Received: 27 February 2018 | Revised: 28 March 2018 | Accepted: 22 April 2018

DOI: 10.1111/chd.12626

ORIGINAL ARTICLE

WILEY Congenital Heart Disease

A qualitative assessment of pediatric cardiology core content: Comments from Kentucky trainees, pediatricians, and pediatric cardiologists

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Abstract

Objective: The 2016 American Board of Pediatrics (ABP) content outline is comprehensive, including more than 50 cardiology-specific objectives within eight content areas. This study complements the quantitative analysis of a Kentucky-wide survey of trainees, pediatricians, and pediatric cardiologists asking them to identify "most important" cardiology content by analyzing their open-ended comments about "what should be added" and "why?" within these eight categories.

Design, Methods, Outcome Measures: This cross-sectional study used an original, online survey instrument based on the 2016 ABP cardiology-specific objectives. We began an initial analysis of the qualitative data using Pandit's version of Glaser and Strauss Grounded theory (constant comparison). However, upon finding an abundance of comments focused on Diagnosis, we proceeded with a secondary analysis that further categorized Diagnosis comments into three themes aligned with Bloom's taxonomy. Additional comments focused on Management and clustered into Emergent/Acute Care (Resuscitation); Short-term Care (Inpatient); and Longitudinal Care (Outpatient).

Results: Of the 136 respondents, 23 (17%) were residents, 15 (11%) fellows, 85 (62%) pediatricians, and 13 (10%) pediatric cardiologists with 80% of attendings having faculty/gratis faculty status. The open-ended questions "what needs to be added" and "why" generated 93 comments; 60 of which focused on Diagnosis; further classified as Recognize (16), Differentiate (12), and Evaluate (32). Management comments were related to acuity and care setting, grouped as Emergent/Acute Care (Resuscitation) [10]; Short-term Care (Inpatient) [6]; and Longitudinal Care (Outpatient) [17].

Conclusions: The 93 comments analyzed for this article showed a distinct preference for all respondents, trainees, pediatricians, and cardiologists alike, to value the addition of diagnostic skills with emphasis in the "evaluate" skill set as important cardiology curricular content beyond that included in the 2016 ABP cardiology-specific objectives. Responses could be used to provide practical guidance for curriculum design and reform.

KEYWORDS
curriculum, medical education, residents, trainees

Abbreviations: AAP, American Academy of Pediatrics; ABP, American Board of Pediatrics; UK, University of Kentucky; UL, University of Louisville.

1 | INTRODUCTION

Clinicians are faced with multiple barriers to being proficient educators, including curriculum design challenges, institutional support issues, and limited faculty development opportunities for medical educators.[1,2] However, perhaps the greatest obstacle facing clinical faculty is the lack of dedicated teaching time available during a busy clinical schedule.[2,3] Time availability is a barrier to both clinical teaching and trainee learning, particularly in a diverse and complex content area such as pediatric cardiology.[4,5] Furthermore, faculty must concurrently teach learners at different stages in training and with diverse goals an ever-growing range of topics.[1,6,7] Finally, the convenience sample of hospitalized inpatients or routinely scheduled outpatients may not provide an appropriate patient mix to optimize instruction.[8]

As described previously, the American Board of Pediatrics (ABP) has compiled a 77-page document for the development of the general pediatrics certification exam, including 52 cardiology-specific objectives within 8 content areas.[9] In our first article assessing curriculum content, we argued that such a large number of cardiology-specific ABP objectives is too detailed to be thoroughly addressed during a 3-year pediatric residency. Due to the limited time available for cardiology education, prioritizing these objectives by practical importance would be useful in curriculum reform.[10]

In this analysis, we further evaluate our data from a statewide survey of pediatric trainees, general pediatricians, and pediatric cardiologists. We aim to expand upon the prioritization of content by exploring the open-ended replies to the questions "what needs to be added" and "why," with the goal of providing additional guidance for curriculum design and reform.

2 | METHODS

This study used an original survey instrument in a cross-sectional research design. The content was based on the 2016 ABP content specifications for cardiovascular disorders, with objectives divided into eight content areas. The survey was administered online using SurveyMonkey. Eligible participants were contacted by email with an invitation to participate including IRB and researcher contact information. As recommended by Dillman,[11] eligible participants were sent a second reminder after 2 weeks and a third reminder after an additional week to maximize response rate.

The population surveyed included all pediatric residents and pediatric subspecialty fellows at the UL School of Medicine and the University of Kentucky (UK) College of Medicine (n = 110); pediatric clinical faculty (noncardiology $n = 187$, and cardiology $n = 13$) at the UL School of Medicine; pediatric clinical faculty (noncardiology $n = 92$, and cardiology $n = 7$) at the UK College of Medicine; other pediatric cardiologists practicing in Kentucky ($n = 10$); and approximately 800 general pediatricians practicing in Kentucky who were members of the Kentucky chapter of the American Academy of Pediatrics (AAP). (The AAP distributed the survey through their e-mail contact list).

This article focuses on open-ended replies to two questions asked for each of the 8 ABP cardiology content areas: "what needs to be added?" and "why?"

We began by applying the traditional review and re-review iterative process based on Pandit's version of Glaser and Strauss Grounded theory (constant comparison)[12] to identify themes within the eight ABP content areas. We soon found that the dominant theme was "diagnosis," leading us to a more flexible and open-ended approach, described by Tavakol et al as an emergent design.[13] Rather than assuming a conceptual framework at the beginning of the process, we applied previously described qualitative research methodology to allow the emergent themes to determine the conceptual framework.[13–15] Bloom's Taxonomy was an ideal guide to subdividing Diagnosis into themes of Recognize, Differentiate, and Evaluate.[16,17] Comments pertaining to content beyond the scope of Diagnosis were categorized as Management, with subcategories of Emergent Care (Resuscitation), Short-term Care (Inpatient), and Longitudinal Care (Outpatient), and examined in the context of the ABP content area in which they were expressed.

The study was deemed exempt by the UL IRB.

3 | RESULTS

Of the 136 respondents, 60 (45%) completed or were completing residency at UL School of Medicine, 15 (11%) at UK College of Medicine, 59 (44%) at another institution, and 2 participants did not respond to this question. Of the respondents, 73 (59%) were female, with mean age 42 years (SD 13), and mean years in practice of 12 (SD 13). Types of medical degrees completed were 120 (88%) MD, 11 (8%) DO, and 5 (4%) were international medical graduates. Most respondents, 56 (42%), were primarily inpatient physicians, while 51 (38%) were primarily outpatient, and 25 (19%) reported equal inpatient and outpatient hours. Regarding academic affiliations, 23 (17%) respondents were pediatric residents, 15 (11%) pediatric fellows, 85 (62%) general pediatricians, and 13 (10%) pediatric cardiologists with 80% of attending's having faculty or gratis faculty status.

Of the 93 open-ended comments, 60 related to diagnosis; and 41 of those 60 related to ABP Cardiology Category 1, Knowledge related to general aspects of cardiovascular disorders and systemic diseases affecting the heart. Within the theme Diagnosis, 16 comments related to Recognize, 12 to Differentiate, and 32 to Evaluate. The 33 Management comments were evenly distributed by ABP topic areas and settings with 2 exceptions: 6 comments related to ABP Cardiology Category 2, Knowledge related to heart failure under longitudinal care (outpatient), and 4 comments related to ABP Cardiology Category 8, Knowledge related to rate and rhythm disorders, ischemia under Emergent/Acute Care (Resuscitation) (see Table 1).

Almost all comments were paired with the respondent providing a response to both prompts: "what needs to be added" and "why." Most comments were clear, complete thoughts, and logically expressed. Many of the "why" comments reflected personal observation or experience and tended to be practical and relevant in a clinical teaching environment.

TABLE 1 Cardiology core content—What needs to be added? Distribution and examples of 93 open-ended comments

Diagnosis*		
Skill set	**What**	**Why**
Recognize/16	Initial presentation, causes, range of signs, and symptoms that may be seen, particularly in emergency or ambiguous situations (ie, left-sided lesions, arrhythmia, murmurs, heart failure, Kawasaki disease)	Seen in nursery and in primary care settings. Core pediatric knowledge needed to identify "dangerous conditions" and avoid "poor outcome."
Differentiate/12	Benign from more serious murmurs/auscultation; in sports physicals, who need referrals? Mimickers and concurrent illnesses (eg, viral illness and myocarditis, congestive heart failure)	Seen frequently and relevant to practice. Illness may have unusual presentation or be part of a larger systemic disease. Most residents have not developed highly honed exam skills.
Evaluate/32	When to order cardiac tests and what to do with the results, how to initiate or complete a workup for a child with cardiac complaint or condition, how noncardiac factors affect development or progression of cardiac disease (eg, CHD, dyslipidemia)	A pediatrician is the front line and often the first to triage a complaint. Resources should be utilized and referrals made appropriately. Patients with cardiac disease seen by pediatricians in many different settings.

***41 of the 60 comments on Diagnosis related to ABP Cardiology Category 1.**

	Management					
	Emergent/acute care (resuscitation)		**Short-term care (inpatient)**		**Longitudinal care (outpatient)**	
ABP cardiology objectives categories	**What (knowledge and skills)**	**Why**	**What (knowledge and skills)**	**Why**	**What (knowledge and skills)**	**Why**
1. Knowledge related to general aspects of cardiovascular disorders and systemic diseases affecting the heart.	2/ Arrhythmias, reading EKGs. The cyanotic infant.	Important in the ED. See this in practice.	1/ Arrhythmia and telemetry.	A monitor is not an "all seeing eye" . . . physicians cannot "disengage."	3/ Hypertension, SBE prophylaxis.	I see these often in my office. High-risk patients.
2. Knowledge related to heart failure.	1/ Signs and symptoms of heart failure, how to triage the degree of illness/heart failure, and how to start initial stabilization if necessary.	A general pediatrician needs to recognize heart failure and begin initial stabilization prior to referring them to the appropriate higher level of care.	0/		6/ Principle of transition from fetal to neonatal circulation, other systems affected by heart failure, continued management of patient with CHD.	They will be seeing such patients in clinics for checkup and weight checks. Children may have other comorbid conditions or require chronic medications.
3. Knowledge related to cyanotic congenital heart disease.	1/ Treatment to stabilize.	Save a life.	1/ Basics of surgical management.	Residents often have difficulty remembering pathway to Fontan and associated complications.	1**/	Outpatient management.
4. Knowledge related to acyanotic congenital heart disease.	0		2/ Pulmonary HTN management (iNO, sildenafil, etc).	Commonly seen in NICU.	2/ Endocarditis prophylaxis, when it is appropriate and when it is not. Nutritional needs with left to right shunt.	Recommendations have changed for prophylaxis. Pediatrician often assists with monitoring growth.

(Continues)

TABLE 1 (Continued)

ABP cardiology objectives categories	Management					
	Emergent/acute care (resuscitation)		Short-term care (inpatient)		Longitudinal care (outpatient)	
	What (knowledge and skills)	Why	What (knowledge and skills)	Why	What (knowledge and skills)	Why
5. Knowledge related to infectious acquired heart disease.	1/ Signs and symptoms that would indicate infective endocarditis vs another infection.	Because pediatricians are our front line triage physicians that need to be trained to recognize patients who require specialized care.	1**/	Empiric management.	1/ Who gets the prophylaxis. . . . who does not.	Still questions in some parents particularly after some repairs.
6. Knowledge related to rheumatic fever and myocarditis.	1/ How to recognize rheumatic fever and myocarditis in a patient who presents to the pediatrician's office.	Because both of these illnesses can present with very generic symptoms to a general pediatrician's office but require very rapid and specialized treatment.	1/ Know when to transfer to a higher level of care facility.	Management concerns in smaller hospitals.	1/ Prognosis of myocarditis.	I recently had a patient with myocarditis who died.
7. Knowledge related to pericarditis and Kawasaki disease.	0		0		2/ I feel that it is very important for a general pediatrician to know how to recognize, manage and treat Kawasaki disease. It is also important to recognize pericarditis so that it can be transferred out for management.	Because Kawasaki disease is a common disorder that is very important to recognize and treat correctly in the general pediatric practice. Pericarditis is a serious disorder that needs to be diagnosed quickly in order to increase the chances of a good patient outcome.
8. Knowledge related to rate and rhythm disorders, ischemia.	4/ What rhythms require immediate attention and what is normal variant (occasional PVCs, bradycardia in athletic patient). ABCs are the most important so PALS arrhythmias and algorithms are essential.	Frequent issue that often led to extensive work up that may not be needed. Every physician should be well versed in basic resuscitation: PALS.	0		1/ Vagal maneuvers according to age.	Might have to use or teach families these in clinic.

**No response provided for "what content should be added," although respondent provided rationale for "why" content should be added in this content area.

4 | DISCUSSION

This analysis describes the open-ended replies to the question "what needs to be added" to the 2016 ABP cardiology-specific content objectives and "why" from a statewide sample of pediatric trainees, general pediatricians, and pediatric cardiologists.[10] The conceptual framework best representing this content focused most prominently on initial skills of Diagnosis, with skill subsets of Recognize, Differentiate, and Evaluate. Divergent comments, seen slightly less frequently, identified skills in Management with skill subsets related to acuity and care setting, grouped as Emergent/Acute Care (Resuscitation); Short-term Care (Inpatient); and Longitudinal Care (Outpatient). Respondents offered thoughtful explanations for inclusion of additional content, referencing evaluation of prior clinical encounters and experiences.

A basic principle of medical practice is that one acquires and assimilates patient data to establish a diagnosis, which dictates further action. Without a presumptive diagnosis, it is difficult to proceed. Thus, it is not surprising that the majority of respondent comments highlighted content related to Diagnosis. The distribution of comments among the subsets of Recognize, Differentiate, and Evaluate likely demonstrates an awareness that a basic understanding of subject matter is required before more complex tasks can be attempted, with respondents labeling information in the Recognize category as "core pediatric knowledge."[16,18] Interestingly, within the Diagnosis skill subsets, many comments clustered in the higher-order cognitive task of evaluation.[17] This may indicate respondents' insight that knowledge of a diagnosis is meaningless if the knowledge cannot be applied to a clinical context.[17,19] Upon adequately recognizing and differentiating a potential cardiac from noncardiac condition, a learner may desire external input as he or she progresses through the cognitive diagnostic process. Affirming a recent study reporting frequent co-management of patients with subspecialists,[20] survey respondents' provided appropriate referral and resource utilization as justification for content included within the Evaluate subset. With increased availability of diagnostic cardiac testing, such as transthoracic echocardiography, contemporary pediatricians may be expected to have a basic understanding of appropriate indications for these tests.[21,22] Once results are available, a pediatrician must then determine whether or not cardiology referral is indicated and the urgency. Alternatively, cardiology consultation prior to diagnostic testing may result in more appropriate resource utilization.[23,24] Thus, increased emphasis on cardiology rotations related to appropriate indications for pediatric cardiology referral versus cardiac testing without referral may be important future components to emphasize in resident cardiology curriculum.

Having established a presumptive diagnosis, a general pediatrician is also likely to be the "front line" in providing patient care, as noted by survey respondents. Therefore, even with contemporary pediatricians reporting frequent subspecialist involvement,[20] content related to Management accounted for just over one-third of responses provided. Respondents felt that pediatricians should not only be well-versed in the "triage," "initial stabilization," and "PALS (pediatric advanced life support)" skills which might be required in an Emergent/Acute Care setting, but also that pediatricians should understand when cardiac patients required "transfer to a higher level of care" in Short-term Care (Inpatient) settings and the prognosis of conditions or teaching of vagal maneuvers in Longitudinal Care (Outpatient) settings. For management comments, the rationale for inclusion was often relevance of the specific skill to that provider's practice or need to address patient or family concerns in a timely manner. Given that respondents within our sample may practice in rural or urban areas, this emphasis on management skills across settings may reflect concerns about resource availability. Whereas the current number of pediatric cardiologists in the United States has increased,[25] distribution of these providers does not always correspond to disease burden.[26]

Building upon our initial study demonstrating the utility of an online survey methodology to identify content perceived most important within pediatric cardiology from the perspective of trainees and faculty,[10] this analysis could be utilized for curriculum reform. Ultimately, pediatric trainees must not only know the information to become certified in general pediatrics, but they must provide patient care in a constantly evolving discipline.[19] As previously reported, cardiology educators must ensure that the most basic content (ie, recognition of signs or symptoms, evaluation of murmurs, and auscultation) is mastered due to the difficulty this poses for learners and the necessity of these skills in establishing a diagnosis.[10] However, a key aspect of the Diagnosis skill set which must be emphasized in curricular design is conscious practice and feedback related to patient evaluation.[27] Furthermore, the design of pediatric cardiology rotations or incorporation within the residency curriculum should account for the need to encourage active resident participation in management of cardiology patients across a variety of settings.

Limitations of this study include that a statewide sample may not be generalizable to a national cohort. Whereas the majority of our respondents were general pediatricians, most respondents, were also affiliated with an academic institution, which could affect perspective on key curricular content. Additionally, as noted in the results, more comments were seen in response to some of the earlier open-ended questions in our survey. It is possible that respondent fatigue may have negatively impacted response to later open-ended questions.

5 | CONCLUSION

This analysis conveys "what needs to be added" to the 2016 ABP cardiology-specific content objectives and "why" from the perspective of pediatric trainees, general pediatricians, and pediatric cardiologists. Open-ended comments demonstrated that all respondents emphasized the need for the addition of diagnostic skills with emphasis in the "evaluate" skill set as important cardiology curricular content. Responses could be used to provide practical guidance for curriculum design and reform.

CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

Initial development of the research project design, had substantial input into data acquisition, substantially contributed to data analysis, was

primarily responsible for drafting manuscript, substantially contributed to revisions, and approved submitted and final version: Ashley E. Neal

Contributed to research project design, had substantial input into data acquisition, substantially contributed to data analysis, contributed substantially to portions of manuscript draft, substantially contributed to revisions, and approved submitted and final version: Elizabeth Lehto

Contributed to research project design, had substantial input into data acquisition, substantially contributed to data analysis, contributed substantially to portions of manuscript draft, substantially contributed to revisions, and approved submitted and final version: Karen Hughes Miller

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How to cite this article: Neal AE, Lehto E, Miller KH, Davis E, Ziegler C. A qualitative assessment of pediatric cardiology core content: Comments from Kentucky trainees, pediatricians, and pediatric cardiologists. *Congenital Heart Disease*. 2018;13:788–793. https://doi.org/10.1111/chd.12626