

A qualitative study to identify entrustable professional activities for a pediatric dentistry
residency program

Arley A. Medrano

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Committee:

Teresa A. O'Sullivan

Travis M. Nelson

Elizabeth K. Velan

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Arley A. Medrano

University of Washington

Abstract

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Arley A. Medrano

Chair of the Supervisory Committee:

Travis Nelson

Department of Pediatric Dentistry

Purpose: This qualitative study was designed to identify entrustable professional activities (EPAs) that may be used to assess progress toward independent practice by pediatric dentistry residents during a two-year residency program.

Methods: Six semi-structured interviews of University of Washington (UW) Advanced Education in Pediatric Dentistry faculty members were conducted in September and October of 2021. Participants were asked what vital tasks all pediatric dentistry residents must be able to complete independently by the end of the residency. Responses were recorded and transcribed. Content analysis of the transcriptions was used to identify themes. These were identified as potential EPAs.

Results: Three overall EPA themes and 12 specific EPAs were identified. The communication theme contained the tasks of working effectively with the pediatric dental team, other care providers, and members of a child's family; it also included being able to document patient work-up findings to support future care. The general care provision theme contained patient work-up, behavior management, and providing care to medically complex children. The specific care provision theme included the ability to provide restorative, pulp therapy, surgical, simple orthodontic, and emergency care to children.

Conclusions: Pediatric Dentistry EPAs may potentially include key tasks within the themes of communication, general and specific care. Such EPAs may provide a practical and competency-based curricula in a residency training program.

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I. INTRODUCTION

Entrustable professional activities (EPAs) are work-based activities that supervising faculty can observe and measure.¹ The concept of EPAs was originally introduced by ten Cate as an assessment approach within competency-based curricula in graduate medical education.² Whereas competencies describe specific resident abilities (e.g., collects a verbal patient history, correctly interprets radiologic imaging), EPAs are more broadly defined as “tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence,” (e.g., manages restorative care).^{3,4} The difficulty with using competencies (specific knowledge, skills, and behaviors) in performance assessment is that they tend to be overly detailed, identifying individual aspects of patient care, and can lack the context needed to determine the degree of independence with which a resident can conduct an entire task.⁵ Identifying broad tasks which each resident needs to be able to perform independently shifts the focus from the individual activity components to the whole of the overall task, which may be a more practical assessment approach for faculty who assess resident performance.^{6,7} These tasks should form the essential elements that define a specialty area,¹ such as pediatric dental practice.

Currently the Commission on Dental Accreditation (CODA) provides a framework for the minimal requirements to graduate from an accredited pediatric dentistry program. For example, all pediatric dentistry residents must complete a minimum of 20 nitrous oxide analgesia patient encounters as primary operator.⁸ The assumption that performing the minimum number of procedures will ensure competency in the defined area is implicit in these standards. However, the standards do not specify assessment strategies to determine whether graduating residents are

competent and can deliver care independently. An EPA framework provides a connection or bridge between the CODA standards and knowledge, skills, and behaviors exhibited in the workplace.⁹ A potential EPA framework for integration of EPAs, competencies, and milestones adapted to a pediatric residency program is summarized in Figure 1.

Most graduate medical education programs have progressed towards a competency-based framework containing EPAs as their system of assessment.¹⁰ A systematic review of pediatric medical residencies found that publications have shifted from descriptions of EPA development toward EPA implementation, acceptance, and assessment.¹¹ These publications in the medical literature have spurred discussions about EPAs in dental education,⁶ and pediatric dentistry specialty programs.¹² The purpose of this study was to identify EPAs that may be used to assess progress toward independent practice by pediatric dentistry residents during a two-year residency program.

II. RESEARCH METHODS

Participants and setting

The participants were faculty in the Department of Pediatric Dentistry at the University of Washington School of Dentistry in Seattle, Washington. All were actively engaged as supervising pediatric dentists in the 2-year pediatric dentistry residency training program. Residents in this program are trained to promote the health of infants, children, adolescents, and persons with special needs through education, research, and service. The length of time spent by faculty members varies from roughly 400 to 2000 hours annually, depending on their role in the training program and schedule in the clinic, classroom, hospital, or operating room.

A group of eight faculty members affiliated with the program's key clinical sites, The UW Center for Pediatric Dentistry, Seattle Children's Hospital (SCH), and SCH Odessa Brown Children's Clinic were invited to participate in the study. Participants were selected purposefully to obtain a range of backgrounds, including consideration of time spent as a practicing pediatric dentist, time spent teaching pediatric dentistry, and part-time versus full-time employment. A standardized initial invitation email was sent to the selected faculty members. A consent form for the study and a short document describing basic background information on EPAs was attached to the confirmation email. Potential participants who did not respond to the initial invitation email were sent one additional reminder email. Ultimately all participants accepted the invitation and provided consent to participate.

Study design and procedures

Semi-structured interviews were used to identify activities that participants felt pediatric dentistry residents should be able to complete independently by the end of their residency. The interview script was developed by the research team using a neopositivist approach, where the interviewer asks open-ended questions and contributes minimally to the conversation.¹³ The interview questions explored supervisors' experiences of entrustment decisions from the perspective of training residents in clinical situations. The first two participant interviews were conducted to refine the interview questions and provide the interviewer (AM) the opportunity to practice conducting the interviews. After reviewing comments and recommendations offered by the first two participants, the script was revised. The final script included an inquiry into participant demographics, one primary question about EPAs, and multiple secondary questions to clarify a participant's response. (See Appendix) The primary question, which is the focus of

this paper, was “What are vital tasks that all pediatric residents must be able to complete independently by the end of their residency?” The study protocol was reviewed by the University of Washington Human Subjects Review Board Study (#00012295: PEDIATRIC DENTISTRY EPAs) and determined to be exempted from human subjects research, as defined by federal guidelines.

Prior to conducting interviews independently, the interviewer was calibrated by completing a training module on conducting a semi-structured interview,¹⁴ and the first two interviews were considered training interviews. Interviews were conducted remotely (Zoom®, San Jose, California) in alignment with COVID-19 pandemic guidelines that were in effect at the time. All interviews were conducted in September and October 2021. Interviews ranged from 19 to 29 minutes in duration. No field notes were taken, and no repeat interviews were carried out for this study. After the interview participants were invited to send additional thoughts to be appended to their responses, however no participants submitted additional feedback after the initial interview sessions. Each interview was transcribed by the recording software. The transcription was reviewed and edited by the study team to produce a transcript that was accurate, anonymous, and faithfully represented the phrasing of the participants.

Data analysis

The investigators used an abductive approach to content analysis of the transcribed interview data, wherein preconceived ideas about EPAs suggested by the participants were not disregarded, but unexpected insights arising during iterative readings of the data were considered equally important.¹⁵ Interview transcript data were initially entered into a spreadsheet (Microsoft

Excel®, version 16.57), with each of the participant responses linked to one of the structured questions. Two researchers (AM and TO) independently read the transcripts and then met to discuss initial impressions. This process was repeated iteratively until themes began to emerge from the data, a process called coding.¹⁶ This analysis was used to help to develop a codebook which summarized important themes derived from the data set and included representative quotes. Emerging themes were tested against two questions to determine if they might be a pediatric dentistry EPA. First, “in what way is this task unique to pediatric dentistry?” The first question was used to differentiate tasks that a pediatric dentist would need to learn versus a general or other dental specialist. Second, “is this task a critical activity of specialty practice or is it a competency an individual needs to possess before a critical activity can be entrusted?”⁷ This second question was used to differentiate if the task was broad enough to be an EPA or was really a competency under a broader EPA.

III. RESULTS

Interview data from six faculty members was included in the analysis. Baseline characteristics of participants are summarized in Table 1. Theme saturation (where no new ideas are introduced by the participants) occurred by the fifth interview. Data analysis identified a framework of twelve EPAs, which could be organized into three overarching themes: communication, general care provision, and specific care provision. These themes, EPAs, and supportive quotes are outlined in Table 2.

Communication

The overall theme of communication encompassed a variety of tasks relating to team and individual interactions. The first EPA in this theme was *working effectively with the pediatric dental team*. It included competencies of effective communication between team members, delegation of functions to well-trained individuals, and knowing how to train dental team members so they can learn to be effective team members. Participants emphasized the unique skills staff members need to work effectively with children, including children with special needs and their parents.

The second EPA in the communication theme was *working effectively with interdisciplinary and interprofessional colleagues*. In this EPA, the pediatric dentist needs to know the limits of their specialty so they can identify what is within their scope and when the patient needs to be referred to another dental specialist or another health care provider. Participants indicated that residents needed to know when interdisciplinary referral was indicated—for example to endodontics or orthodontics—but also referral to or communication with other health care professionals such as pediatricians and dieticians.

The third EPA in the communication theme was *working effectively with all family members*. Participants spoke of obtaining consent for care from caregivers, providing anticipatory guidance to parents and other caregivers, and providing information in a way that the family member can best understand.

The final EPA in the communication theme was *documentation skills*. This EPA refers to written communication for the purposes of documenting treatment decisions and care provided. Some participants expressed the opinion that documentation is important when caring for children because they move through different developmental phases. Clinical care and the decision-making process is guided by the child's specific developmental phase. Other examples provided by participants included the fact that emergency services for children often involve trauma outside the oral cavity and it is important that specialist or interprofessional health provider be informed because that might affect other medical care. Many participants also expressed the opinion that when providing care to medically complex children it is very important for interprofessional care providers to know the rationale behind dental care decisions.

General care provision

The first EPA in this theme was *performing a complete patient work-up on a child of any age*, defined as the constellation of procedures on which a patient's diagnosis and therapy is based. For example, the work-up might include taking a medical history, performing a physical exam, and ordering and evaluating lab tests and imaging procedures.¹⁷ Participants commented on the need to conduct a comprehensive medical and dental history, clinical exam, and radiologic assessment. They expressed that this is the basis for residents to determine a correct diagnosis and create a developmentally appropriate treatment plan. This EPA includes another competency of taking into account the child's medical and socioeconomic circumstances.

The second EPA in this theme was *managing behavior of children and their caregivers*. This EPA includes developing customized behavior guidance plans dependent on the child's temperament and their treatment needs. Participants noted that behavior guidance uses non-pharmacological and pharmacological options.

The final EPA in this theme was *providing quality care to medically complex children*. All participants agreed that this EPA is an integral part of the specialty of pediatric dentistry.

Specific care provision

The first EPA in this theme was *managing restorative care*. This EPA is comprised of the many different procedures a pediatric dentistry resident must learn in order to be able to provide restorative dental care to children. Participants spoke of anterior and posterior restorations, including sealants, composite fillings, composite crowns, stainless steel, and zirconia crowns. They also noted that restorative management is a major facet of pediatric dentistry, and it will be practiced extensively by most providers throughout their careers.

The second EPA in this theme was *managing pulp therapy*. This EPA focuses on the different pulp therapy procedures a pediatric resident learns to be able to appropriately provide oral rehabilitation services to pediatric patients. Participants spoke of anterior and posterior pulp treatment, including indirect and direct pulp capping, partial and cervical pulpotomy, and pulpectomy.

The third EPA in this theme was *managing children needing emergency care*. This includes providing proper triage, an appropriate diagnosis, and appropriate oral trauma care. Participants named hard and soft tissue repair, treatment of crown and/or root fractures, intrusion, extrusion, and avulsion as well as treatment for fulminant odontogenic infections.

The fourth EPA in this theme was *managing children needing oral surgery*, including anterior and posterior extractions of both primary and permanent teeth. Participants spoke of the need for planning and completing extractions of primary and permanent teeth in the context of the growth and development of children.

The final EPA in this theme was *managing noncomplex orthodontic procedures for children of all ages*. This area is centered on the simple orthodontic procedures a pediatric resident learns to be able to appropriately provide care to pediatric patients who are growing and developing. Participants spoke of basic orthodontic screening, space assessment and management.

IV. DISCUSSION

Assessing residents to determine when they are ready to independently undertake clinical procedures at a specialist level is critical for tracking their progress through the residency training. Entrustable professional activities are an assessment tool that could be used to accomplish this in a graduate residency program. This study employed a qualitative process to outline EPAs that pediatric dentistry residents should be expected to perform independently by

the end of a two-year residency program. In this process we identified three EPAs in the theme of communication, three in general care provision and five in specific care provision.

Given the importance of adequate training to the provision of quality patient care, there is understandable interest in refining resident assessment during training to ensure clinicians are ready to practice independently in different contexts and environments.^{20,22} This present project was conducted in response to recent publications calling for EPA development in dental undergraduate and graduate programs.^{5,6,12,21-23}

Specialty training should provide graduates with the essential knowledge, skills, and experiences to build opinions, principles, and predictable actions which demonstrate self-awareness and trustworthiness in a new specialist. A key strength of EPAs is that the assessment process combines multiple competencies to construct overarching tasks that a competent clinician can be entrusted to perform, as outlined in the Figure 1 showing the relationship between the graduate pediatric dentist, EPAs, competencies and milestones.⁷ Supervising faculty can support entrustment decisions by assessing specific competencies, as outlined in Table 3, and the resident can use the same criteria for self-assessment leading them to develop approaches for improvement.¹² Applying this manner of self-assessment allows the resident to be accountable in developing their clinical skills and self-awareness.

Some activities mentioned by participants seemed at first like they should be considered EPAs. One example was the participants' emphasis on the importance of the complete examination and the correct diagnosis to design the optimal treatment plan. Applying the

question of whether these were discrete tasks or rather competencies within larger EPAs helped us see that the complete examination, assessment and correct diagnosis, and development of the treatment plan were all steps in the larger task of managing a patient work-up.²³ Likewise, assessing dental and craniofacial development initially appeared to be an EPA. However, we realized that these would better be categorized as competencies for the patient work-up, managing a medically complex child, and all of the specific care EPAs. Finally, several participants suggested that keeping abreast of the primary literature and knowing current practice guidelines are important skills. However, after much discussion we ultimately categorized these skills as competencies under all the specific care EPAs.

In our assessment, we found considerable overlap of EPAs. For example, behavior guidance is a continuum of interaction involving the pediatric dentist and dental team, the child, and caregivers directed toward communication and education, while also ensuring the safety of oral health professionals and the child.²⁴ While all of the communication EPAs had overlap with general and specific care EPAs, we chose to group them separately. The rationale was that inability to communicate successfully and independently affects a resident's ability to complete all other EPAs.

While the advantages of using EPAs as a tool in assessing trainees' readiness for independent practice are apparent, the creation and administration of these within a program may take a considerable amount of time and effort. The current widespread use of EPAs by predoctoral and specialty medical education programs took years to develop, and it will likely be the same for dental education programs. Two published reports have described development of a

predoctoral EPA framework.^{18,19} Another recently-published report has proposed exploration of EPAs as an assessment tool for post-graduate dental training.²⁰ And indeed, a recent publication by orofacial pain residency program directors identified ten EPAs in that specialty setting.²¹ In a survey of pediatric dentistry resident program directors, Cully and Schwartz found that while most respondents were satisfied with their current resident evaluation process, most felt that standardizing parameters for assessing resident competence could be beneficial.²² Over two-thirds of the respondents were not aware of EPA use in medical education.

We included several steps in our study to increase trustworthiness of the results.²³ Purposeful selection of participants enabled sampling of key informants to answer our study question. The same interviewer conducted all the interviews, minimizing variation in interview style and clarifying questions asked. Edited transcriptions were compared to the original audio-recordings to assure transcribing faithfulness. Data were analyzed iteratively, with regular meetings to compare impressions and resolve inconsistencies. Incoming data were checked to assess saturation; additional individuals were identified for interview in case saturation was not reached by the sixth interview. Data from interviews of the first two participants were not included in the data analysis because these individuals helped design the study and their familiarity with EPAs may have given them more time to develop their answers compared to other participants. However, as a source of data triangulation, the transcript for participant 2 was compared to the emerging EPAs to see if they were also apparent in that interview. Finally, during study design we were mindful of how our own perspective can affect how investigators perceive data.¹⁵ The first author was a pediatric dentistry resident at the time of data collection and was highly involved in data analysis; his experiences in that program might

have influenced how he perceived the data, potentially leading him to think deductively. To balance that, the second author, also highly involved in data analysis, was not a dentist, so her analysis was purely inductive. The other authors were program directors and did not directly participate in the data analysis process. However, they were active in designing the study, providing guidance as questions arose, and editing the study report.

This study has limitations. One of those is that the data is from a single pediatric dentistry residency program and the results are thus not generalizable to other programs. Although the similarity in many responses from the participants make it likely their opinions are fairly representative of faculty in other programs. A survey design would have helped gather information from a larger group of people but would not have provided the rich descriptions that were so informative in generation of these proposed EPAs. A natural next step is using these results in the design of a survey or Delphi approach to gather data from other program directors or faculty. There was also an imbalance in the gender of participants of one male to five females. This is reflective of the ratio of male to female faculty members within the program's key clinical sites.

This study employed qualitative research techniques to identify twelve potential EPAs that could be used in performance assessment of pediatric dentistry residents. It is hoped that these findings will contribute to discussion at a national level about the utility of EPAs in competency-based assessment of pediatric dentistry residents. Future studies are needed to clarify the nature and scope of pediatric dentistry EPAs and identify stakeholder responses.

V. CONCLUSIONS

Based on the study's results, the following conclusions can be made:

1. A qualitative approach, utilizing semi-structured faculty interviews, identified entrustable professional activities (EPAs) that may be used to assess progress toward independent practice by pediatric dentistry residents during a two-year residency program.
2. The assessment framework that was developed included the EPA themes of communication, general care, and specific care. Within these themes, 12 EPAs were identified which residents should be able to do independently by the end of a 2-year pediatric dentistry residency program.

VI. FIGURES & TABLES

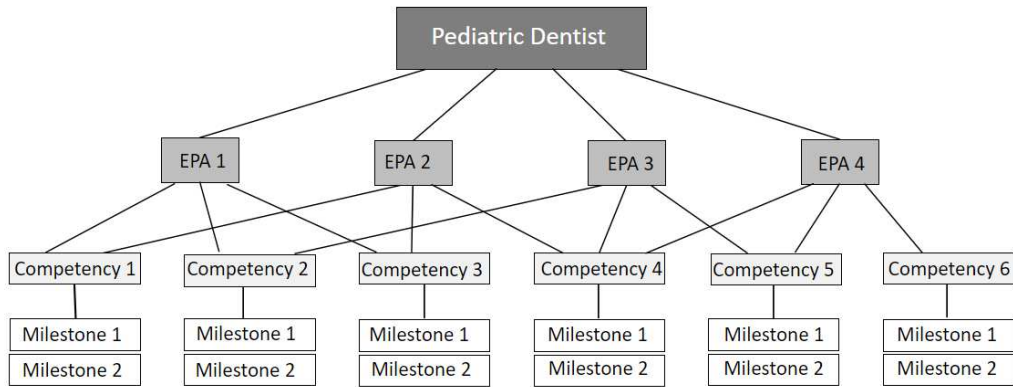


Figure 1. Potential EPA Framework in a pediatric residency training program

Table 1. Baseline characteristics of participants	
Demographic Categories	N (%)
Gender	
Female	5 (83)
Male	1 (17)
Years Teaching Pediatric Dentistry	
0-6	1 (17)
7-12	2 (33)
13-18	1 (17)
18-24	2 (33)
Years Practicing Pediatric Dentistry	
0-9	1 (17)
9-18	3 (50)
18-27	1 (17)
49+	1 (17)
Pediatric Dentistry Practice History	
Academic	4
Private	6
Public/Community	2
Hospital based	5
Type of Employment	
Part-time	1 (17)
Full-time	5 (83)

Table 2. ENTRUSTABLE PROFESSIONAL ACTIVITIES (EPAs), DOMAINS, AND REPRESENTATIVE QUOTES

EPA	Representative Quotes
Domain: Communication	
Work effectively with other members of the pediatric dental team.	“...being able to be a good leader. Again, to manage a team that can do a lot of the tasks that we kind of delegate, like a good cleaning. I mean, it's important for us to know what's a good cleaning, what's not a good cleaning, when there's things like that for a child that it may not be that complex. But leave your tasks to your dental assistants, that will be able to do that with you and for you.” (Participant 7)
Work effectively with interdisciplinary and interprofessional providers	“But I think what really made me feel like I'm prepared I'm ready it's like I was in [Surgery Center] working with anesthesiologist and nurses and assistants so having this interdisciplinary communication and being able to talk in an intelligent way about a child's medical history and to communicate with the medical team about their safety and health during anesthesia. That was really big.” (Participant 3)
Work effectively with all members of a child's family	“Adequate informed consent. I think is important and really being able to educate parents on what you're doing and obtaining informed consent that makes sense to them.” (Participant 5)
Document work-up findings, treatment plans, and care provision	“...being able to document, clearly, and appropriately clinical encounters is all those might sound simple. It's something that is really important to be able to complete and I find residents are still really working on that by the time they graduate and sometimes I'm not convinced that we've nailed it down in terms of what the substantive information is required in terms of all the clinical and the social pieces of the note.” (Participant 5)
Domain: General care provision	
Perform a complete patient work-up on a child of any age.	“I would expect being able to perform an adequate radiographic and physical exam and then from that extrapolating treatment plans that are acceptable for age, by age for both the typical child and maybe a child with more complexities” (Participant 5) “...the importance of a comprehensive exam because the comprehensive exam serves as the foundation for the diagnosis.” (Participant 6)
Manage behavior of children and their caregivers.	“...the pharmacologic behavior management, you know administration of nitrous oxide, administration of sedative agents.” (Participant 3)
Manage medically complex children.	“...patient care at all ages and also of all complexity. I think they need to be comfortable with special care needs patients to the level of the specialty—more than just taking the simple kind of conditions of childhood.” (Participant 7)
Domain: Specific care provision	
Manage restorative care in children of all ages.	“...you have to be competent in all areas in terms of restorative dentistry from well-placed sealants...to any type of composite restorations, stainless steel crowns...” (Participant 4)
Manage pulp therapy in children of all ages.	“I will expect them to be able to do first, good pulpal diagnosis, to...do a good pulpotomy, that is not coming back as an extraction later on.” (Participant 7)
Managing children needing oral surgery	“You know there's also the ability to do extractions—both primary and permanent extractions.” (Participant 7)
Manage noncomplex orthodontic procedures in children of all ages	“Evaluating future orthodontic concerns, spacing issues, space management issues, things that require some kind of intervention early so either knowing if someone's going to need earlier intervention or not terms of growth and development.” (Participant 5)
Manage children needing emergency oral care.	“...how to do phone triage and then also to have experience going in and treating things that come into the emergency department, I think that's also very important.” (Participant 8)

VII. APPENDIX

Semi-structured interview questions

Demographic questions

How long have you been teaching and training pediatric dental residents?

How long have you been practicing pediatric dentistry?

What type of practice? Tell me a little bit about your practice history – academic vs private vs public vs corporate

Research question

What are vital tasks that all pediatric residents must be able to complete independently by the end of their residency? Please take whatever time you need to process this mentally and then start stating everything that comes to your mind.

Potential follow-up questions

Are there any other vital tasks that you perform(ed) in your daily practice?

Urgent Care

Vital tasks outside of patient care?

Leadership/Organization/Teamwork

Practice Management

What are the most important things to learn in a residency?

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