment, and (3) evidence-based practice are not new content areas to pediatric nursing. In trauma, *the golden hour* refers to the critical point of time during the *initial resuscitation*, during which appropriate care may limit morbidity and increase the chance of survival (Little, 2010). Assessment and utilization of evidence-based practice are embedded into specialty courses that address the care of pediatric patients such as Advanced Trauma Care for Nurses (ATCN) (STN, n.d.-a), Emergency Nurse Pediatric Course (ENPC) (Emergency Nurses Association, n.d.-a), and Trauma Nurse Core Curriculum (TNCC) (Emergency Nurses Association, n.d.-b). In addition, there are many institutions that create their own continuing education programs to prepare their nurses to take care of pediatric trauma patients (Haley & Schweer, 2007). Trauma leaders have collaborated to establish regional trauma nursing education standards (Haley et al., 2017). Future research should explore current national practices in pediatric trauma nursing education and consider standardizing pediatric trauma nursing educational programming and expectations to ensure quality and potentially decrease expenses by educating individual nurses (Haley et al., 2017).

The top three pediatric trauma nursing research priorities in this study included the following: (1) impact of nursing care on outcomes; (2) initial resuscitation; and (3) critical care. As stated in the report, *Pediatric Trauma Centers: Availability, Outcomes, and Federal Support Related to Trauma Care,* it is necessary to identify outcomes other than mortality when assessing the quality and outcomes of pediatric trauma care (U.S. Government Accountability Office, 2017). *The impact of nursing care on outcomes* is one of high value yet of limited exploration in the scientific literature; future research efforts should target this priority. *Initial resuscitation* is the only theme to hold a top priority in both the education and research categories of this current study. Careful consideration for projects that potentially meet both goals should be strongly considered. *Critical care* was the third research priority identified, and the opportunity exists to further explore nursing care of pediatric trauma patients in the critical care setting, from physiological and psychosocial responses to the evaluation of evidence for standardized clinical practices.

In response to this project and feedback from members during and shortly after this study, the Pediatric Trauma Committee initiated two subcommittees, pediatric trauma nursing education and pediatric trauma nursing research. Currently, these groups meet monthly and actively seek opportunities to discuss and address current topics and projects related to these areas. Also, in response to these expert-identified education and research priorities, the Pediatric Trauma Committee home page on the STN website was updated to include pediatric trauma online educational opportunities (http://www.traumanurses.org/resources/pediatric-trauma-resources; STN, n.d.-c). The Pediatric Trauma Nursing Research Subcommittee of the Pediatric Committee of STN is currently designing a nursing research project to address one of these priorities. Recently, STN has initiated the STN Research Grant fund, a program that supports nurse-led projects that have the goal to improve practice of trauma nursing (STN, n.d.-d). Nursing experts in pediatric trauma should consider designing projects that aim to improve the care of pediatric trauma patients and should consider applying for this grant opportunity. Finally, experts in pediatric trauma nursing need to continue high-level collaborations with other professional organizations that share the mutual goal of improving the care and outcomes for injured children. Trauma nurses have advanced critical thinking and highly developed skills in patient management, communication, and education (Maccauley, n.d.) that make their leadership essential to the advancement of pediatric trauma care and trauma systems.

Limitations

Although the current study determined the priorities for pediatric trauma nursing education and research, there are several limitations. There are limitations with utilizing the Delphi method, especially in the electronic survey form, for research. The consensus reached in this study may not represent true consensus for education and research priorities for all nurses who care for pediatric trauma patients across the United States. The participants selected to be invited to participate in this study were members of STN, an optional professional organization; specifically, membership is not mandatory for pediatric trauma nursing care providers. Participation in the surveys was over a period of time (three surveys), and there was a significant decrease in participation from Round 1 (n = 78) to Round 2 (n = 25), reflecting a 68% rate of attrition for all of the members who received the invitation to participate in the study. Less than a third of published studies using the Delphi technique in one systematic review of more than 80 published studies in health care reported response rates for each round of the study (Boulkedid et al., 2011), so it is not possible to benchmark participation and rates of attrition in this current study, nor is it possible to calculate an exact response rate to the survey, as all members of STN were invited to participate in this study and all may not have an interest in pediatric trauma.

Fortunately, Round 3 had no attrition (n = 25). Overall participation in this online survey in Round 1 was also low (n = 78), which was just over 5% of members in STN. It is possible that many who received the invitation to participate chose not to participate because although they are members of STN, they are not involved in the care of pediatric trauma patients. It is not clear exactly how many STN members at the time this survey was initiated had significant contact with pediatric trauma patients and would have the interest/expertise to participate this study. For example, in running a query in the members-only area of the official STN website portal at the time this article was written (June 2018), 361 nurses self-identify as members of the Pediatric Trauma Special Interest Group (SIG) but that information is not available from when this study was initiated (Society of Trauma Nurses, 2018). It is also possible that there are nurses involved in the care of injured children who do not identify themselves as being part of the Pediatric Trauma SIG. This current study was designed to include all members of STN so that those who had an interest in pediatric trauma care, regardless of their affiliation with the Pediatric Trauma SIG or employer type, were provided with an opportunity to participate.

CONCLUSION

Over the past 3 years, STN has more than doubled the numbers of active members from 1,440 during July 2014 to 2,990 during March 2017 (C. Devine, personal communication, October 10, 2017). Developing strategies to educate bedside nurses about the care of pediatric trauma patients must continue to remain a priority. STN members' expert opinions generated group consensus on the education and research priorities for pediatric trauma nursing. Many of those who responded to the three rounds of Delphi surveying in this current study were clinical and administrative leaders, making their reflections essential to gaining understanding of what the education and research priorities should be. These priorities provide future direction for pediatric trauma nursing professionals who aspire to bring optimal care for children to the next level across our nation.

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KEY POINTS

- Pediatric trauma education priorities include (1) initial resuscitation; (2) assessment; and (3) evidence-based practice.
- Pediatric trauma research priorities include (1) impact of nursing care on outcomes; (2) initial resuscitation; and (3) critical care.
- These priorities should be considered when developing new projects targeted at developing benchmarks for successful patient care outcomes in the pediatric trauma patient population.

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