

Minimum Supervision Levels Required by Program Directors for Pediatric Pulmonary Fellow Graduation

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ABSTRACT

Background: Entrustable professional activities (EPAs) define the essential tasks expected of subspecialists in unsupervised practice. Although EPAs have been piloted in some programs, their use for summative assessment of pediatric pulmonology fellows for graduation has not been studied.

Objective: To determine the minimum level of supervision that pediatric pulmonary program directors (PDs) require of their fellows for graduation and compare it with the minimum level of supervision they expect for a practicing subspecialist for the five pediatric pulmonology EPAs.

Methods: Using a modified Delphi approach, we developed supervision scales for the five pediatric pulmonology EPAs and conducted a national survey of pediatric pulmonary PDs in the United States through the Subspecialty Pediatric Investigators Network between April 2017 and August 2017.

Results: Forty-six pediatric pulmonary PDs completed the survey, representing a response rate of 85%. The majority did not require fellows to be trusted to practice without supervision for graduation for any of the five EPAs (level 5); the *median minimum* level of supervision they required was 4, equating to indirect supervision for complex cases. The *minimum level for graduation*, defined by consensus as the level of supervision for which no more than 20% of PDs would want the level to be lower to allow a fellow to graduate, was 3, which corresponded to requiring supervision for both simple and complex cases. There was a statistically significant difference between the minimum level of supervision deemed necessary by PDs for graduation and for practice as a subspecialist for each of the EPAs.

Conclusion: Most pediatric pulmonary PDs reported that they would graduate fellows who may still require indirect supervision for the five pediatric pulmonology EPAs. The findings suggest a need for stakeholders to reevaluate the structure and outcomes of training programs and ensure support for pediatric pulmonologists in their early practice period.

Keywords:

entrustable professional activities; educational assessment; graduate medical education

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Entrustable professional activities (EPAs) have been developed to address the challenges in competency-based assessment in medical education (1–3). EPAs are measurable units of observable work, and “entrustment” requires that the competencies needed to complete that work be integrated for safe and effective practice without supervision (1, 2). Collectively, the EPAs define the tasks expected of pediatric subspecialists in unsupervised practice (3). Seven common EPAs and scales were developed, and validity evidence accrued for the pediatric subspecialties (4–6). In 2015, five EPAs were developed for pediatric pulmonology by a taskforce working in collaboration with the American Board of Pediatrics (ABP) (1, 4). Although EPAs are being piloted in a number of training programs for formative assessment and curriculum development (7–9), their use as summative assessments for advancement and graduation is limited.

Pediatric pulmonary program directors (PDs) are responsible for overseeing the clinical and scholarly training of fellows and play an important role in the decision to graduate their fellows. Although PDs receive assessments from clinical competency committees, they are responsible for providing a final evaluation, attesting that fellows are competent and can

practice autonomously (10). However, their expectations for the performance of graduating fellows are unclear.

We developed supervision scales for the pediatric pulmonology EPAs and then conducted a national survey of pediatric pulmonary PDs in the United States to determine the minimum level of supervision that they require fellows to achieve for graduation and compared it with the minimum level they expect of practicing subspecialists to provide safe and effective patient care. We hypothesized that pediatric pulmonary PDs would not require fellows to be trusted to practice without supervision for graduation and that there would be a gap between the minimum level of supervision they deem necessary for graduation and the minimum level they deem necessary for practice. The study holds important implications for the goals and structure of training programs as well as the support of early practicing pediatric pulmonologists.

METHODS

Using a modified Delphi approach, the steering committee of the Subspecialty Pediatrics Investigator Network (SPIN) (11), an educational research network, adapted the supervision scales to the pediatric pulmonology EPAs with input from

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members of the Pediatric Pulmonary Training Directors Association in 2017 (Table 1). The SPIN steering committee is composed of up to two representatives from each of the 14 pediatric subspecialties approved by the Accreditation Council for Graduate Medical Education (ACGME) and for which the ABP offers certification, as well as representatives from the Council of Pediatric Subspecialties, ABP, and Association of Pediatric Program Directors Fellowship Executive Committee and Longitudinal Educational Assessment Research Network. All members of SPIN and Pediatric Pulmonary Training Directors Association have graduate medical education experience.

We sent an anonymous survey (*see* Text E1 in the data supplement) through SPIN using LimeSurvey between April and August 2017. This survey was part of a larger study that included fellowship PDs from 14 ACGME-accredited fellowships with ABP certification. Support for content validity was obtained by reviewing the literature and using expert review by SPIN steering committee members. We pilot-tested the survey with three pediatric pulmonary faculty members who had graduate medical education experience but were not current PDs, revising it on the basis of their feedback. The study was reviewed by the University of Illinois at Chicago Institutional Review Board and was found to be exempt. We sent the original invitation and then at least four reminder emails to prospective participants via LimeSurvey. Nonresponders were then contacted personally via e-mail by the SPIN pulmonary representative three times and asked to complete the survey.

The title and functions of each of the five pediatric pulmonology EPAs were described in the survey (*see* Text E1 in the data supplement); questions for each

included 1) “For this EPA, what do you believe is the MINIMUM level of supervision a fellow must achieve to successfully complete fellowship?” 2) “For this EPA, if a fellow did not achieve at least this minimal level of supervision, would you still allow him/her to graduate?” with choices of “yes” or “no,” and 3) “For this EPA, what is the LOWEST level in which you would consider that a practicing subspecialist (and not necessarily a trainee) should be able to perform most of the activities described above resulting in a safe and effective outcome?” To ensure a shared mental model, we explained the concept of entrustment in choosing the supervision level, specifically that the PD does not necessarily have to see a fellow perform the functions to trust them to do so. In addition, we collected information from PDs about the number of fellows in the program, duration of program directorship, understanding of EPAs, use of EPAs, and participation in the previous SPIN study (6). Data were described as number and percentage for categorical survey items and as median and percentiles. After discussions with experts in both medical education and pediatric subspecialties, we set the minimum level of supervision required for graduation at the level that PDs required for graduation or one level below if the PDs reported in the second question that they would allow the fellow to graduate even if the fellow did not achieve the expected level. Similarly, by expert consensus and to align with previously published residency EPA performance data and standards (12), we set the standard for the *minimum level for graduation* and the *minimum level for practice* as the level of supervision at which no more than 20% of PDs would want the level to be lower for each EPA. We tested the differences in level of supervision between graduation and practice for each EPA using

Table 1. Pediatric pulmonology EPAs and level of supervision scales

EPA	Level of Supervision Scale
<ul style="list-style-type: none"> Manage patients with acute complex respiratory disease in an ambulatory, emergency, or inpatient setting <i>Manage acute complex respiratory disease</i> 	<p>Level 1: Trusted to observe or assist</p> <p>Level 2: Trusted to execute with direct supervision and coaching</p>
<ul style="list-style-type: none"> Care of children with chronic respiratory disease <i>Manage chronic respiratory disease</i> 	Level 3: Trusted to execute with indirect supervision for most simple and some complex cases
<ul style="list-style-type: none"> Demonstrate competence in communicating a new diagnosis of a life altering disease using a patient and family centered approach <i>Communicate a new diagnosis</i> 	Level 4: Trusted to execute with indirect supervision but may require discussion or direct supervision at critical portions for a few complex cases
<ul style="list-style-type: none"> Manage the use of supplemental respiratory equipment such as oxygen, ventilators, and airway clearance devices <i>Manage respiratory equipment</i> 	Level 5: Trusted to execute independently without supervision
<ul style="list-style-type: none"> Demonstrate competence in performing the common procedures of the pediatric pulmonary subspecialist <i>Perform procedures</i> 	

Definition of abbreviation: EPA = entrustable professional activity.

Wilcoxon signed-rank tests. We measured the correlation between key variables with graduation and entrustment levels using Spearman's ρ . A P value of less than 0.05 was considered significant. Data analyses were conducted using R 3.2.2 (13).

RESULTS

Forty-six of 54 pediatric pulmonary PDs completed the survey, a response rate of 85%. The median duration of program directorship was 5 years. Of the PDs, 27 (59%) had zero to three fellows, 16 (35%) had four to six fellows, and three (6.5%) had more than six fellows. Of the PDs, nine (20%) and 21 (46%) participated in the previous SPIN study (6) and were using EPAs, respectively; 24 (52%) and 20 (44%) rated their understanding of EPAs as basic or in depth, respectively, whereas <3% were either unfamiliar or expert.

The minimum level of supervision that PDs required for graduation for each of the five pediatric pulmonology EPAs are shown in Table 2 (*see* Table E1 for unadjusted data). The majority of PDs did not require fellows to achieve a minimum supervision level of 5, or unsupervised practice, for graduation for any of the EPAs. Of the PDs who did not require unsupervised practice for graduation, most would allow fellows to graduate with indirect supervision for complex cases; however, for "communicate a new diagnosis," 54% of them would allow fellows to graduate even if indirect supervision was required for both simple and complex cases. The *median minimum* level of supervision required by PDs for graduation was 4, requiring indirect supervision for complex cases for all five EPAs (Table 3). However, the *minimum level for graduation* was 3, indicating that indirect

supervision was required for both simple and complex cases, for all EPAs.

The minimum level of supervision that PDs believed to be required for subspecialists to perform safe and effective practice are shown in Table 2. The *median minimum* level of supervision for practice was 4, requiring indirect supervision for complex cases, for the following four EPAs (Table 3): manage acute complex respiratory disease, manage chronic respiratory disease, communicate a new diagnosis, and manage respiratory equipment. However, for the EPA “perform procedures,” the *median minimum* level of supervision for safe and effective practice was 5 (unsupervised practice). However, the *minimum level for practice* was 4 for all EPAs, indicating that indirect supervision would still be required for complex cases.

There was a statistically significant difference between the minimum level of supervision for graduation from fellowship and safe and effective practice for each of the five EPAs (Table 3). There was no association between the minimum level of supervision for graduation or practice for any of the EPAs and the number of fellows, years as PD, or PD understanding, current use of EPAs, or involvement in the previous SPIN study (6).

DISCUSSION

The majority of pediatric pulmonary PDs reported that they would not require their fellows to be trusted to practice without supervision for graduation for any of the five pediatric pulmonology EPAs, which constitute the essential activities of our subspecialty. These findings challenge expectations described by the ACGME (10) and the Institute of Medicine (14) that trainees achieve levels of competence required for unsupervised practice. That trainees may not meet expected levels for

unsupervised practice for EPAs has been reported in pediatric residency (12) and subspecialty fellowship programs (15). In the study by Schumacher and colleagues, if performance standards were set for residents to achieve unsupervised practice for graduation, they would not have been met for 9 of the 17 general pediatrics EPAs (12). In pediatric fellowship programs, PDs did not require fellows to be trusted to practice without supervision for graduation for any of the seven common pediatric subspecialty EPAs (15). Our findings suggest that the structure and curricula of training should be reevaluated to determine whether the goal of entrustment for unsupervised practice can be achieved. Models of competency-based medical education in which time is variable and outcomes are fixed should be considered (16). The use of EPAs to guide assessment and curricula would allow better alignment between training and expected outcomes and entrustment decisions to be made across the continuum from training to practice. Furthermore, structured assessment and support may be required for recent fellowship graduates during their early years of practice to ensure high-quality patient care and further skill development to ensure safe and effective outcomes (17, 18).

The reasons that the majority of pediatric pulmonary PDs reported that they would not require fellows to be trusted to practice without supervision for graduation are unclear. A potential contributing factor is that the majority of PDs did not expect subspecialists to be required to be trusted to practice without supervision to provide safe and effective care for any of the EPAs except “perform procedures.” Despite our previous work, which provided validity evidence for the use of EPAs as assessment tools in pediatric fellowship programs (6),

Table 2. Minimum levels of supervision required by pediatric pulmonary program directors for graduation and practice for the pediatric pulmonology EPAs (*n* = 46)

Level of Supervision	EPA				
	Manage Acute Complex Respiratory Disease [n (%)]	Manage Chronic Respiratory Disease [n (%)]	Communicate a New Diagnosis [n (%)]	Manage Respiratory Equipment [n (%)]	Perform Procedures [n (%)]
Graduation*					
1	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)
2	2 (4)	4 (9)	4 (9)	2 (4)	5 (11)
3	10 (22)	9 (20)	15 (33)	12 (26)	7 (15)
4	29 (63)	28 (61)	18 (39)	26 (57)	25 (54)
5	5 (11)	5 (11)	7 (15)	6 (13)	9 (20)
Practice					
1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2	1 (2)	3 (7)	3 (7)	3 (7)	2 (4)
3	3 (7)	2 (4)	3 (7)	4 (9)	4 (9)
4	23 (50)	21 (46)	20 (43)	18 (39)	13 (28)
5	19 (41)	20 (43)	20 (43)	21 (46)	27 (59)

Definition of abbreviation: EPA = entrustable professional activity.

*Minimum level of supervision adjusted for program director willingness to graduate fellows even if they did not meet the expected minimum level.

there may be ambiguity in PD interpretation of the entrustment and supervision scales used in this study. PDs were asked to assign the level of supervision on the basis of what they would trust fellows to do, which may not align with observable activities because those can be limited by institutional supervision policies. In addition, the ACGME requirements for supervision during training may conflate the response to the survey question about minimum level of supervision needed for graduation (i.e., one cannot assess any trainee as ready for unsupervised practice because trainees are required to have some level of supervision at all times). Furthermore, the fact that the majority of

PDs chose level 4 (trusted to execute with indirect supervision with a discussion of information for a few complex cases) as the minimum level of supervision for practicing subspecialists for all the EPAs except “perform procedures,” suggests that there might be some confusion about the term “supervision,” as we did not define it in the survey. Supervision in graduate medical education specifically includes observation, monitoring, and assessment of learners (with feedback) by supervisors (14); it differs from the common postgraduate practice of working unsupervised but asking for help with specific cases. We are currently collecting validity evidence for the supervision scales, including qualitative

Table 3. Median and minimum levels of supervision based on consensus required by pediatric pulmonary program directors for graduation and practice for the pediatric pulmonology EPAs ($n = 46$)

EPA	Minimum Level of Supervision [Median (IQR)]		Minimum Level of Supervision Based on Consensus*	
	Graduation [†]	Practice	Graduation [†]	Practice
Manage acute complex respiratory disease	4 (3.25–4)	4 (4–5) [‡]	3	4
Manage chronic respiratory disease	4 (3–4)	4 (4–5) [‡]	3	4
Communicate a new diagnosis	4 (3–4)	4 (4–5) [‡]	3	4
Manage respiratory equipment	4 (3–4)	4 (4–5) [‡]	3	4
Perform procedures	4 (3.25–4)	5 (4–5) [‡]	3	4

Definition of abbreviations: EPA = entrustable professional activity; IQR = interquartile range.

*Minimum level of supervision defined as no more than 20% of program directors would want a lower level.

[†]Minimum level of supervision adjusted for program director willingness to graduate fellows even if they did not meet the expected minimum level.

[‡] $P < 0.001$ versus minimum supervision level for graduation.

data on PD interpretation, which could help identify and clarify potential areas of confusion.

We found a significant difference between the minimum level of supervision required by pediatric pulmonary PDs for graduation and what they believed to be necessary for safe and effective practice as a subspecialist. The gap may be due to inadequate resources or expertise to adequately train fellows. Alternatively, it may reflect PD beliefs about the goals and outcomes of fellowship training and beliefs that fellows will receive adequate support to continue to develop along their trajectory of clinical expertise in their postgraduate positions. It is possible that the absence of performance data resulted in PDs setting lower minimum standards for graduation. However, previous studies indicate that, without

performance data, assessors actually overestimate the minimum standards (19).

The fact that the majority of pediatric pulmonary PDs reported that they would graduate fellows even if they required supervision suggests the need for structured support during their early practice period. Supervision of new graduates may be variable in institutions and practices. However, it appears that a period of indirect supervision that includes assessment of skills and knowledge with feedback should be considered. A structured handover of PDs to the new graduate's practice would help facilitate the transition. However, even fellows who demonstrated competency in EPAs during fellowship will be faced with challenges adapting their skills to new patient populations and healthcare systems. Ensuring

that new graduates have mentors can help support quality patient care as well as their professional success and well-being (18, 20). An individualized curriculum of continuous professional development and maintenance of certification activities targeted at identified gaps can help support moving the early pulmonologists along the developmental trajectory to unsupervised practice.

Setting minimum standards for assessment tools such as EPAs is a complex process that includes the subjective judgment of assessors (21). PDs are important contributors to the credibility of the standards, as they have extensive experience assessing fellows and making summative decisions about advancement and graduation. However, when setting standards, it is critical to include other stakeholders in the decision (22), such as division directors, department chairs, trainees, graduates, institutions, patients and their families, and accrediting organizations. For this study, we set the standard for graduation and practice as the level of supervision for which no more than 20% of PDs would want a lower minimum level by consensus of SPIN members and other groups with educational experts to align with residency performance data (12). However, these PD judgments were subjective, and they need to be triangulated with fellow performance data. Qualitative data on how PDs interpret and select the minimum level of supervision would be of benefit in interpreting our study results. We are presently collecting longitudinal fellow performance and qualitative data to gain further validity evidence for the scales and proposed standards.

The limitations of the study include the potential for nonresponder and self-reporting bias. Nonresponder bias is limited, however, by the high response rate. Although this study established content and

response process validity of the pediatric pulmonology EPAs and their scales, the validity argument needs to be further strengthened, including internal structure, relationship to other variables, and consequences (23). Furthermore, standard setting and consequential validity require input from other stakeholders. In addition, by adjusting the minimum level of supervision for graduation by only one level for PDs who stated that they would graduate fellows even if they did not meet the minimum level, we may have overestimated the actual level. In that case, the amount of supervision that fellows require at graduation and the gap between graduation and practice would be even greater than we reported. Although EPAs have the advantage of being construct aligned, that is, asking faculty whose responsibility it is to supervise residents in the clinical setting to assess the amount of supervision needed, further studies are needed to demonstrate the benefits of using EPAs over current methods of assessment (24).

This study suggests a need to assess in real time whether newly graduated pediatric pulmonologists are ready to practice without supervision. Depending on the results, further collaboration between PDs, program leadership, institutions, regulatory bodies, and other stakeholders may need to reevaluate the goals for fellowship training programs. Support and mentoring to ensure both safe and effective outcomes for patients and the well-being of early practice pulmonologists may also be critical. Studies collecting fellow performance data and qualitative information from PDs on their beliefs about the use of EPAs in summative assessment are presently underway.

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