Development of a Curricular Framework for Pediatric Hospital Medicine Fellowships

Karen E. Jerardi, MD, MEd,[a] Erin Fisher, MD, MHM,[b] Caroline Rassbach, MD,[c] Jennifer Maniscalco, MD, MPH,[d] Rebecca Blankenburg, MD, MPH,[c] Lindsay Chase, MD,[e] Neha Shah, MD, MPH,[f] on behalf of the Council of Pediatric Hospital Medicine Fellowship Directors

Pediatric Hospital Medicine (PHM) is an emerging field in pediatrics and one that has experienced immense growth and maturation in a short period of time. Evolution and rapid expansion of the field invigorated the goal of standardizing PHM fellowship curricula, which naturally aligned with the field's evolving pursuit of a defined identity and consideration of certification options. The national group of PHM fellowship program directors sought to establish curricular standards that would more accurately reflect the competencies needed to practice pediatric hospital medicine and meet future board certification needs. In this manuscript, we describe the method by which we reached consensus on a 2-year curricular framework for PHM fellowship programs, detail the current model for this framework, and provide examples of how this curricular framework may be applied to meet the needs of a variety of fellows and fellowship programs. The 2-year PHM fellowship curricular framework was developed over a number of years through an iterative process and with the input of PHM fellowship program directors (PDs), PHM fellowship graduates, PHM leaders, pediatric hospitalists practicing in a variety of clinical settings, and other educators outside the field. We have developed a curricular framework for PHM Fellowships that consists of 8 education units (defined as 4 weeks each) in 3 areas: clinical care, systems and scholarship, and individualized curriculum.

DEVELOPMENT AND GROWTH OF PEDIATRIC HOSPITAL MEDICINE

Pediatric Hospital Medicine (PHM) is an emerging field and one that has experienced immense growth and maturation in a short period of time. In the late 1990s, pediatricians practicing primarily in the hospital setting took the first steps toward developing PHM as an independent area of pediatric practice.[1] By the early 2000s, ~600 to 1000 physicians identified as practicing pediatric hospitalists.[2,3] More recently, 8% of pediatric residents reported PHM as their chosen area of practice upon completion of residency, with half of these intending PHM to be their long-term career path.[4,5] Thus, PHM represents one of the largest areas of practice for graduating pediatric residents.

The early focus for pediatric hospitalists was to create a clear identity for the field, which involved defining clinical and nonclinical roles and developing an organizational structure for its leadership. In 2009, a group of national PHM leaders in the United States developed a mission statement to guide the

[a]Department of Pediatrics, Cincinnati Children's Hospital and Medical Center, Cincinnati, Ohio; [b]Department of Pediatrics, University of California San Diego, San Diego, California; [c]Department of Pediatrics, Stanford School of Medicine, Stanford, California; [d]Department of Pediatrics, Children's Hospital Los Angeles, Los Angeles, California; [e]Department of Pediatrics, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; and [f]Department of Pediatrics, Children's National Medical Center, Washington, DC

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Address correspondence to Karen E. Jerardi, MD, MEd, Cincinnati Children's Hospital and Medical Center, 3333 Burnet Ave, MLC 3024, Cincinnati, OH 45229. E-mail: karen.jerardi@cchmc.org

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discipline and inform the larger medical and pediatric community. Two key components embedded within this mission statement were to "develop a skilled and stable workforce who are expert providers of care for hospitalized children" and "provide the expertise that supports innovative continuing education in the care of the hospitalized child for pediatric hospitalists, trainees, midlevel providers, and hospital staff."[6] This leadership group evolved into the Joint Council on PHM (JCPHM), which included representation from major stakeholders and leading organizations in the field (E.S. Fisher, MD, K.E.J., personal communication, 2016). In addition, educational leaders within PHM pursued rigorous development of the Core Competencies in the domains of clinical care, core skills, and systems improvement.[7]

A Strategic Planning Committee was formed to explore 4 options for future training: residency with a PHM track, a PHM focus of practice, standardized postresidency training, and fellowship.[8] In April of 2013, the certification options were evaluated by a representative group of leaders in PHM. At this meeting, "there was overwhelming consensus that a 2-year accredited fellowship track was [sic] optimal path to provide the best patient care for hospitalized children and assure the public the qualifications of physicians practicing Pediatric Hospital Medicine. It was also agreed that this path was most likely to move the field forward, leading to worthy scholarship that will benefit hospitalized children."[8] In August 2014, The JCPHM petitioned the American Board of Pediatrics (ABP) for subspecialty status for PHM. The petition was approved by the ABP in November 2015 and subsequently by the American Board of Medical Specialties in November 2016.[9]

PHM fellowship program development has paralleled the formalization of the field itself. By the late 1990s, the earliest PHM fellowship programs were launched. Programs ranged from 1 to 3 years and had variable structures and requirements.[10] In an early effort to standardize curricula and establish a cohesive identity for PHM fellowships, fellowship PDs began yearly national meetings in 2008. In 2010, the group established 1-, 2-, and 3-year fellowship program standards based upon the established PHM Core Competencies.[11] Still, variability in curricula and structure remained and became more apparent as the number of fellowship programs increased.

Continued evolution and rapid expansion of the field reinvigorated the goal of standardizing PHM fellowship curricula, which naturally aligned with the field's evolving pursuit of a defined identity and consideration of certification options.[8] Subsequently, the national group of PHM fellowship PDs sought to establish curricular standards that would more accurately reflect the competencies needed to practice pediatric hospital-based care and meet future board certification needs. These curricular standards were balanced with the desire to allow for focused or enhanced training in distinct areas of the field.

The goals of this article are to (1) communicate the method by which we reached consensus on a 2-year curricular framework for PHM fellowship programs, (2) detail the current model for this framework, and (3) provide examples of how this curricular framework may be applied to meet the needs of a variety of fellows and fellowship programs.

METHODS FOR DEVELOPMENT OF PHM CURRICULAR FRAMEWORK

The 2-year PHM fellowship curricular framework was developed over a number of years through an iterative process and with the input of PHM fellowship PDs, fellowship graduates, PHM leaders, pediatric hospitalists practicing in a variety of clinical settings, and other educators outside the field. PHM fellowship PDs meet in person annually in July and at least quarterly via scheduled conference calls, with additional committee work done via e-mails and conference calls.

In April 2014, an anonymous, Web-based survey was distributed by the PHM fellowship PD group leadership to all fellowship PDs to gather information about the current state of clinical and research training in PHM fellowships (response rate 87%, 27/31).[12] In July 2014, the PHM fellowship PDs reviewed the results, engaged in a formal discussion of the current state of fellowship curricula, and identified key areas of focus for the standard curricular framework. The areas identified were clinical/procedures, research, quality improvement (QI), leadership, business administration, medical education, and advocacy. At this meeting, the fellowship PD group divided into committees to address areas of need within PHM fellowship programs. Committees included Curriculum, Evaluation/Metrics, Recruitment, Funding, and Faculty Development. As new fellowship directors join the larger group, they engage with a committee that aligns with their skills and interests.

In particular, the Curriculum Committee was purposefully composed of 14 members including both new and established PDs, all with specific interest and skills in curricular development and standardization. In May 2015, the Curriculum Committee conducted an anonymous, Web-based survey of all PHM fellowship PDs to elicit perspectives on the ideal type, number, and duration of required rotations (response rate 93%, 31/33) (Tables 1 and 2).

TABLE 1 PD Responses ($n = 31$) for Time Requirements

	Average	Median	Range
What percentage of time should PHM fellows spend in clinical rotations?	50%	50%	25%–70%
How many months for resident-covered service, university or children's hospital site?	5	5	1–12
How many months for resident-covered service, community hospital site?	1.6	1	0–4
How many months as attending-only service, university or children's hospital site?	1.5	1	0–4
How many months as attending-only service, community hospital site?	1.5	1	0–4
How many, if any, months should PHM fellowships include for required electives?	2.8	2	0–6
How many months should be dedicated to research and research training (including QI)?	9	8	5–16

TABLE 2 Responses ($n = 31$) for Required/Elective Components of a Curricular Framework

Rotation	Required (May Be Integrated in HM Rotations)	Elective/Optional
Child abuse and neglect	14	17
Comanagement: subspecialty	23	8
Comanagement: surgical	24	7
Complex care	29	2
Neonatal critical care	7	24
Newborn nursery/delivery room care	14	17
Pediatric critical care	18	13
Pediatric emergency medicine	14	17
Pediatric palliative care	10	21
Pediatric pain management	11	20
Pediatric sedation	19	12
Pediatric transport medicine	9	22

HM, hospital medicine.

The Curriculum Committee reviewed the survey results and achieved consensus on the required rotations through an iterative process. The draft curricular framework was revised and adjusted to ensure current Accreditation Council of Graduate Medical Education (ACGME) requirements and ABP expectations common to other pediatric subspecialties were met.[13] Additionally, PHM-specific Entrustable Professional Activities (EPAs) (R. Blankenburg, MD, MPH, K.E.J., personal communication, 2016) were created and then used to guide the further development of the curricular framework, ensuring that each EPA was covered by at least 1 curricular component. At the conclusion of this work, the Curriculum Committee developed a proposed 2-year framework to use as the starting point for discussion and revision with the larger PD group.

This draft framework was presented to PHM PDs during the July 2015 annual PDs' meeting. Representatives of the Medicine-Pediatrics Section of the Society of Hospital Medicine and the American Academy of Pediatrics (AAP) Section on Hospital Medicine (SOHM) Community Hospitalist Subcommittee were also invited participants in this meeting. Large and small group discussions were used to adjust the draft curricular framework until saturation was reached on content and consensus was reached on 3 areas of particular focus: clinical care, systems improvement and scholarship, and individualized training. Drawing from the design of the ACGME pediatric residency curriculum, standard rotation or experience duration was defined using an educational unit (EU),[10] consisting of 4 calendar weeks. Thus, the 2-year PHM fellowship curricular framework was composed of 26 total EUs.

Through a series of conference calls and discussion with key stakeholders, specifically members of the JCPHM, representatives of the Society of Hospital Medicine Medicine-Pediatrics Section, the AAP SOHM Subcommittee of Community Hospitalists, and the AAP SOHM Subcommittee of Neonatal Hospitalists, the curricular framework was further refined. The group also reviewed current literature regarding reported needs of PHM fellowship graduates and practicing pediatric hospitalists to ensure alignment of the framework with needs of those in the field.[14,15] The framework was then finalized at the annual PDs' meeting in July 2016. Key components addressed included minimum required EUs for core clinical activities and site characteristics, such as community versus tertiary/quaternary hospital.

PROPOSED 2-YEAR PHM CURRICULAR FRAMEWORK

The standard 2-year PHM fellowship curricular framework is composed of 26 EUs, each 4 weeks in duration. The framework includes 3 sections, each comprising 8 EUs: (1) clinical care, (2) systems and scholarship, and (3) individualized curriculum. An additional 2 units of nonworking time are included to comprise a total of 26 EUs. The components of each section are provided in Table 3.

Within the core clinical rotations, 6 required EUs (24 weeks) focus on education in specific clinical PHM skills, and 2 additional units (8 weeks) are flexible to meet the fellows' individual goals. The required experiences are Hospital Medicine, Complex Care, Comanagement/Consultation, Care and Stabilization of the Critically Ill Child, and Newborn

TABLE 3 Proposed Curricular Framework

	No. EUs	Rotations Included	Additional Requirements
Core clinical rotations	8	6 EUs required to include areas of: Hospital medicine Complex care Comanagement, Assessment and stabilization of the critically ill child Newborn 2 additional clinical units of fellow/program selection to meet clinical training needs	1 EU must be at community based site, 3 EUs must be at tertiary/quaternary site or children's hospital
Systems and scholarship	8	To include general training in each category and focus in 1: Improvement science Clinical and translational research Medical education Leadership Business administration Patient safety Advocacy	Must meet ABP requirements for scholarly activity in at least 1 domain
Individualized curriculum	8	May include clinical and nonclinical activities. Must be determined by the learning needs and career plans of each fellow and developed with guidance of a faculty mentor Examples of clinical rotations that would be acceptable include but are not limited to: Sedation Newborn care Internal medicine (Medicine-Pediatrics trainees) Transitions in care Child abuse and neglect Palliative care Acute pain Transport medicine Examples of nonclinical experiences that would be acceptable include but are not limited to: Degree study in field-applicable degree Additional study in any of the systems and scholarship areas Medical informatics Developing, implementing, analyzing, or disseminating a scholarly project	—

EU, educational unit; —, not applicable.

Care. Within the 8 core clinical units, at least 1 must occur at a community site and at least 3 at a tertiary/quaternary site or children's hospital.

With regard to the systems and scholarship training, all fellows will be expected to receive training in the areas of improvement science, research, medical education, leadership, business administration, patient safety, and advocacy, with a selected focus in one of these areas. The training will be distributed according to each program's area of focus and expertise, as well as an individual fellow's learning needs and goals. Regardless of area of focus, each fellow will be expected to meet the ABP requirement for scholarly work that applies to all pediatric subspecialty fellowships.[13]

The individualized time or study component of the framework can be used to augment the clinical care and/or systems and scholarship sections as deemed appropriate by each program or as needed to meet the needs and aspirations of the fellow. This component is similar to the 6 months of individualized curriculum that pediatrics residencies have had since 2013.

In summary, of the 24 total EUs, 8 are spent in each of the 3 major areas of study, with a requirement of 6 clinical units in specified rotations (Table 4).

PROPOSED APPLICATION OF CURRICULAR FRAMEWORK

Below, we provide a series of examples of how this curricular framework can be individualized to accommodate a fellow's needs and career aspirations while still providing for standardized fundamental clinical and scholarly training. First, a fellow may wish to have a community-based focus during their training to prepare them for a job at a community hospital. The skills for this job may include additional clinical expertise focused on newborn care and consultation. In addition, such a hospitalist may be tasked with leadership or QI roles. To meet these needs, the fellow and fellowship program could

individualize the training to allow additional experiences in these areas (Table 5). A second fellow may wish to obtain fellowship training to focus on research with the ultimate goal of becoming an independent investigator at an academic medical center. This fellow, while still needing the clinical and systems-based skills of a hospitalist, may require additional time in pursuit of an advanced degree and the dissemination of scholarly work (Table 5). Third, a Medicine-Pediatrics trained physician may wish to complete a PHM fellowship with the intention to hone pediatric hospitalist skills while maintaining their Internal Medicine skill set. This fellow may benefit from additional time focused on transitions of care and consultation. They may also benefit from additional leadership and QI training as they consider a career bridging 2 medical systems (Table 5). Finally, while all PHM fellows will have a training requirement in procedural sedation, some fellows may wish to have additional focused training in this area. The additional training may include extra clinical time in sedation as well as training in leadership and business administration to prepare to lead a sedation program (Table 5).

As is the case with most fellowship training programs, we recognize that most PHM competencies and procedural skills will be acquired longitudinally over the course of fellowship, rather than within 1 rotation or a group of specified rotations. While the rotations are expected to provide a fellow with the education and opportunities needed to attain the PHM competencies, the individualized study time allows programs and fellows the ability to adjust the training experience. Additionally, a specific procedural EPA has been developed to allow for more standard expectations around training for and evaluation of individual fellow's procedural competencies.

TABLE 4 Curricular Requirements and EUs

	Core Clinical Curriculum	Systems and Scholarship Curriculum	Individualized Curriculum	TOTAL
Required Standard across all programs	6 EUs	0 EUs	0 EUs	6 EUs
Flexible Tailored to program and fellow's career path	2 EUs	8 EUs	8 EUs	18 EUs
Total	8 EUs	8 EUs	8 EUs	24 EUs

EU, educational unit.

DISCUSSION

The recent approval of the subboard in PHM by the American Board

TABLE 5 Example Curricular Schedules for 4 Different PHM Fellowship Focus Options

	A: Community Focus		B: Research Focus		C: Medicine-Pediatrics Focus		D: Sedation Focus	
Core clinical units	PHM tertiary	2 EUs	PHM tertiary	4 EUs	PHM tertiary	3 EUs	PHM tertiary	3 EUs
	PHM community	2 EUs	PHM community/newborn	1 EU	PHM community/newborn	1 EU	PHM community	1 EU
	Newborn community	1 EU	Pediatric critical care	1 EU	HM community	1 EU	Newborn community	1 EU
	Pediatric critical care	1 EU	Comanagement/consult tertiary	2 EUs	Comanagement/consult Peds	1 EU	Pediatric critical care	1 EU
	Consult/ED community	1/2 EU	—	—	HM tertiary	1 EU	Comanagement/consult tertiary	1 EU
	Comanagement/consult tertiary	1/2 EU	—	—	Pediatric critical care	1 EU	Sedation	1 EU
	NICU	1 EU	—	—	—	—	—	—
Systems and scholarship units	QI/leadership (in community)	2 EUs	Leadership and practice management	1 EU	Leadership and practice management	2 EUs	Leadership and practice management	2 EUs
	Medical education	1 EU	Medical education	1 EU	Medical education	1 EU	Medical education	1 EU
	Practice management	2 EUs	QI and safety/advocacy	1 EU	QI	2 EUs	QI	2 EUs
	Research	1 EU	Research/degree study	5 EUs	Research	2 EUs	Research	2 EUs
	Safety/advocacy	2 EUs	—	—	Safety/advocacy	1 EU	Safety/advocacy	1 EU
Individualized curriculum units	PHM tertiary	1 EU	PHM tertiary	1 EU	PHM	2 EUs	PHM	2 EUs
	PHM community	1 EU	QI & safety/advocacy	1 EU	Palliative care	1 EU	Palliative care	1 EU
	Palliative care	1 EU	Research/degree study	6 EUs	ED/transport	1 EU	ED/transport/sedation	1 EU
	Newborn	1 EU	—	—	Sedation	3 EUs	QI	3 EUs
	Transport	1 EU	—	—	QI	1 EU	—	1 EU
	Child abuse and neglect	1 EU	—	—	—	—	—	—
	QI	2 EUs	—	—	—	—	—	—

HM, hospital medicine; EU, educational unit; —, no further data.

of Medical Subspecialties[9] has placed critical focus on the need for standardized training in PHM. PHM fellowship PDs have identified core training program content and structure needs and engaged the leaders from key areas of focus within PHM in an organized manner. This PD group, with its growing number of programs, is a key component of the larger PHM community that is critical for continued progress in the field. Together, we have combined the expertise of our group of PHM fellowship PDs, the input of key stakeholders representing physicians practicing within the field, and lessons from the historical development of Pediatric Emergency Medicine (PEM) fellowships,[16] to create a robust curricular framework. Our goal is to provide a standardized educational experience for fellows that allows them to meet the clinical, improvement science, teaching, and scholarly demands of a pediatric hospitalist while continuing to improve the care and outcomes of hospitalized children.

This PD group has met annually since 2008 to optimize PHM fellowship training by sharing resources, discussing essential curricular components, and working with stakeholders in the PHM community to determine best practices. Membership is voluntary and PDs are invited to join the group as soon as they begin to develop a program. The input from this group was instrumental in the development of the curricular framework proposed here. In addition to the PD group, we considered the reported practice areas, both clinical and nonclinical, as well as reported training needs from PHM physicians to identify gaps in residency training and ensure that fellowship would work to close those gaps.

Practicing pediatric hospitalists report a variety of clinical responsibilities, including management of patients on a general inpatient service, complex care, surgical comanagement and other pediatric consultation services, newborn care, and sedation. Furthermore, they report significant amounts of effort spent in research, QI, development of practice guidelines, medical education, and hospital leadership.[15,17] When comparing perceived competencies between fellowship-trained and nonfellowship-trained pediatric hospitalists, it is noted that fellowship-trained physicians report feeling more competent in managing patients with medical complexity, undertaking research projects, participating in and leading QI programs, and educating trainees.[14] This curricular framework includes specific training in each of these areas to ensure continued competence for fellows in training. Nonfellowship-trained pediatric hospitalists reported feeling more competent in newborn care and pain management.[14] We have included required training in newborn care within the core clinical rotations to allow fellows to attain this set of important skills.

More recently, fellowship-trained PHM physicians were surveyed about their needs after completing fellowship. Most needs identified were in nonclinical areas, such as hospital program management, practice guideline design, development of educational curricula, and research skills.[15] Our curricular framework is built to include and bolster these areas. Furthermore, 40% of recent fellowship graduates noted deficiencies in their procedural skills.[15] We anticipate that the required clinical EUs and additional individualized study will allow programs to address this gap.

While most information about training needs has focused on clinical competencies or a mix of all competencies, a recent survey of hospitalists evaluated research needs specifically.[17] The authors found over half of pediatric hospitalists had presented an abstract at a national meeting and are involved in local QI projects. However, the same survey showed that <15% of respondents had received funding for their research or had completed more than 2 first-author publications. This demonstrates that there is a continued need for additional research training and infrastructure. Respondents identified lack of time, resources, funding, and mentorship as barriers to scholarly activity.[17] We expect that additional training will help fellows identify strategies to overcome such impediments. It has been further noted that with continued years of practice, the perceived need for research skills increased for nonfellowship-trained physicians, whereas this was not true for fellowship-trained physicians.[14] Thus, we aimed to include sufficient research training for all fellows regardless of career aspirations. We also worked to ensure that fellowship training provided structured mentorship plans so as to address these needs and meet ACGME requirements.[13] The varied training needs and career goals of PHM fellows reflect the varied clinical and nonclinical roles that pediatric hospitalists fill. While our goal is to develop a standard curricular framework, we also recognize the need and desire to tailor training based on an individual fellow's goals and a program's areas of expertise. In this framework, only 6 of the 24 EUs are required training and the remaining 18 EUs are flexible. As such, we feel that the needs of fellows with diverse career interests can be met within this framework.

The field of PHM is in a period of rapid growth, similar to the early years of PEM. For PEM, the first fellowship started in 1981, the first sample training curriculum was published 5 years later,[18] and the first board examination occurred in 1992.[16] The

PEM committee noted in the initial fellowship curriculum published in 1997 that "ongoing refinement and adaptation based on feedback from fellows and directors is essential to provide the best fellowship experience to our trainees."[19] As predicted, the PEM field has evolved with changes in clinical skill needs and scholarly requirements. To meet these changes, the number of PEM fellowship programs has grown and the diversity of programs has increased. Almost 20 years after the first curriculum was published, PEM fellowship directors recently shared a framework to document the current state of their training and future opportunities, with a focus on EPAs, clinical and nonclinical educational needs, scholarship, and program administration.[16] While PHM fellowships are in the earliest stages of growth and development, we have worked to include the same focus on EPAs, clinical and nonclinical education, and scholarship that PEM fellowships have highlighted as keys to successful fellowship development. Similar to PEM, we expect that as our field grows and evolves, this proposed fellowship curricular framework will require continuous evaluation and revision to meet the needs of fellows, hospitalized children, and the health care system in general.

As we look to institute this PHM fellowship curricular framework, our group has developed priorities to be addressed. First, we need to ensure that all fellowship programs can provide learning experiences that will allow our trainees to complete curriculum requirements and meet subspecialty and PHM-specific EPAs and milestones. Secondly, we need to develop clear assessment tools to ensure that our fellowship graduates meet all competencies through their PHM fellowship training. In the future, we hope to develop standardized assessment tools that will be used across training sites. Lastly, metrics for assessment of individual fellows and evaluation of fellowship program outcomes should be developed to guide future growth and fellowship improvements to ensure that the ever-evolving needs of hospitalized children are being met.

We encountered challenges not unique to any new subspecialty. Current practice, future practice, successes from other pediatric subspecialties, input from varied stakeholders in the PHM community, and other information was used; however, input may be skewed from those with strong opinions and may not be representative of all PHM providers. Additionally, because PHM will be the first 2-year fellowship training program in pediatrics,[20] there are no current fellowship examples to use as a starting point for this framework. However, despite these limitations, we have developed a robust curricular framework using an iterative process of review of available data, revision, and input from key stakeholders to develop a balanced and innovative curriculum.

CONCLUSIONS

With input from stakeholders in the PHM community from varied practice settings and perspectives, we have developed a curricular framework for PHM Fellowships that consists of 8 EUs each of (1) clinical care, (2) systems and scholarship, and (3) individualized curriculum. This curricular framework is robust enough to allow PHM fellows to meet all the EPAs while being flexible enough to meet individual career goals. Though we anticipate additional refinement as the field evolves, this first standardized curricular framework includes the agreed-upon key components and incorporates the many potential practices of PHM fellows and fellowship graduates.

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ABBREVIATIONS

AAP: American Academy of Pediatrics
ABP: American Board of Pediatrics
ACGME: Accreditation Council of Graduate Medical Education
EPA: Entrustable Professional Activity
ED: emergency department
EU: educational unit
JCPHM: Joint Council on PHM
PD: program director
PEM: Pediatric Emergency Medicine
PHM: Pediatric Hospital Medicine
QI: quality improvement
SOHM: Section on Hospital Medicine

Medicine (PHM) Subboard of the American Board of Pediatrics in March 2017 and will receive an honorarium in that role. Part of her work with the subboard is development of Entrustable Professional Activities that are relevant to PHM fellowships; the other authors have indicated they have no potential conflicts of interest to disclose.

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