Pediatric Educational Needs Assessment for Urban and Rural Emergency Medical Technicians

Ross J. Fleischman, MD, MCR, Lalena M. Yarris, MD, MCR,* Merlin T. Curry, BS, EMT-P,* Stephanie C. Yuen, BS,* Alia R. Breon, MD,* and Garth D. Meckler, MD, MSHS†*

Objective: The objective of the study was to identify past experiences, present needs, barriers, and desired methods of training for urban and rural emergency medical technicians.

Methods: This 62-question pilot-tested written survey was administered at the 2008 Oregon EMS and 2009 EMS for Children conferences. Respondents were compared with registration lists and the state emergency medical services (EMS) database to assess for nonresponder bias. Agencies more than 10 miles from a population of 40,000 were defined as rural.

Results: Two hundred nineteen (70%) of 313 EMS personnel returned the surveys. Respondents were 3% first responders, 27% emergency medical technician basics, 20% intermediates, and 47% paramedics. Sixty-eight percent were rural, and 32% were urban. Sixty-eight percent reported fewer than 10% pediatric transports. Overall, respondents rated their comfort caring for pediatric patients as 3.1 on a 5-point Likert scale (95% confidence interval, 3.1–3.2). Seventy-two percent reported a mean rating of less than "comfortable" (4 on the scale) across 17 topics in pediatric care, which did not differ by certification level. Seven percent reported no pediatric training in the last 2 years, and 76% desired more. The "quality of available trainings" was ranked as the most important barrier to training; 26% of rural versus 7% of urban EMS personnel ranked distance as the most significant barrier ($P < 0.01$). Fifty-one percent identified highly realistic simulations as the method that helped them learn best. In the past 2 years, 19% had trained on a highly realistic pediatric simulator. One to 3 hours was the preferred duration for trainings.

Conclusions: Except for distance as a barrier, there were no significant differences between urban and rural responses. Both urban and rural providers desire resources, in particular, highly realistic simulation, to address the infrequency of pediatric transports and limited training.

Key Words: EMS, prehospital emergency care, medical education, rural health

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Children represent between 4 and 13% of the patients transported by emergency medical services (EMS).[1–5] This wide variation is due to regional differences, study methodology, and the age definition used. Although out-of-hospital providers are expected to meet educational standards for managing acutely ill adults, it is unclear whether they have adequate training for pediatric emergencies. Children experience distinct disease processes, need different methods of assessment, and require age-, weight-, and size-specific knowledge of vital signs and drug dosages. Quality EMS care requires training providers in this specialized body of knowledge.

The Institute of Medicine's (IOM's) 2006 report, *Emergency Care for Children, Growing Pains*, identifies limited initial training, infrequent cases, and medic discomfort caring for children as obstacles to quality out-of-hospital care for children.[6] Studies cited by the article report low requirements for initial training and continuing education for out-of-hospital providers.[7–10] This problem is compounded by low volumes of case experiences needed to maintain proficiency.

Since the studies cited by the IOM report, efforts to develop educational standards have progressed. The general outline of EMS training in the United States, the National Highway Traffic Safety Administration National Standard Curriculum, was developed in 1998. Important continuing education programs were also released after some of the cited studies, including Pediatric Education for Paramedics in 1995 (renamed and expanded as Pediatric Education for Prehospital Providers in 2000), the National Association of Emergency Medical Technicians Pediatric Prehospital Care course in 2000, and other regionally developed courses.[11–13] Ours is one of the few studies conducted in the past 5 years to examine the potential impact of these efforts and measure the progress incited by the IOM report.

This study was designed to assess the educational needs of out-of-hospital providers in managing pediatric emergencies. Our primary objective was to identify past educational and field experiences, barriers to training, and perceived areas of training needs among practicing emergency medical technicians (EMTs). We hypothesized that experience, needs, and barriers would differ between urban and rural providers.

METHODS

Study Setting and Participants

We surveyed out-of-hospital providers attending the October 2008 Oregon State EMS conference and the February 2009 Oregon EMS for Children (EMS-C) conference. These conferences represent the only statewide EMS conferences and are advertised on the state EMS and EMS-C Web sites, as well as through e-mail and mailings to all transporting EMS agencies. Grants were available through the state EMS-C program to offset costs for participants. All first responders, EMT basics, EMT intermediates, and EMT paramedics were given a survey by study personnel upon arrival to the conference, along with a brief information sheet inviting them to participate. As an incentive, participants were entered in a drawing for an iPod. Because some overlap between participants at the October and February meetings was anticipated, attendees of the latter meeting were asked if they had previously participated, and if so, they were not given a survey but were still allowed to enter the iPod drawing. Oregon first responders, EMT basics, and EMT paramedics are certified according to the

From the *Center for Policy and Research in Emergency Medicine, Department of Emergency Medicine; and †Departments of Emergency Medicine and Pediatrics, Oregon Health and Science University, Portland, OR.
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Reprints: Ross J. Fleischman, MD, MCR, Department of Emergency Medicine, Oregon Health and Science University, 3181 SW Sam Jackson Park Rd, Mail Code CR114, Portland, OR 97239 (e-mail: fleischr@ohsu.edu).
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National Standard Curricula. At the time of our survey, EMT-intermediate certification was based on a curriculum unique to Oregon requiring an additional 120 hours of training beyond EMT basic. Their scope of practice includes pharyngeal airways devices, cardiac monitoring, peripheral intravenous access, first-line emergency medications, and additional pediatric continuing education requirements.

Data Collection

The instrument was a 62-question, anonymous, 5-page survey. Survey item content was drawn from published data describing the needs of out-of-hospital providers in pediatric training as well as consensus of the study group. Each item was evaluated for clarity and meaning by read-aloud sessions by the investigators and piloted on 6 EMTs. The initial group of items asked respondents to rate how they "feel about caring for pediatric patients" on a 5-point Likert-type scale ranging from "dislike" to "like." The next section asked their level of comfort across 17 topics, age groups, and procedural areas on a 5-point scale ranging from "very uncomfortable" to "very comfortable." The next section prompted respondents to use check boxes and rankings to describe past training experiences, barriers to additional training, and perceived needs for additional training. Training was categorized by type (highly realistic simulations, simulation with simple mannequins, lectures and classes, case reviews, regional conferences and meetings, live video conferences, and Internet based). Highly realistic simulators were described as "mannequins that simulate real patients, allowing you to assess breath sounds, pulses, and rhythms; practice procedures such as intravenous and IO placement; and respond to your interventions." The terms "pediatrics" and "pediatric patients" were used throughout the survey but were not explicitly defined by age.

The final section collected demographic information including age, sex, level of training, years of experience, whether respondents had children, type of position, type of agency, and agency zip code.

The study was approved by the primary institution's institutional review board. Written informed consent was obtained from all subjects.

Outcomes

Our primary outcome variables included the types of training received by EMS personnel in the last 2 years, percentage of transports involving children, comfort level with topics in pediatric care, barriers to additional training, and perceived need for additional training. Secondary outcomes included past experiences with and future interest in simulation training. Based on expecting

TABLE 1. Characteristics, Training, and Field Experiences of EMS Personnel Completing the Pediatric Out-of-Hospital Care Needs Assessment Survey (n = 219)

Variable	Overall (n = 219)	Urban* (n = 61, 32%)	Rural* (n = 129, 68%)	*P* for Urban vs Rural
Male sex, n (%)	119 (55)	36 (59)	71 (55)	0.61
Age, mean (95% CI), y	42 (range, 41–44)	41	43	0.34
Level of certification, n (%)				**<0.001**
First responder	7 (3)	2 (3)	5 (4)	
EMT basic	58 (27)	11 (18)	42 (33)	
EMT intermediate	43 (20)	5 (8)	32 (25)	
EMT paramedic	103 (47)	43 (71)	47 (37)	
Years in EMS, mean (95% CI)	14 (12–15)	15 (13–18)	13 (11–14)	0.08
Has children	168 (77)	40 (66)	107 (83)	**<0.01**
Volunteer only	82 (37)	11 (18)	66 (51)	**<0.001**
Training in last 2 y, n (%)				
PALS	115 (53)	34 (56)	65 (50)	0.49
Pediatric assessment	99 (45)	24 (39)	60 (47)	0.35
Pediatric intraosseus insertion	95 (44)	32 (52)	51 (40)	0.09
Pediatric resuscitation	90 (41)	26 (43)	56 (43)	0.92
Pediatric trauma	80 (37)	16 (26)	52 (40)	0.07
Pediatric airway/intubation	66 (30)	21 (34)	34 (26)	0.25
Pediatric respiratory	66 (30)	16 (26)	42 (33)	0.38
Pediatric medications	47 (22)	16 (26)	25 (19)	0.28
Pediatric Education for Prehospital Providers	43 (20)	13 (21)	25 (19)	0.76
Pediatric shock	38 (17)	8 (13)	34 (18)	0.24
Neonatal Resuscitation Program	22 (10)	8 (13)	13 (10)	0.53
None	16 (7)	3 (5)	10 (8)	0.55
Percentage of transports involving pediatric patients, n (%)				**<0.01**
<10%	149 (73)	48 (82)	85 (70)	
10%–25%	45 (22)	8 (14)	32 (25)	
25%–50%	7 (3)	0 (0)	6 (5)	
>50%	3 (1)	3 (5)	0 (0)	

*Not all respondents could be classified as urban or rural.

Entries in bold indicate statistical significance of $P < 0.05$.

to detect a difference in mean comfort level between urban and rural respondents of 0.5 on a 5-point Likert scale, a 2-sided α of 0.05, power of 0.9, 2:1 ratio of rural to urban respondents, and an SD of 0.66, we calculated a need for 84 subjects.

Data Analysis

Surveys were transcribed into a Microsoft Excel (Microsoft, Redmond, Wash) spreadsheet by a single reviewer. Mean ages between urban and rural providers were compared using a *t* test. A χ^2 test was used to compare categorical outcomes between urban and rural groups. Fisher exact test was used when expected cell counts were less than 5 (number reporting no training in the last 2 years, level of training, and percentage of transports involving children). The 17 Likert-scale questions regarding comfort levels were averaged and compared between urban and rural groups using a *t* test. They were also compared dichotomously by a χ^2 test around a threshold of 3.5 (between neutral and comfortable). Ranked items were compared between urban and rural by the χ^2 test using count data of the respondents' first choice.

Rural providers were classified by the zip code of their agency according to the definition used by the Oregon Office of Rural Health of falling more than 10 miles from a population center of 40,000. Providers who could not be classified as urban or rural (eg, no zip code given or coming from beyond areas immediately bordering Oregon) were excluded from the comparisons between urban and rural providers.

The relationship between EMS personnel's reported comfort level on a topic and their interest in training in that area was tested by Pearson correlation coefficient (*r*). We determined response rate and tested for nonresponder bias by comparing the sex and urban status of our respondents with the list of conference registrants. We tested for representativeness by comparing the age, sex, level of certification, and urban status of our respondents to an anonymous list of all Oregon EMS providers obtained from the state EMS office. Statistical tests were performed with Stata 11 (StataCorp LP, College Station, Tex).

RESULTS

Two hundred nineteen of 313 eligible conference participants completed and returned the survey (70% response rate). Table 1 describes the demographic characteristics of the participants. Responders were not significantly different than all conference attendees eligible to complete the survey in terms of level of certification and sex. Our sample was considerably more rural (68%) than the state EMS workforce of 6899 providers (44%, $P \leq 0.001$). Paramedics comprised a greater percentage of respondents (50% vs 38%) compared with the state EMS workforce as a whole. Emergency medical technician basics made up a smaller percentage compared with the state (27% vs 43%). Our sample was composed of fewer men (55%) compared with the state EMS workforce (83%). Respondents were also older, with a mean age of 42 versus 40 years for the state EMS workforce as a whole ($P < 0.01$).

Table 1 also shows past experiences with pediatric training and transports. The American Heart Association's Pediatric Advanced Life Support (PALS) program was the most commonly conducted training. Seven percent of respondents reported having received no pediatric training in the last 2 years. Nearly 3 quarters of medics reported that fewer than 10% of their transports involved pediatric patients. Of those for whom it was relevant to their level of certification, 51% (95% confidence interval [CI], 44%–59%) reported adequate training in pediatric intraosseus access.

TABLE 2. Attitudes and Comfort Levels Related to Pediatric Out-of-Hospital Care (n = 219)

Variable	Overall (n = 219)	Urban* (n = 61, 32%)	Rural* (n = 129, 68%)	*P* for Urban vs Rural
"How do you feel about caring for pediatric patients?"†	3.4 (3.2–3.6)	3.5 (3.2–3.8)	3.3 (3.1–3.6)	0.33
Comfort level across 17 topics and age groups	3.1 (3.1–3.2)	3.1 (3.0–3.3)	3.1 (3.0–3.2)	0.99
Airway management	3.4 (3.2–3.5)	3.5 (3.2–3.7)	3.4 (3.2–3.5)	0.43
Trauma	3.4 (3.3–3.5)	3.5 (3.2–3.7)	3.4 (3.2–3.5)	0.45
Seizures	3.4 (3.2–3.5)	3.5 (3.2–3.8)	3.4 (3.2–3.5)	0.31
Infectious disease	3.2 (3.1–3.3)	3.0 (2.8–3.2)	3.3 (3.1–3.4)	0.11
Nonaccidental trauma/abuse	3.2 (3.0–3.3)	3.0 (2.8–3.3)	3.2 (3.0–3.4)	0.27
Pain assessment	3.2 (3.1–3.4)	3.0 (2.7–3.2)	3.3 (3.1–3.5)	**<0.03**
Respiratory illness	3.1 (3.0–3.2)	3.0 (2.7–3.2)	3.1 (2.9–3.2)	0.60
Shock	3.1 (3.0–3.2)	3.0 (2.7–3.2)	3.2 (3.0–3.3)	0.18
Vascular access	3.0 (2.9–3.2)	3.2 (2.9–3.5)	2.9 (2.7–3.2)	0.20
Giving bad news	2.8 (2.6–2.9)	2.7 (2.4–3.0)	2.8 (2.6–3.0)	0.60
Medication dosing	2.7 (2.6–2.9)	2.8 (2.6–3.1)	2.7 (2.5–2.9)	0.33
Newborn resuscitation	2.7 (2.5–2.8)	2.7 (2.4–2.9)	2.7 (2.5–2.9)	0.99
Cardiac arrest and arrhythmias	2.7 (2.6–2.9)	2.9 (2.6–3.2)	2.7 (2.5–2.9)	0.24
Comfort level by age group				
Infants <1 y	2.7 (2.6–2.9)	2.9 (2.6–3.1)	2.7 (2.5–2.9)	0.22
Young children 1–4 y	3.2 (3.1–3.3)	3.2 (3.0–3.4)	3.2 (3.0–3.4)	0.88
Children 5–10 y	3.7 (3.6–3.9)	3.7 (3.5–4.0)	3.7 (3.6–3.9)	0.94
Older children and adolescents	4.1 (4.0–4.2)	4.0 (3.8–4.3)	4.1 (3.9–4.2)	0.68

Values are 5-point Likert score mean (95% CI).

*Not all respondents could be classified as urban versus rural.

†1 = Very uncomfortable, 5 = very comfortable.

Entries in bold indicate statistical significance of $P < 0.05$.

Table 2 shows participants' attitudes toward pediatric out-of-hospital care. Respondents reported highest comfort with airway management, trauma, and seizures. They reported the lowest comfort ratings with pediatric cardiac arrest and arrhythmias, newborn resuscitation, and medication dosing. Comfort level increased with patients' age from infants through adolescents. None of these findings differed significantly between urban and rural providers except that urban providers reported lower comfort with pain assessment. Overall, 72% of EMS personnel reported a mean comfort level across pediatric topics and age groups corresponding to less than comfortable ($P < 0.99$ for urban versus rural).

Table 3 shows out-of-hospital providers' attitudes toward additional training. More than 3 quarters desired to spend more of their continuing education time on pediatric topics. There was poor correlation between respondents' comfort levels with pediatric topics and their desire for training in those areas. The strongest correlation was for delivering bad news ($r = -0.31$). The mean correlation coefficient across all 17 areas was −0.09. Highly realistic simulation training was the method that most participants reported "helps them learn best." Emergency medical services personnel ranked "the quality of available trainings" as the foremost barrier to additional trainings. Distance to training was the only barrier that was ranked significantly differently between urban and rural providers (8% of urban providers vs 26% of rural, $P < 0.01$). Providers most commonly chose 1 to 3 hours as their preferred duration of training (34%; 95% CI, 27%–40%). Nineteen percent reported using highly realistic pediatric simulation training in the last 2 years (95% CI, 14%–24%). Of those who had used either an adult or pediatric highly

TABLE 3. EMS Personnel's Interest in Additional Training in Pediatrics (n = 219)

Variable	Overall (n = 219)	Urban* (n = 61, 32%)	Rural* (n = 129, 68%)	P for Urban vs Rural
Would like to spend more time on pediatrics, n (%)	116 (76)	46 (75)	100 (77)	0.75
Interest in additional training topics, 5–point Likert scale mean (95% CI)				
Airway management	4.4 (4.3–4.5)	4.3 (4.2–4.5)	4.4 (4.3–4.5)	0.72
Neonatal resuscitation	4.3 (4.2–4.4)	4.3 (4.1–4.5)	4.3 (4.1–4.5)	0.81
Respiratory illness	4.3 (4.2–4.4)	4.4 (4.2–4.6)	4.3 (4.1–4.4)	0.36
Pain assessment	4.2 (4.1–4.3)	4.3 (4.1–4.5)	4.2 (4.0–4.3)	0.47
Cardiac arrest and arrhythmias	4.2 (4.1–4.3)	4.3 (4.1–4.5)	4.2 (4.0–4.4)	0.39
Trauma	4.2 (4.1–4.3)	4.2 (4.0–4.4)	4.3 (4.1–4.4)	0.49
Shock	4.2 (4.1–4.3)	4.3 (4.1–4.5)	4.2 (4.0–4.3)	0.46
Medication dosing	4.1 (3.9–4.2)	4.2 (4.0–4.5)	4.0 (3.8–4.2)	0.41
Seizures	4.1 (3.9–4.2)	4.0 (3.7–4.2)	4.1 (4.0–4.3)	0.21
Infectious disease	4.0 (3.9–4.1)	4.0 (3.8–4.2)	4.0 (3.8–4.2)	0.86
Abuse and nonaccidental trauma	4.0 (3.9–4.2)	4.0 (3.7–4.2)	4.1 (3.9–4.2)	0.41
Giving bad news	3.8 (3.7–4.0)	3.9 (3.6–4.1)	3.9 (3.7–4.0)	0.82
Vascular access	3.8 (3.7–4.0)	3.9 (3.6–4.1)	3.7 (3.5–4.0)	0.47
Interest in additional training by age group, 5–point Likert scale mean (95% CI)				
Infants <1 y	4.3 (4.2–4.4)	4.4 (4.2–4.6)	4.3 (4.2–4.5)	0.73
Young children 1–4 y	4.2 (4.1–4.3)	4.3 (4.1–4.5)	4.2 (4.1–4.3)	0.55
Children 5–10 y	3.9 (3.8–4.1)	4.0 (3.7–4.2)	4.0 (3.8–4.1)	0.99
Older children and adolescents	3.7 (3.6–3.9)	3.8 (3.5–4.0)	3.8 (3.6–4.0)	0.80
Preferred learning method, n (%)				
Highly realistic simulations	112 (51)	31 (51)	64 (50)	0.88
Lectures and classes	72 (33)	18 (30)	45 (35)	0.46
Case reviews	41 (19)	14 (23)	20 (16)	0.21
Simulation with simple mannequins	35 (16)	13 (21)	21 (16)	0.40
Regional conferences and meetings	19 (9)	3 (5)	13 (10)	0.23
Live video conferences	4 (2)	0 (0)	4 (3)	0.17
Internet based	4 (2)	0 (0)	4 (3)	0.17
Foremost barrier to training, n (%)				
Quality of available trainings	71 (32)	23 (38)	40 (31)	0.36
Time	64 (29)	12 (20)	40 (31)	0.10
Cost	51 (23)	18 (30)	26 (20)	0.15
Distance to training sites	46 (21)	5 (8)	34 (26)	**<0.01**
"I don't desire any additional trainings beyond what I'm getting"	7 (3)	4 (7)	3 (2)	0.15

*Not all respondents could be categorized as urban or rural.

Entries in bold indicate statistical significance of $P < 0.05$.

realistic simulator, 88% (95% CI, 81–94%) reported that it enhanced their training experience (96% for urban, 85% for rural, $P = 0.16$). If the opportunity to use a highly realistic pediatric simulator were available in their area, 95% reported that they would likely or very likely take advantage of the opportunity ($P = 0.53$).

DISCUSSION

In our survey of Oregon out-of-hospital care providers, EMS personnel identified limited past training, infrequent patient contacts, and a low level of comfort with dealing with pediatric emergencies. The needs of urban and rural providers were generally similar except that rural providers identified distance as a significant barrier to quality education more often than did urban providers.

The reported lack of training may stem from inconsistent standards. Neither the National Standard Curriculum, the National EMS Education Standard, nor the National Registry of Emergency Medical Technicians mandate a minimum number of hours of pediatric training for initial certification as an EMT basic or paramedic.[14,15] A 1986 survey of training programs nationwide reported an average of only 8 hours of initial pediatric didactic training and 15 hours for paramedics.[7] Our survey did not focus on initial training but on the experiences of the practicing medic, with only 25% of our respondents having attained their current level of certification within the previous 2 years. Until 2008, Oregon required only 4 hours of pediatric training every 2 years for paramedic recertification, which has since increased to 8 hours of combined pediatrics and obstetrics. We were surprised to find that 7% reported no pediatric training in the last 2 years. This conflicts with the recommendation of the National Council of State Emergency Medical Services Training coordinators for pediatric-specific training at least every 2 years.[16] Our results seem to show some improvement in pediatric continuing education over time: A 1997 survey of nationally registered EMTs reported 0 to 3 hours of pediatric training in the last 2 years for 25% of EMT basics and 6% of paramedics.[8] Our data may not be exactly comparable, however, because of the inclusion of first responders in our sample and the comparison between 0 to 3 hours in that study and no training in ours. These same studies were also consistent with our findings of limited case experience, with 73% of our respondents reporting that less than 10% of transports involved children. The same study of nationally registered EMTs of all levels found that 77% cared for fewer than 4 children younger than 17 years per month. Although we would expect that our overall case volume would be higher for urban than rural EMS personnel, therefore giving a higher pediatric volume, the reported proportion of transports involving children was not different between urban and rural providers in our sample. The importance of actual field experience in skill maintenance is highlighted by studies of the decay of classroom knowledge over time. A study of paramedics completing the 16-hour Oregon Pediatric Prehospital Critical Care Course found that knowledge and scenario performance had decayed to precourse levels by 12 months, regardless of whether EMS personnel received additional testing at 6 months.[17] These findings emphasize the importance of field experience in skill retention.

Our study showed a lower level of comfort with pediatric emergencies than the survey of nationally registered EMTs. In that study, more than 70% reported being comfortable "to some degree" with pediatric emergencies. We found that only 28% reported themselves as "comfortable" or "very comfortable" with pediatric emergencies. This difference may partially be explained by the different wording of the question. Also, individuals may tend to report higher levels of overall confidence than when asked to rate their comfort on individual topics. Nonetheless, our study seems to show a much lower level of self-reported comfort by EMS personnel in caring for children than the previous work.

Given the perceived deficits in training, 76% of respondents reported wanting to spend a greater amount of their continuing education time on pediatrics. Our results are consistent with the survey of nationally registered EMTs, of whom 76% supported state or national mandates for increasing pediatric continuing education time. Our respondents reported that the "quality of available trainings" was the foremost barrier to additional training. We believe that the perceived quality deficit is due to a mismatch between the types of training EMS personnel find valuable and what they receive. Providers report that highly realistic simulations were the most useful training method. Yet, the most commonly reported training course or topic was PALS, which is essentially a combination of lectures (the second most popular learning method) and simple simulation (the fourth most popular method).

Given the limited amount of training time, limited case experience, and desire for more training, our findings support developing highly realistic simulation programs for pediatric out-of-hospital emergencies. Highly realistic simulation represents some of the most important recent developments in emergency medical education.[18] However, our results show that it has not yet diffused into the community, with fewer than 20% having trained with a highly realistic pediatric simulator in the last 2 years. Among those who had done either pediatric or adult simulation, a very high percentage reported that it was beneficial, and a very high proportion of our sample reported interest in using a highly realistic simulator. As only 51% reported adequate training in intraosseus access, emphasizing that this easily taught and lifesaving skill seems beneficial.

We hypothesized significant differences between urban and rural providers in their experiences, needs, and barriers to quality pediatric education. We expected that our rural providers would face greater challenges such as lower case volumes, time and financial constraints of often being volunteers, and greater distances to training opportunities; however, their answers were generally similar to their urban counterparts. One of the few significant differences was the importance of distance to training for rural EMS personnel, highlighting the importance of regional availability of training efforts. One proposed solution to this obstacle is to develop mobile pediatric simulation training units.[13] Further research is necessary to determine whether such interventions would improve perceived needs and, ultimately, patient outcomes.

Limitations

As a survey, our study is limited to self-report and provider perceptions. Other studies of medical education have shown that self-assessments often poorly estimate competence when compared with observed measures.[19] In particular, a study reported that more than 95% of paramedics who failed tests of pediatric airway management skills reported confidence and lack of anxiety in those areas.[20] Perceived needs for training in various areas may not actually match the areas in which additional training would have the most clinical benefit. As we found almost no correlation between EMS personnel's comfort with various topics and their interest in additional training in those areas, it is unclear which topics should be prioritized in designing future EMS education efforts.

Convenience samples always have some degree of selection bias. Within the population of conference attendees eligible to complete the survey, bias was limited by a good response rate and our checks for differences between the respondents and the conference registration lists to the extent possible in an anonymous survey. With respect to generalizability to Oregon out-of-hospital providers as a whole, conference participants clearly represent a self-selected sample who are motivated to seek out high-quality continuing education. This may artificially inflate the reported interest in further training, as less motivated EMS personnel would likely obtain their required continuing education through easier means than traveling to conferences.

Our sample differed from overall state EMS provider characteristics in several areas and may not be generalizable to other regions. Our sample was considerably more rural, which may be explained by the fact that whereas urban providers tend to work for larger agencies that provide continuing education in-house, rural providers from smaller agencies must travel to conferences for their needs. The state-to-state variation in the scope of practice and frequency of EMT intermediates may also limit generalizability. It bears stating that a sample of nationally registered EMTs does not equal a national sample of registered EMTs.

CONCLUSIONS

Oregon's EMS personnel identified limited past training, infrequent patient contacts, and a low level of comfort in dealing with pediatric emergencies. The needs of urban and rural providers were generally similar, except that distance was a significant barrier for rural compared with urban providers. Emergency medical services personnel were interested in regionally based, highly realistic simulation trainings to address those challenges.

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