Assessing the Utility of Procedural Training for Pediatrics Residents in General Pediatric Practice

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Abstract

Background The Accreditation Council for Graduate Medical Education (ACGME) recommends that residents gain broad procedural competence in pediatrics training. There is little recent information regarding practice patterns after graduation.

Objective We analyzed reported procedures performed in actual practice by graduates of a general pediatrics residency program.

Methods We conducted an online survey from April 2007 to April 2011 of graduates of a single pediatrics program from a large children's hospital. Eligible participants completed general pediatrics residency training between 1992 and 2006. Graduates were asked about the adequacy of their training for each procedure, as well as the frequency of commonly performed procedures in their practice. As the primary analysis, procedures were divided into emergent and urgent procedures.

Results Our response rate was 54% (209 of 387). General pediatricians rarely performed emergent procedures, such as endotracheal intubation, intraosseous line placement, thoracostomy, and thoracentesis. Instead, they more commonly performed urgent procedures, such as laceration repair, fracture or dislocation care, bladder catheterization, foreign body removal, and incision and drainage of simple abscesses. Statistically significant differences existed between emergent and urgent procedures ($P < .001$).

Conclusions In a single, large, urban, pediatrics residency, 15 years of graduates who practiced general pediatrics after graduation reported they rarely performed emergent procedures, such as endotracheal intubation, but more often performed urgent procedures, such as laceration repair. These results may have implications for ACGME recommendations regarding the amount and type of procedural training required for general pediatrics residents.

Editor's Note: The online version of this article contains the survey instrument used in this study.

Introduction

In 1999, the Accreditation Council for Graduate Medical Education (ACGME) began requiring competency-based assessment by training programs, including broad procedural competence for pediatrics residents.[1] For the urban general pediatrician, access to multiple specialties and subspecialties may obviate the need for broad procedural training. Changes in insurance reimbursement may also change the practice of medicine because there may be an incentive to redirect procedures to other providers.

More recently, the approach to competency for complex procedures has been reconsidered, with recognition that uncommonly performed procedures necessitate frequent practice.[2–4] Few studies have investigated postgraduation competency, and a recent report by Wood et al[5] suggested that current training in newborn resuscitation, for example, may not provide sufficient preparation for those who plan to attend deliveries after graduation.

We sought to determine whether practicing general pediatricians regularly perform procedures common to the emergent and urgent care of children. Incorporating such information into the pediatrics curriculum may improve the preparation of current and future trainees for practice after residency.

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Funding: The authors report no external funding source for this study.

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Received October 23, 2011; revision received June 27, 2012; accepted December 10, 2012.

DOI: http://dx.doi.org/10.4300/JGME-D-11-00255.1

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Methods

Survey Design

We surveyed graduates to assess their familiarity with procedures required in the ACGME Program Requirements for Graduate Medical Education in Pediatrics (TABLE 1).[1] Questions focused on 2 basic concepts: (1) were residents adequately trained in the procedure during residency; and (2) how frequently did they perform the procedure in their current practice.

Setting and Participants

We conducted the survey at a single, large, primary and tertiary care, teaching hospital. Pediatrics residents at this hospital have diverse primary care experience, as well as required rotations in critical care subspecialties. Eligible participants included pediatrics graduates who graduated between 1992 and 2006 and were actively practicing ambulatory pediatrics. Graduates practicing in other subspecialties, those practicing transport or hospitalist medicine or those no longer practicing general pediatrics, were excluded from this analysis. A request to complete an online survey (provided as online supplemental material) was mailed to all graduates.

Data Analysis

We analyzed the performance of 4 emergent and 4 urgent procedures as groups. We categorized procedures as *emergent* if performing them immediately could prevent life-threatening adverse events (endotracheal intubation, intraosseous line placement, thoracostomy, and thoracentesis) and as *urgent* if the procedure required immediate management (laceration repair with sutures, laceration repair with tissue adhesive, reduction/splinting of simple dislocations and fractures, incision and drainage of superficial abscesses). The individual procedure data were combined into an emergent group and an urgent group. Each group represents the cumulative responses for the combined procedures. Therefore, each respondent may have up to 4 responses per group. If no response was given for individual questions, the remainder of the responses was still included in data analysis. If different responses were made to the same question, the responses to this question were removed.

The Mann-Whitney-Wilcoxon test was conducted to examine whether there was a statistically significant difference in ordinal frequency between emergent and urgent groups. Statistical analyses were performed with SPSS software, version 15 (IBM Corporation, Chicago, IL). The study was approved by the Institutional Review Board of the hospital.

Results

Our response rate was 54% (209 of 387). According to our exclusion criteria, we excluded 84 respondents from the analysis (73 graduates practicing subspecialty pediatrics, 8 who were hospitalists, and 3 who practiced transport medicine). Of the 125 general pediatrician respondents, 109 (87%) provided procedural data to analyze. We excluded 16 respondents (13%) for not completing the procedural section of the survey (n = 13) and who were not practicing clinical medicine (n = 3).

Respondents indicated that some procedures were nearly universally trained or not trained, whereas training for some procedures appeared more divergent (TABLE 2). The 4 emergent procedures were infrequently performed, whereas general pediatricians performed the urgent procedures more frequently (TABLE 3). For many of the procedures, frequency of procedures appeared to be related to adequacy of training (laceration repair, incision and drainage, foreign body removal). When comparing emergent versus urgent procedures combined as groups, urgent procedures were more commonly performed than were emergent procedures ($P < .001$).

For lumbar puncture (LP), most respondents (107 of 109, 98%) reported adequate training, but only 5 (5%) respondents reported performing LP routinely, 26 (25%) reported performing LP more often than once per year, 41 (39%) reported performing LP less than once per year, and 34 (32%) reported never performing the procedure. Similarly, for endotracheal intubation, 69 of 109 (63%) respondents reported adequate training and 33 of 109 (30%) reported some training; but endotracheal intubation was reported as routine for only 1 respondent. For incision and drainage of superficial abscesses, 97 respondents (90%) reported some or adequate training (11 [10%] reported no training), but 101 (95%) respondents reported having performed the procedure at some point after

What was known

Pediatrics residents must acquire broad procedural competence during their training. Little recent information is available regarding practice patterns after graduation to advise programs on the scope of that training.

What is new

A survey of 15 years of pediatrics graduates from a single program collected self-reported data on adequacy of procedural training and frequency of performance in practice.

Limitations

Survey data were subjective recollections of physicians' practice; the survey instrument was not validated, and the response rate was low.

Bottom line

Pediatrics residency graduates rarely performed emergent procedures, such as endotracheal intubation, but more often performed urgent procedures, such as repairs of lacerations. The results have implications for the amount and type of procedural training for general pediatrics residents.

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TABLE 1 **Accreditation Council for Graduate Medical Education (ACGME) Recommended Procedures[1,8]**

Current ACGME Recommendations	Proposed Changes for 2013 ACGME Requirements[b]
Basic and advanced life support	Bag-mask ventilation
Endotracheal intubation	Endotracheal intubation of neonates, endotracheal intubation of nonneonates[c]
Placement of intraosseous lines	
Placement of intravenous lines	Peripheral intravenous catheter placement
Arterial puncture	Arterial puncture,[c] arterial line placement[c]
Venipuncture	Venipuncture
Umbilical artery and vein catheterization	Umbilical catheter placement
Lumbar puncture	Lumbar puncture
Bladder catheterization	Bladder catheterization
Gynecologic evaluation of prepubertal and postpubertal females	
Wound care and suturing of lacerations	Simple laceration repair
Subcutaneous, intradermal, and intramuscular injections	Giving immunizations
Developmental screening test	
Procedural sedation	
Pain management	
Reduction and splinting of simple dislocations and fractures	Reduction of simple dislocation, temporary splinting of fracture
Circumcision[a]	Circumcision[c]
Tympanometry and audiometry interpretation[a]	
Vision screening[a]	
Hearing screening[a]	
Simple removal of foreign bodies[a]	Simple removal of foreign body
Inhalation medications[a]	
Incision and drainage of superficial abscesses[a]	Incision and drainage of abscess
Chest tube placement[a]	Chest tube placement[c]
Thoracentesis[a]	Thoracentesis[c]

[a] Residents should have exposure to these procedures or skills.
[b] Residents must also complete training and maintain certification in pediatric advanced life support, including simulated placement of an intraosseous line, and neonatal resuscitation.
[c] Residents must be competent in understanding the indications, contraindications, and complications of these procedures.

graduation (5 [5%] reported never performing the procedure).

Discussion

General pediatricians performed some procedures more commonly than they did others in their pediatric practice but infrequently performed emergent procedures, such as endotracheal intubation, intraosseous line placement, and thoracostomy and thoracentesis. Urgent procedures, such as fracture care, laceration repair, incision and drainage of abscesses, foreign body removal, and bladder catheterization, were commonly performed procedures.

A 1991 survey conducted by the American Board of Pediatrics described procedures that general pediatricians thought were necessary for pediatric training.[6] Eighty percent of respondents (2885 of 3606) cited 49 procedures as necessary for training, including endotracheal intubation, cardiopulmonary resuscitation, and arterial puncture. Also included in this list were procedures that are no longer routinely performed, such

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TABLE 2 **Adequacy of Training During Residency**

Procedure	Adequately Trained, No. (%)	Some Training, No. (%)	Not Trained, No. (%)
Endotracheal intubation, n = 109	69 (63)	33 (30)	7 (6)
Intraosseous line placement, n = 106	32 (30)	56 (53)	18 (17)
Thoracentesis, n = 109	6 (6)	40 (37)	63 (58)
Chest tube placement, n = 107	12 (11)	51 (48)	44 (41)
Lumbar puncture, n = 109	107 (98)	1 (1)	1 (1)
Intravenous line placement, n = 108	36 (33)	53 (49)	19 (18)
Bladder catheterization, n = 109	41 (38)	42 (39)	26 (24)
Laceration repair			
Suturing, n = 108	99 (92)	9 (8)	0 (0)
Tissue adhesive, n = 107	65 (61)	14 (13)	28 (26)
Reduction/splinting of simple dislocations and fractures, n = 107	39 (36)	45 (42)	26 (24)
Incision and drainage of superficial abscess, n = 108	60 (56)	37 (34)	11 (10)
Foreign body removal, n = 109	75 (69)	32 (29)	4 (4)

as gastric gavage, mist tent vaporizer, and aspiration of the bladder.

In 2007, the Residency Review Committee (RRC) for Pediatrics published a list of 16 procedures and skills in which all residents must have "sufficient" training (TABLE 1).[1] Based on these requirements and additional recommended procedures, Gaies et al[7] surveyed the opinions of residency program directors regarding the importance of these procedures and residents' perceived competency. Notably, a large percentage of program directors

TABLE 3 **Frequency of Occurrence**

Procedure	Daily, No. (%)	>1, No. (%)	<1, No. (%)	Never, No. (%)
Endotracheal intubation, n = 108	1 (1)	8 (7)	34 (31)	64 (59)
Intraosseous line placement, n = 106	0 (0)	1 (1)	18 (17)	86 (81)
Thoracentesis, n = 103	0 (0)	0 (0)	2 (2)	101 (98)
Chest tube placement, n = 104	0 (0)	1 (1)	5 (5)	98 (94)
Lumbar puncture, n = 106	5 (5)	26 (25)	41 (39)	34 (32)
Intravenous line placement, n = 108	3 (3)	6 (6)	31 (29)	67 (62)
Bladder catheterization, n = 107	16 (15)	32 (30)	25 (23)	34 (32)
Laceration repair				
Suturing, n = 107	13 (12)	28 (26)	39 (36)	27 (25)
Tissue adhesive, n = 107	21 (20)	35 (33)	21 (20)	30 (28)
Reduction/splinting of simple dislocations and fractures, n = 107	20 (19)	36 (34)	26 (24)	25 (23)
Incision and drainage of superficial abscess, n = 106	30 (28)	50 (47)	21 (20)	5 (5)
Foreign body removal, n = 103	34 (33)	53 (51)	14 (14)	2 (2)

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did not assign the same level of importance as the RRC did for its recommended procedures. Additionally, the program directors' assessments of their own residents' competencies were also lower than the RRC goal. Of note, the ACGME[8] has proposed a revision of these recommendations beginning in 2013. TABLE 1 includes the proposed changes.

Our survey of procedures performed by graduates of a single, large, pediatrics training program, including 15 years of graduates, is the largest and most comprehensive study addressing the performance of pediatrics procedures in actual clinical practice, to our knowledge. An assessment of family medicine graduates in Canada reported their procedural practice standards vary.[9] Simon and Sullivan[10] have assessed pediatric procedural competency for community emergency practitioners, but no work has been done to assess the utility of procedural training for the general pediatrician.

Adequacy of training may have affected the frequency of procedures. As shown in TABLES 2 and 3, responses to adequacy of training were better for urgent procedures than they were for emergent procedures, and urgent procedures were more commonly performed. A corollary observation is that inadequate training in emergent procedures may have led to infrequent performance of emergent procedures. However, some nonemergent procedures, such as intravenous line placement, also follow the trend of inadequate training and infrequent performance. Infrequent performance may be related to uncommon practice in the routine practice of general pediatricians (eg, LP, endotracheal intubation) or it may be due to inadequate training. As noted in the case of incision and drainage, more respondents reported performing this procedure than reported training for this procedure.

Our study had several limitations. First, our data are based on the subjective recollection of physicians' practice, so the actual frequency of the procedures may not be as accurate as in a prospective study. Second, respondents' interpretation of the study questions may have varied. Third, our survey instrument was developed internally using the ACGME procedures and frequencies determined by informal polling of a sample of graduates and is not validated. Fourth, we obtained a low response rate. Finally, the availability of other physicians or ancillary staff to perform the procedure is also unknown.

Conclusions

Procedural training is an important component of general pediatrics training. Urgent procedures are commonly performed, but emergent procedures are rarely performed. The results of our study may have implications for ACGME recommendations regarding type of procedures required in pediatrics training.

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