

Improving Pediatric Education for Emergency Medical Services Providers: A Qualitative Study

Seth A. Brown, MD;¹ Theresa C. Hayden, PhD;² Kimberly A. Randell, MD;³ Lara Rappaport, MD;⁴ Michelle D. Stevenson, MD, MS;⁵ In K. Kim, MD, MBA⁵

1. Department of Pediatrics, East Tennessee State University, Johnson City, Tennessee USA
2. Department of A&S Criminal Justice, University of Louisville, Louisville, Kentucky USA
3. Pediatric Emergency Medicine, Children's Mercy Hospitals and Clinics, Kansas City, Missouri USA
4. Department of Pediatrics, University of Colorado School of Medicine, Aurora, Colorado USA
5. Department of Pediatrics, University of Louisville, Louisville, Kentucky USA

Correspondence:

Seth A. Brown, MD
East Tennessee State University
Department of Pediatrics
400 N. State of Franklin Rd
Johnson City, Tennessee 37604 USA
E-mail: brownsa2@msha.com

Conflicts of interest: none.

Keywords: continuing education; emergency responders; focus groups; pediatrics

Abbreviations:

ED: emergency department
EMS: Emergency Medical Services
EMT: emergency medical technicians
HIPAA: Health Insurance Portability and Accountability Act

Received: February 5, 2016

Revised: June 2, 2016

Accepted: June 21, 2016

Online publication: December 22, 2016

doi:10.1017/S1049023X16001230

Abstract

Objectives: Previous studies have illustrated pediatric knowledge deficits among Emergency Medical Services (EMS) providers. The purpose of this study was to identify perspectives of a diverse group of EMS providers regarding pediatric prehospital care educational deficits and proposed methods of training improvements.

Methods: Purposive sampling was used to recruit EMS providers in diverse settings for study participation. Two separate focus groups of EMS providers (administrative and non-administrative personnel) were held in three locations (urban, suburban, and rural). A professional moderator facilitated focus group discussion using a guide developed by the study team. A grounded theory approach was used to analyze data.

Results: Forty-two participants provided data. Four major themes were identified: (1) suboptimal previous pediatric training and training gaps in continuing pediatric education; (2) opportunities for improved interactions with emergency department (ED) staff, including case-based feedback on patient care; (3) barriers to optimal pediatric prehospital care; and (4) proposed pediatric training improvements.

Conclusion: Focus groups identified four themes surrounding preparation of EMS personnel for providing care to pediatric patients. These themes can guide future educational interventions for EMS to improve pediatric prehospital care.

Brown SA, Hayden TC, Randell KA, Rappaport L, Stevenson MD, Kim IK. Improving pediatric education for Emergency Medical Services providers: a qualitative study. *Prehosp Disaster Med.* 2017;32(1):20–26.

Introduction

Nationally, eight percent of prehospital care involves children.¹ Previous survey-based research has illustrated knowledge deficits in pediatric care among Emergency Medical Services (EMS) providers.² These knowledge deficits may be attributed, in part, to shifts in the standardized EMS curricula over the years. In the 1990s, all initial courses for EMS followed a national standardized curriculum that included time requirements by topic. Three major core content updates from 2005–2009 emphasized “competency” rather than a minimum number of hours.^{3–5} In addition, maintenance of pediatric certification requirements for EMS professionals varies from state to state and can be diluted by replacing pediatric continuing education hours with other specialty training. Although outcome-based research regarding EMS and the pediatric population is sparse,^{6,7} implications of the current mode of pediatric education for EMS providers is that it may translate into suboptimal delivery of pediatric prehospital care.

Although surveys are inexpensive and may reach a large number of participants, this methodology has potential bias due to low response rates and a lack of qualitative data.⁸ This study aimed to use focus groups to produce a more rich body of data regarding pediatric education needs of EMS providers than can be ascertained through surveys. This methodology has identified knowledge and training gaps among the EMS community, but it has not been applied specifically to the issue of pediatric training.^{9–13} The specific objectives of this study were to identify perspectives of EMS providers regarding pediatric prehospital care educational deficits as well as to propose methods of training improvements.

Methods

Qualitative methodology was used to avoid preconceived assumptions regarding EMS pediatric education and enable generation of hypotheses regarding means to improve pediatric education of EMS providers.¹⁴ The EMS system in the Commonwealth of Kentucky (USA) consists of 225 ground EMS services, 3,200 paramedics, and 9,951 emergency medical technicians (EMTs). The study was approved by the University of Louisville (Louisville, Kentucky USA) Institutional Review Board and was conducted from February 2013 through June 2013.

Recruitment

Purposive sampling¹⁵ was used to recruit EMS providers from three agencies in the Commonwealth of Kentucky. Purposive sampling entails selecting information-rich cases to facilitate generation of data, capturing both typical and atypical thoughts regarding EMS pediatric education. Participants from agencies from three geographic regions (urban, suburban, and rural) were sampled to ensure no important themes were missed from across the Commonwealth. The rural agency was located further than 10 miles from a population center of 40,000 or more.² The suburban site was a community whose emergency department (ED) was approximately 80 miles by air and 105 miles by ground to the nearest Level 1 pediatric trauma center. The urban site was the primary EMS agency in the immediate area of a Level 1 pediatric trauma center. The study team contacted EMS agency training officers, who in turn invited participation from other members of the agency, through flyers and word of mouth.

Data Collection

Administrative and non-administrative personnel participated in separate focus groups to prevent potential inhibition of comments critical of administrative policies/processes regarding training. Administrative personnel were defined as EMTs or paramedics with administrative/leadership duties within the EMS division. Non-administrative providers were defined as EMTs or paramedics with the sole responsibility of response to EMS calls.

Focus groups were limited to 10 participants to ensure opportunity for each participant to express their opinions. A professional moderator facilitated discussion using a guide (Supplemental Table; available online only) developed by the study team. The principal investigator, who received moderator training, was present during each focus group to clarify any questions that arose between participants and the non-medically trained moderator; he was otherwise a non-participating observer. Groups lasted a maximum of 90 minutes. Sessions were audio recorded, then professionally transcribed. Participant anonymity was established through aliases which were self-chosen prior to audio recording. The principal investigator reviewed each transcript and the audio recording of each group to ensure accuracy.

Data Analysis

The research team met to discuss initial findings and formed a master coding list using the first transcript. A grounded theory approach was used to analyze verbatim focus group transcripts.¹⁶ The research team reviewed each transcript for underlying themes and used structured analysis to identify codes and themes. After subsequent transcripts were analyzed using the master code list, the team discussed and approved the final analysis.

The themes were translated into codes via manifest coding and latent coding. Manifest coding involves the visible, surface content

	Number of Respondents
Level of Training	
EMT	16 (38%)
Paramedic	26 (62%)
Sex	
Male	27 (65%)
Female	15 (35%)
Number of Pediatric Patients in the Last Month	
0-2	19 (45%)
3-5	18 (43%)
Average Age in Years: 37 (range = 21-54)	
Average Number of Years in EMS: 13 (range = 1-35)	

Brown © 2017 Prehospital and Disaster Medicine

Table 1. Participant Demographics

Abbreviations: EMS, Emergency Medical Services; EMT, emergency medical technician.

in a text and involves three subcategories: open, axial, and selective coding.¹⁶ Since manifest coding does not take into account the connotation of words or phrases, latent coding was employed to look for underlying, implicit meaning in the content of the text. Data corroboration was achieved by means of investigator triangulation as well as methodological triangulation.¹⁷ Investigator triangulation was achieved by independent analysis of transcripts by multiple investigators. Methodological triangulation was achieved by analyzing audio tapes and transcripts. Disciplinary triangulation was also used by employing experts from the backgrounds of EMS, pediatric emergency medicine, and qualitative research. A grounded theory approach allowed individuals with diverse backgrounds to evaluate the analysis and offer fresh perspectives, ensuring the conclusions were not discrepant from what is known about the field of pediatric EMS.

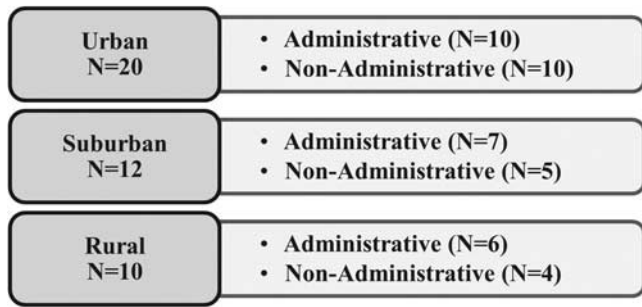
ATLAS.ti (Scientific Software Development GmbH; Berlin, Germany), a computer-based qualitative analysis package designed to assist researchers through a systematic approach to analyzing narrative data, also was utilized to identify codes and final themes.¹⁸

Results

Forty-two participants provided data (Table 1; Figure 1). Participants had a significant range of duration of field experience, from less than one year to over 30 years. After reaching the data saturation point (the point at which no new ideas emerged from subsequent focus groups), four major themes emerged (Figure 2): (1) suboptimal previous pediatric training and training gaps in continuing pediatric education; (2) opportunities for improved interactions with ED staff, including case-based feedback on patient care; (3) barriers to optimal pediatric prehospital care; and (4) proposed pediatric training improvements. Table 2 shows representative quotes.

Variation and Gaps in Pediatric Training

For previous training, varied content, types, and length of pediatric courses were noted. Additionally, it was noted that the evolution



Brown © 2017 Prehospital and Disaster Medicine

Figure 1. Focus Group Composition.

of EMS pediatric training courses over time has added to the variability in training. Some participants were exposed to only the lectures from their EMT or paramedic curriculum; others had more extensive training, such as shadowing opportunities in pediatric EDs or direct experience with pediatric endotracheal intubations in the operating room. Some shadowing opportunities, such as those based in general pediatric offices, were described as suboptimal since these settings often lacked a high number of critically ill children.

In describing training needs or gaps, respondents noted problems with current educational strategies (Figure 3). Specifically, PowerPoint (Microsoft Corporation; Redmond, Washington USA) presentations alone were not viewed as ideal teaching. Respondents also noted little allocated time in the EMS training curriculum for high-quality, student-involved, pediatric hands-on experience. Often, EMS instructors may not be trained adequately in pediatric prehospital care topics which can lead to inexperienced instructors teaching material that they are not comfortable or familiar teaching. Some focus group respondents preferred pediatric emergency medicine providers as instructors as these providers were viewed as experts in their field. In addition, lack of travel time and budgetary support for learners engaged in continuing education were noted barriers, especially in rural or suburban EMS systems. Obsolete pediatric care protocols and limited time devoted to pediatric continuing education were additional issues. Of note, complex pediatric patients with special needs created anxiety for EMS providers due to their inexperience and lack of familiarity with these patients. This anxiety ranged from how to approach and care for children with autistic spectrum to delivering care to the medically fragile, technology-dependent patient on a home ventilator.

Case-Based Learning Opportunities

Emergency department staff interactions, as well as the ability to receive constructive patient care feedback and follow-up, also were described as an important theme at all study sites. Health Insurance Portability and Accountability Act (HIPAA) regulations were frequently cited as barriers to receiving patient care follow-up. Overall rapport between the EMS team and the accepting ED staff also was felt to affect the quality of information conveyed during patient handoff. Follow-up was even more difficult for EMS providers working in suburban or rural locations when transferring pediatric patients to tertiary pediatric referral centers by air. When the initial ground EMS team would attempt to ascertain the ultimate patient outcome, the receiving hospital would release little to no information. This barrier was noted by respondents as suboptimal, since debriefing may be a means of

improvement for the next pediatric patient with critical illness or injury encountered by the team. In all respondent groups, EMS providers desired patient care feedback, both positive and negative.

Barriers to Optimal Pediatric Prehospital Care

An additional major theme was the current EMS daily practice experiences that can pose significant barriers to maintaining pediatric skills. The overall low number of pediatric patients who are transported (in comparison to more frequent adult EMS calls) translates to concerns about remaining proficient with pediatric resuscitative procedures. Also, since there are less standardized clinical care pathways for EMS providers in pediatrics, there is high variability in the care of pediatric patients versus the more algorithm-based care of adults.

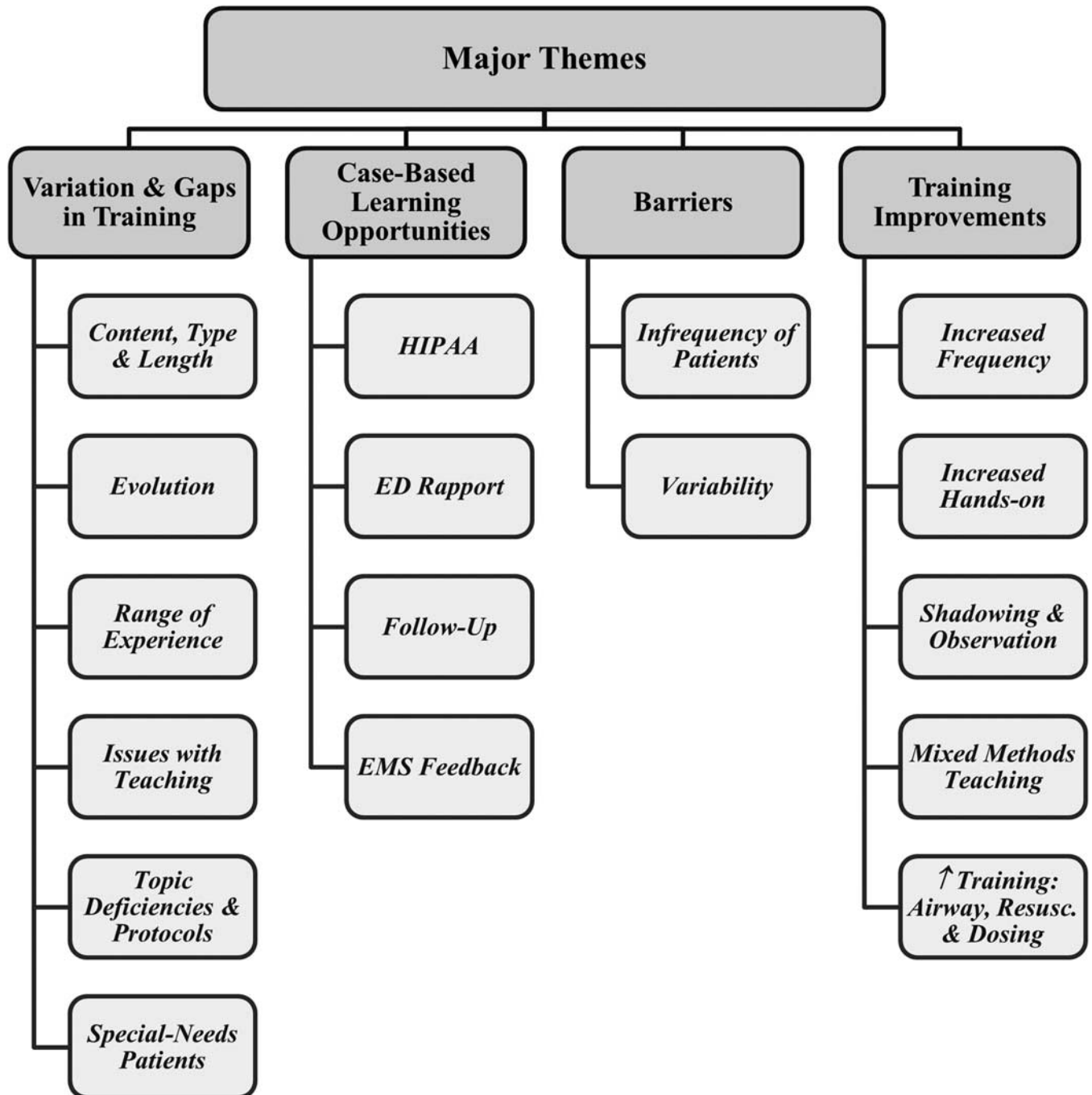
Proposed Pediatric Training Improvements

Suggestions to improve training included: (1) increased frequency of pediatric training; (2) increased hands-on time with pediatric patients; (3) more shadowing and observation opportunities with pediatric emergency providers; (4) mixed methods of instruction, such as focused didactics followed by hands on practice; and (5) increasing specific content in the areas of medication dose calculation and administration, intravenous access, airway management, and pediatric resuscitation. In sub-group analysis, all administrative groups felt that there were no issues regarding the presence of pediatric equipment on ambulances as all states mandate the presence of certain pediatric equipment. Non-administrative EMS providers working in the field sometimes questioned the actual location of the infrequently used pediatric equipment. Lastly, distance traveled in order to train in pediatric hospitals was noted as a significant cost and time barrier for suburban- and rural-based agencies.

Discussion

This qualitative study identified four important themes surrounding EMS preparation to provide pediatric prehospital care. These themes may be used to shape and study future educational interventions for EMS. The study found concerns during patient care handoffs between the ED staff and EMS providers that may not have otherwise been discovered, and to date, has never been reported in the literature. In addition, this study revealed that constructive feedback for EMS personnel may be inhibited by misinterpretation of HIPAA regulations. Furthermore, EMS teams expressed a strong desire for feedback about their performance in treating pediatric patients, which could serve as an important component of quality improvement.

Previous research from the 1980s demonstrated a gap in meeting the emergency medical needs of children in the pre-hospital setting.¹⁹ Improvements in EMS system design and provider education were identified as critical areas for further study.²⁰ These studies described the relative infrequency of pediatric resuscitation, which may decrease the opportunity to perform emergency procedures and increase the likelihood of error.²¹⁻²⁵ Additionally, when errors occur, the current EMS working environment does not actively support event reporting or mitigation of adverse events.²⁶ Since EMS skills for adult patients are reinforced on a regular basis in the field, EMS providers acquire most of their pediatric knowledge and skills from continuing education.²⁷ Despite this body of literature, many of the concerns raised in the 1980s were still noted in a 2006 report on Pediatric Emergency Care by the Institute of Medicine



Brown © 2017 Prehospital and Disaster Medicine

Figure 2. Major Themes and Sub-themes.

Abbreviations: EMS, Emergency Medical Services; HIPAA, Health Insurance Portability and Accountability Act.

(Washington, DC USA),²⁸ and continue to be issues expressed by EMS providers in the focus groups seven years later.

This focus group approach expands the understanding of EMS preparedness for pediatric care through identification of themes which differ from previous conclusions using other methodology. Using a survey approach, a recent 2011 study described the pediatric educational needs assessment for urban and rural EMTs.² Similar to these authors' findings, a need for increased pediatric training using a variety of methods was found.

In contrast, barriers to knowledge acquisition and communication issues between EMS and ED providers also were illustrated.

Similar to two previous surveys,^{27,29} a relative infrequency of pediatric EMS calls, as well as cost, availability, and travel distance as barriers to continuing education were found. Respondents recognized the infrequency of pediatric calls (no more than three per month) and identified continuing education as the main source of EMS pediatric knowledge and skills.²⁷ These findings suggested that more than 70% of all providers were comfortable, to

<p>Variation and Gaps in Pediatric Training</p> <ul style="list-style-type: none"> • “In our class, we had the little baby head that we intubated and I felt woefully under-prepared the first time I had to intubate an actual child. The same thing with starting IVs.” • “When I went through my paramedic class, we never had to go through a pediatric ward. We didn’t have to do neonatal intensive care. We really didn’t have access to the small patients. All we dealt with were adult patients.” • “I was privileged - we got to go through sim labs, where it was all controlled and they could give a baby a particular cardiac rhythm and if you treated it inappropriately, they could change that rhythm very quickly on you. Then, of course, you had your standard book work.” • “I find that there’s no hands on. They just want you to watch. So basically we have to take our training and learn on the job when it comes to pediatrics.” • “It’s the stuff that we don’t see a whole lot of – like pediatric cardiac arrest. You know, what are the drugs? We just don’t train enough on that kind of stuff. I can tell you, in 10 years I’ve never had a pediatric cardiac arrest.”
<p>ED Staff Interactions/Patient Care Follow-up and Feedback</p> <ul style="list-style-type: none"> • “If you do something wrong. If we did something wrong they’re all about telling us. That’s good. Don’t get me wrong, that’s very good. But as far as doing a good job, I’ve never gotten a pat on the back or kudos.” • “We want to know the end result. In today’s medical world, we get about two-thirds down the road and the map ends and you never know the destination. So, that’s frustrating for EMS professionals.” • “I think the other problem is HIPAA violations. I mean, people get really scared and clam up with HIPAA, but if you know what the fine lines are and the basic guidelines of HIPAA, there’s a lot you can give out without violating it, especially between two health care providers. And that’s been a big reason why we don’t get reports.”
<p>Current Practice Experience/Barriers to Maintaining Pediatric Skills</p> <ul style="list-style-type: none"> • “In my opinion, when I get nervous, it’s typically on a pediatric call.” • “I’ve worked here for three years and I’ve had two child codes, a 13-year-old and a 4-year-old. It’s something you’re never comfortable with.” • “In any children’s hospital, that they put forth the effort to go out to train people in a pre-hospital setting. I’ll bet they’ll find a lot of people who are really eager and willing to learn as much as they can.”
<p>How to Improve Training</p> <ul style="list-style-type: none"> • “I would love to go to another hospital where there are sick children and work with these children for a little while just for my own knowledge, how I would want to treat them in the field.” • “Pediatric resuscitation should be practiced at least a couple of times a year. I mean once a year is just not enough. I would also be aggressive to say once every other month.” • “I would like to see, maybe quarterly, the availability to come in and do intubations. Like an intubation lab, an IV station. Whether we are just following a physician (and hopefully it could be somebody that would really take what we do seriously.) You know, I wish we had that available to us. Where we could go in

Brown © 2017 Prehospital and Disaster Medicine

Table 2. Representative Quotes (continued)

<p>and get our hands dirty, with somebody else watching us and teaching us.”</p>
<ul style="list-style-type: none"> • “You can stare at a power-point nonstop but until you get your hands on it, it doesn’t sink in.”

Brown © 2017 Prehospital and Disaster Medicine

Table 2. Representative Quotes

Abbreviations: EMS, Emergency Medical Services; HIPAA, Health Insurance Portability and Accountability Act; IV, intravenous.

<ul style="list-style-type: none"> • Special-Needs Patients • Limited Travel Time & Budgets • Obsolete Pediatric Protocols • PowerPoint Not Ideal • Limited Time for Pediatric Curriculum • EMS Instructors Not Experienced

Brown © 2017 Prehospital and Disaster Medicine

Figure 3. Problems with Current Educational Strategies.

Abbreviation: EMS, Emergency Medical Services.

some degree, with their own ability and their EMS systems’ ability when confronted with a critical pediatric call. The level of EMT training and hours of continuing education may influence the level of comfort when confronting a pediatric emergency.²⁹ In contrast, this study identified important communication issues during handoffs between the ED team and EMS providers for pediatric patient care. Furthermore, many of the EMS respondents expressed discomfort when confronted with critically ill pediatric patients—regardless of level of training.

These findings are consistent with a previous survey study describing deficient pediatric education for EMS providers.³⁰ These authors surveyed EMS for Children (EMS-C) program managers inquiring about the certification and recertification processes of EMS providers, as well as barriers to pediatric training. They found that a requirement for pediatric education hours exists in more states and territories for recertification (63%-67%) than initial certification (41%). Additionally, they described barriers to pediatric education: funding, time, instructors, and accessibility. This study’s focus group participants desired pediatric-specific emergency medicine physicians as instructors since they had significant experience. These results combined with Ngo’s findings suggest an asynchronous, mixed method of education could help address the issues of time, travel, and accessibility currently hindering EMS provider education.³⁰

Recently, focus groups in EMS have helped to understand the nature and contributions to safety events in the pediatric EMS setting.³¹ Similar to this study, concerns regarding pediatric equipment that is present on ambulances, medication dosing issues, as well as concerns with EMS training and culture were found. In contrast, the study methods utilized a professional moderator who was not otherwise affiliated with the study, thus potentially decreasing bias. Additionally, the emphasis on educational deficits revealed the misinterpretation of HIPAA and its effect on the feedback process.

One previous study used qualitative research methods to evaluate pediatric EMS education.^{32,33} The findings of this study are consistent with the previous study in describing barriers of cost, distance, and time for rural EMS providers who seek

pediatric-specific training. Interestingly, it appears that the findings are consistent between geographically different regions, the Northwest versus Midwest United States. The previous study divided focus groups by level of training, whereas this study divided groups based on job role, administrative versus non-administrative, as well as by practice setting (rural, suburban, and urban). The findings differed between groups in terms of the location of infrequently used pediatric equipment. While the study findings were similar in recommending increased pediatric training for critically ill and medically complex pediatric patients, as well as recommending focused lectures followed by focused simulation, the study participants preferred a different approach to increase time with children during training. Specifically, the respondents described general pediatrician offices as less than ideal training sites due to a paucity of critically ill patients and procedures in comparison to pediatric EDs. Exposing EMS personnel to critical care arenas may increase their knowledge and experience when caring for similar patients in the prehospital setting.

Finally, the findings are consistent with and complement a recent national report, the 2011 National EMS Assessment.³⁴ This report highlighted multiple pediatric equipment and communication deficiencies, including: (1) the lack of pediatric specific equipment on ambulances; (2) insufficient attempts by EMS teams to contact medical direction when treating a pediatric patient; and (3) the lack of hospital capability of treating pediatric trauma patients (only 28% nationally). In addition to the National EMS Assessment, this work supports the need for further study of the Pediatric Emergency Care Applied Research Network (PECARN) high-priority EMS research topics for children.³⁵

Future Hypotheses

Based on the findings, five hypotheses were derived that may improve EMS provider preparation to deliver care to children:

1. Online asynchronous education targeting busy EMS providers may help fulfill their educational needs. This online education could easily fit into most EMS agency budgets while making the current barrier of distance (for suburban and rural agencies) obsolete. Additionally, online education could be accessed at any time—reaching all providers, no matter their work schedule. Online education may serve as a foundation upon which focused, on-site simulation could further increase pediatric knowledge and skill sets.
2. A HIPAA-compliant approach for feedback may provide educationally important de-briefing on high-acuity patients.
3. For ongoing EMS education, standardizing the initial and continuing pediatric training for all EMS providers,

nationwide or regionally, may result in EMS teams who are better prepared for the critically ill pediatric patient.

4. Increasing focused instruction on four resuscitation skills (airway maintenance, intravenous access, drug calculations, and medication administration) may result in an improved EMS experience for the patient and family.
5. Targeted education regarding special needs and medically fragile pediatric populations may fill a current void in the EMS provider knowledge base.

Limitations

Variation in the amount of time the administration group members actually spend in the field may have affected perspective and responses. Additionally, self-selection of participants demonstrates some potential bias of respondents. Bias was reduced through inclusion of three different regions in the state and sampling administrative and non-administrative EMS professionals. This also increases understanding and further development of needs for the frontline EMS worker. Also, since participants were anonymous, it was impossible to extrapolate the experience level of each participant.

Additionally, the research was performed with active EMS systems and frequently, during times of EMS coverage. Subsequently, meetings occasionally were interrupted with simultaneous emergency calls that required response of some of the EMS providers. This issue of staffing coverage may have influenced responses in rural areas where there were no back-up teams available to cover for the on-duty participants.

Finally, the presence of the principal investigator may have influenced the responses of participants. This limitation may have been offset by the benefit that the principal investigator could clarify points when the non-medically trained moderator needed assistance during the focus group. Fortunately, this participation was rare.

Conclusions

This focus group approach identified four major themes surrounding preparation of EMS personnel for providing care to pediatric patients. These four major themes expand and complement previous conclusions from other methodology. It also offers five hypotheses based on the major themes as future possible endeavors to improve the preparation of EMS providers to provide effective care to pediatric patients. Most EMS agencies are fertile ground for future outreach and collaboration.

Supplementary Material

To view supplementary material for this article, please visit <https://doi.org/10.1017/S1049023X16001230>

References

1. Tsai A, Kallsen G. Epidemiology of pediatric prehospital care. *Ann Emerg Med.* 1987;16(3):284-292.
2. Fleischman R, Yarris LM, Curry MT, Yuen SC, Breon AR, Meckler GD. Pediatric educational needs assessment for urban and rural emergency medical technicians. *Pediatr Emerg Care.* 2011;27(12):1130-1135.
3. National EMS Core Content, 2005. <http://www.ems.gov/education/EMSCoreContent.pdf>. Accessed May 17, 2014.
4. National EMS Scope of Practice Model, 2006. <http://www.ems.gov/education/EMSScope.pdf>. Accessed May 17, 2014.
5. National EMS Education Standards, 2009. <http://www.ems.gov/pdf/811077a.pdf>. Accessed May 17, 2014.
6. Baker T, King W, Soto W, Asher C, Stolfi A, Rowin ME. The efficacy of pediatric Advanced Life Support training in Emergency Medical Service providers. *Pediatr Emerg Care.* 2009;25(8):508-512.
7. Losek J, Szweczuga D, Glaeser PW. Improved prehospital pediatric ALS care after an EMT-paramedic clinic training course. *Am J of Emerg Med.* 1994;12(4):429-432.
8. Wyatt J. When to use web based surveys. *J Am Med Inform Assoc.* 2000;7(4):426-429.
9. Grudzen CR, Timmermans S, Koenig WJ, et al. Paramedic and emergency medical technician's views on opportunities and challenges when forgoing and halting resuscitation in the field. *Acad Emerg Med.* 2009;16(6):532-538.
10. Butterfoss F, Major DA, Clarke SM, et al. What providers from general emergency departments say about implementing a pediatric asthma pathway. *Clin Pediatr.* 2006;45(4):325-333.
11. Cooper S. Contemporary UK paramedical training and education. How do we train? How should we educate? *Emerg Med J.* 2005;22(5):375-379.
12. Miles D. Quality indicators for out-of-hospital Emergency Medical Services: the paramedics' perspective. *Prehosp Emerg Care.* 1997;1(1):23-27.

13. Thomas J, Abo BM, Wang HE. Paramedic perceptions of challenges in out-of-hospital endotracheal intubation. *Prehosp Emerg Care.* 2007;2(2):219-223.
14. Kitzinger J. Qualitative research: introducing focus groups. *BMJ.* 1995;311:299-302.
15. Patton MQ. *Qualitative Evaluation and Research Methods.* (2nd edition). Thousand Oaks, California USA: Sage Publications; 1990.
16. Denzin N, Lincoln Y. *Handbook of Qualitative Research.* Second Edition. Thousand Oaks, California USA: Sage Publications; 2000.
17. Mathison S. Why triangulate? *Educational Researcher.* 1988;17(2):13-17.
18. ATLAS qualitative software informational website. <http://www.atlasti.com/index.html>. Accessed April 7, 2014.
19. Seidel JS, Hornbein M, Yoshiyama K, Kuznets D, Finklestein JZ, St Geme JW Jr. Emergency Medical Services and the pediatric patient: are the needs being met? *Pediatrics.* 1984;73(6):769-772.
20. Seidel JS, Henderson DP, Ward P, Wayland BW, Ness B. Pediatric prehospital care in urban and rural areas. *Pediatrics.* 1991;88(4):681-690.
21. Kumar VR, Bachman DT, Kiskaddon RT. Children and adults in cardiopulmonary arrest: are advanced life support guidelines followed in the prehospital setting? *Ann Emerg Med.* 1997;29(6):743-747.
22. Su E, Schmidt TA, Mann NC, Zechnich AD. A randomized controlled trial to assess decay in acquired knowledge among paramedics completing a pediatric resuscitation course. *Acad Emerg Med.* 2000;7(7):779-786.
23. Youngquist ST, Henderson DP, Gausche-Hill M, Goodrich SM, Poore PD, Lewis RJ. Paramedic self-efficacy and skill retention in pediatric airway management. *Acad Emerg Med.* 2008;15(12):1295-1303.
24. Hoyle JD, Davis AT, Putman KK, Trytko JA, Fales WD. Medication dosing errors in pediatric patients treated by emergency medical services. *Prehosp Emerg Care.* 2012;16(1):59-66.
25. Lammers RL, Byrwa MJ, Fales WD, Hale RA. Simulation based assessment of paramedic pediatric resuscitation skills. *Prehosp Emerg Care.* 2009;13(3):345-356.
26. Cushman JT, Fairbanks RJ, O'Gara KG, et al. Ambulance personnel perceptions of near misses and adverse events in pediatric patients. *Prehosp Emerg Care.* 2010;14(4):477-484.
27. Glaeser P, Linzer J, Tunik MG, Henderson DP, Ball J. Survey of nationally registered Emergency Medical Services providers: pediatric education. *Ann Emerg Med.* 2000;36(1):33-38.
28. Institute of Medicine. *Emergency Care for Children: Growing Pains.* Washington, DC USA: National Academies Press; 2006.
29. Stevens S, Alexander JL. The impact of training and experience on EMS providers' feelings toward pediatric emergencies in a rural state. *Pediatr Emerg Care.* 2005;21(1):12-17.
30. Ngo T, Belli K, Shah MI. EMS-C program manager survey on education of prehospital providers. *Prehosp Emerg Care.* 2014;18(3):424-428.
31. Cottrell EK, O'Brien K, Curry M, et al. Understanding safety in prehospital Emergency Medical Services for children. *Prehosp Emerg Care.* 2014;18(3):350-358.
32. Breon AR, Yarris L, Law J, Meckler G. Determining the pediatric educational needs of prehospital providers, part 1. *J Paramedic Practice.* 2011;3(8):450-456.
33. Breon AR, Yarris L, Law J, Meckler G. Determining the pediatric educational needs of prehospital providers, part 2. *J Paramedic Practice.* 2011;3(9):510-514.
34. 2011 National EMS Assessment. http://ems.gov/pdf/2011/National_EMS_Assessment_Final_Draft_12202011.pdf. Accessed January 19, 2012.
35. Foltin G, Dayan P, Tunik M, et al. Priorities for pediatric prehospital research. *Pediatr Emerg Care.* 2010;26(10):773-777.