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The Current Status of Infant Oral Health Instruction Within Predoctoral Dental Education

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ABSTRACT

A pediatric dental home is a patient–provider relationship that establishes compassionate, comprehensive care that is continually accessible. For more than two decades, professional organizations have recommended children establish a dental home by their first birthday. In 2024, the American Academy of Pediatric Dentistry (AAPD) Council on Pre-Doctoral Education had a governance charge approved by the AAPD Board of Trustees to evaluate the status of infant oral health (IOH) instruction in pre-doctoral dental education. This study was designed to describe the current state of didactic and clinical clock hours dedicated to IOH in U.S. pre-doctoral curricula. Following IRB approval, a 25-item questionnaire was developed and administered electronically to faculty contacts at 66 accredited dental schools. Question types included multiple choice, multiple selection, and fill-in-the-blank. Descriptive statistics were reported for each item. Response rate for the survey was 59%. The majority of clinical IOH experiences occur at the dental school (82%) or community-based rotations (59%). All respondents teach dental students to recommend that children have their first dental visit by their first birthday. However, only 81% teach dental students to recommend the use of fluoridated toothpaste starting with the eruption of the first tooth or by the child's first birthday. This study describes the current state of didactic and clinical clock hours dedicated to IOH in U.S. predoctoral curricula. By highlighting the disconnection between professional guidelines and the realities of dental education, the study underscores the need for targeted reforms to enhance student preparedness and improve patient access to care.

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1 | Introduction

The concept of a pediatric dental home was first introduced around the turn of the 21st century [1]. Professional organizations adopted policies and guidelines supporting the early establishment of a dental home by a child's first birthday [2, 3]. Establishing the doctor–patient relationship early in life can facilitate individualized and comprehensive anticipatory guidance, primary prevention, and early disease detection [1, 4, 5].

An essential component of policy implementation is workforce development and provider education. Dental school curricula, specifically the pediatric dentistry components, evolved to include instruction related to infant oral health (IOH) [6–10]. Over time, more dentists agree with policies supporting the age one dental visit, and more curricula are incorporating content related to IOH [7, 8]. The Commission on Dental Accreditation (CODA) Standard 2-23 for pre-doctoral programs states that graduates must be competent in providing oral health care within the scope of general dentistry throughout the life-course, which includes infancy [11]. However, historically, dental student experiences have not prepared graduates to perform dental examinations on infants upon entering practice or residency [10, 12].

Studies of IOH utilization reveal overall low uptake; less than 10% of children have their first dental visit by age one, and the mean age of first dental visits is 3 years old [13, 14]. In some states, the mean age of first dental visits among Medicaid-enrolled children is closer to 5 years old [15]. A delay in the first dental visit could be due to numerous factors including inadequate knowledge among providers and parents about age one dental visit recommendations, access to dentists, or inadequate reimbursement policies [16–20]. A recent qualitative study suggested a complicated relationship between what dentists recommend and what mothers experience when seeking dental care for their infant children [16]. Mothers have reported that some dentists do not recommend the first visit until Age 3, whereas some mothers were seeking care prior to that age [16]. Additional support is needed for dentists and parents to operationalize and achieve the age-1 dental visit.

In 2024, the American Academy of Pediatric Dentistry (AAPD) Council on Pre-Doctoral Education in conjunction with the AAPD Research and Policy Center had a joint governance charge to evaluate the status of IOH instruction in pre-doctoral dental education. Especially in instances without geographic access to pediatric dental specialists, it is important for general dentists to have knowledge and clinical skills to provide an IOH examination and anticipatory guidance to pediatric patients. Predoctoral dentistry curricula plays an essential role in providing these educational and clinical experiences. The primary objective of this study was to describe the current state of didactic and clinical clock hours dedicated to IOH in U.S. pre-doctoral curricula. For this study, clock hours describe the amount of time students have dedicated within their curriculum to a particular field of study. As a secondary measure, we described different competency assessments some schools use to assess IOH practices. When

possible, we described changes in curricular practices compared to the earlier studies of IOH within dental school curricula.

2 | Methods

This cross-sectional, descriptive study was reviewed by the Ohio State University Institutional Review Board and determined to be exempt from review (Study #2024E0073).

2.1 | Data Collection

Following an extensive literature review, a 25-item questionnaire was developed specifically for this survey. Question types included multiple choice, multiple selection, and fill-in-the-blank. They were adapted from previous literature examining pediatric dentistry curricular time, dental student experiences treating pediatric patients, and dental school graduate preparedness to treat pediatric patients [6–10, 12, 21]. Questions were selected if they asked participants about the number of clock hours in the pediatric dentistry curriculum, specific educational practices and clinical tasks performed during an IOH visit, and clinical sites where experiences occur. Clinical tasks for children 0–36 months included examining children, providing toothbrush prophylaxis, applying fluoride varnish, assessing fluoride status/intake, providing oral hygiene instructions, providing nutritional counseling, assigning caries risk status, providing counseling about teething and non-nutritive habits, recommending use of fluoride toothpaste at the time of first tooth eruption, and recommending the first dental visit by age 12 months.

Additional questions were added to assess clinical operations about workflows for infant patients. To update previous studies, the questionnaire also included questions about methods of instruction and specific competency assessments directly or indirectly related to an IOH visit, such as an IOH exam, diet or nutritional counseling, fluoride varnish application, and silver diamine fluoride application. The questionnaire was pilot tested for content validity by members of the AAPD Council on Pre-Doctoral Education. The final version of the questionnaire was converted to REDCap to facilitate data collection and analysis [22], and a copy is available as [Appendix 1](#).

The questionnaire was administered electronically via an email distribution list maintained by the AAPD Educational Program Manager that includes pediatric dentistry faculty contacts at all dental schools. Among the 75 accredited dental schools in the United States, 9 were excluded since they had not yet graduated their first class by the time of questionnaire administration, leaving 66 eligible schools. The data collection window was from March 15, 2024, through May 31, 2024. Potential participants were sent email reminders approximately 2, 4, and 8 weeks following the initial introductory email about the questionnaire. A final, in-person reminder to respond to the survey was made at the AAPD Annual Session Joint Academic Day in May 2024. Potential participants were given information about the study's purpose, potential risks and benefits of participation, and an assurance

of confidentiality. The primary author's contact information was provided to participants if they had any questions about the study or their participation.

2.2 | Statistical Analysis

Descriptive statistics were reported for each questionnaire item as counts and percentages or means and standard deviations based on the type of data each item represented. This was a descriptive study without planned hypothesis testing. Missing data was included as its own category. All analysis was performed in STATA (version 16.0, STATA Corp. LLC, College Station, TX, USA).

3 | Results

Among the 66 dental schools, 39 returned a response to the questionnaire (response rate = 59%). The age range used to define IOH by most programs was 0–2 years old (44%) or 0–3 years old (39%). Didactically, IOH content is delivered mostly in-person (86%), but also with virtual (both synchronous and asynchronous) components (14%). The predominant technique is lecture-based instruction (92%, Table 1), with videos (56%) and demonstrations (54%) also being incorporated by more than half of the respondents.

Among the 39 schools that returned a response, competency assessments in IOH were limited and variable (Table 2). Diet or nutritional counseling (23%) and fluoride varnish application (20%) were assessed for competency by some schools, but these topics are not unique to the IOH encounter.

All respondents teach dental students to recommend that children have their first dental visit by their first birthday. However, only 81% teach dental students to recommend the use of fluoridated toothpaste starting with the eruption of the first tooth or by the child's first birthday.

The majority of clinical IOH experiences occur at the dental school clinics (82%) or community-based rotations (59%) (Table 3). The task with the fewest respondents ($n = 24$, or 61%) was the recommendation for fluoride toothpaste after the first tooth erupts. At 16 schools, more than 75% of students have an opportunity to recommend that the first dental visit occur by Age 1, which was the IOH task with the highest percentage of students having a clinical experience. At 11 schools (28%), infant patients, by default, get scheduled with pediatric dentistry residents at the primary clinical site where dental students train. Most schools (59%) reported an insufficient pool of infant patients at the primary clinical site to provide each student a direct clinical experience in providing IOH. Respondents were asked to estimate the percentage of new patients that were 12 months old or younger and for how long an IOH visit was scheduled for dental students. The mean percentage of new patients was 11.6% (standard deviation, 9.9), and the mean length of appointment time was estimated to be 49.5 min (standard deviation, 19.1).

4 | Discussion

4.1 | Summary and Interpretation of Results

This study provides a comprehensive evaluation of the dedicated pediatric clock hours and the current state of IOH education within U.S. predoctoral dental school curricula. Substantial variability was identified in both didactic and clinical components. The findings align with previous research describing discrepancies in IOH training, particularly the number of clinical experiences and the methods used to assess competency [6, 10, 11]. By offering an updated summary of IOH education, this study extends existing literature and identifies critical gaps in clinical exposure and curricular integration. These findings underscore the persistent challenge of aligning dental education practices with established professional guidelines, such as the recommendation for a child's first dental visit by age 1 [12, 13].

4.2 | Importance of Results

Nearly 25% of 2–5 year-old children have dental caries, a percentage that has not changed appreciably over the past four decades [23, 24]. Rates of untreated decay have improved, suggesting that access to dental care is improving [23]; however, trends in preventing the disease altogether are stagnant [24]. Few children have a dental visit by their first birthday in the United States [13, 14]. The average child has a first dental visit closer to age 3 [13], where disease is often present and likely at advanced stages requiring expensive and extensive treatment [25]. Reimbursement policies and innovative care delivery models that support earlier access to dental care hold promise at improving IOH utilization. However, the role of training the new dental workforce cannot be overlooked.

The availability of an adequate number of infant patients for clinical training limits a dental student's ability to be prepared to treat infant patients upon graduation. This disconnect between professional guidelines and what is currently achieved in predoctoral curricula, specifically for IOH, represents a significant opportunity for dental educators to think differently about dental care delivery systems beyond traditional clinical operations [10, 11]. Students are not adequately prepared to deliver IOH [26]. A number of strategies could be implemented in the predoctoral curriculum to enhance IOH training and prepare graduates to provide these services upon graduation (Table 4). In addition to making sure the content is covered in didactic instruction, clinical operations could be modified to support IOH clinical experiences, which generally require fewer resources than other preventive or treatment visits. Modifications might include changes to scheduling templates, visit locations, and instrument kits. Developing simulated cases that use either basic pediatric mannequins (Figure 1) or standardized patient parents, depending on the specific objective, could be useful adjuncts in lieu of or in preparation for clinical experiences. Calibrating faculty on what is specifically defined within the IOH visit would align expectations for students.

Community-based education could bridge gaps in both clinical exposure and access to care. Community rotations and partnerships with Early Head Start school-based centers or Women,

TABLE 1 | Didactic methods, definitions, and clock hours used to teach and evaluate infant oral health (IOH) knowledge and skills at 39 dental schools in the United States.

Variable	N	%
For IOH, how is content delivered to predoctoral students? (not mutually exclusive categories)		
Lectures	36	92.3%
Videos	22	56.4%
Demonstration	21	53.8%
Case-based scenarios	18	46.2%
Textbooks	18	46.2%
Handouts	15	38.5%
Small group discussion	12	30.8%
Journal articles	11	28.2%
Modules	7	17.9%
Simulations	7	17.9%
What age range does your program use to define IOH?		
0–12 months	2	5.1%
0–18 months	1	2.6%
0–2 years	17	43.6%
0–3 years	15	38.5%
0–5 years	1	2.6%
Missing	3	7.7%
How many clock hours is your entire pediatric dentistry didactic curriculum?		
5–10 h	3	7.7%
11–15 h	1	2.6%
16–20 h	2	5.1%
> 20 h	31	79.5%
Missing	2	5.1%
How many didactic clock hours are specifically devoted to IOH?		
< 1	3	7.7%
1–2	12	30.8%
2–5 h	19	48.7%
> 5 h	3	7.7%
Missing	2	5.1%

TABLE 2 | For the following topics in *pediatric dentistry*, do you perform a clinical competency assessment of predoctoral students? If so, how? (options are not mutually exclusive)

Topic	Yes (n,%)	Oral exam/OSCE	Typodont-based exercise	Standardized patient experience	Clinical patient experience
Infant oral health exam	5 (12.8%)	1	0	0	4
Diet/nutritional counseling	9 (23.1%)	4	0	1	4
Fluoride varnish application	8 (20.5%)	2	0	1	5
SDF application	4 (10.3%)	1	1	1	1

TABLE 3 | Description of clinical sites where infant oral health (IOH) training occurs and which procedures are delivered in an infant oral health visit at 39 US dental schools.

Question	Variable	N	%
Which clinical locations best describe where your dental students perform IOH visits?	Dental school clinics	32	82.1
	Community-based rotations	23	59.0
	School-based rotations	14	35.9
	Hospital-based rotations	5	12.8
	Private practice rotations	3	7.7
How often do your dental students perform infant oral health evaluations at the primary clinical site where dental students train?	At least every day	6	15.4
	At least every week	13	33.3
	At least every month	8	20.5
	Rarely	4	10.3
	Never	4	10.3
	Missing	4	10.3
Do your dental students provide these services at your primary clinical training site (all % yes)?	Examine children aged 0–36 months?	29	74.4%
	Provide toothbrush prophylaxis for children aged 0–36 months?	28	71.8%
	Apply fluoride varnish to children aged 0–36 months?	28	71.8%
	Assess fluoride status/intake to children aged 0–36 months?	27	69.2%
	Provide oral hygiene instructions for children aged 0–36 months?	29	74.4%
	Provide nutritional counseling for children aged 0–36 months?	27	69.2%
	Assign caries risk status to children aged 0–36 months?	29	74.4%
	Provide counseling about teething and non-nutritive habits?	27	69.2%
	Recommend the use of fluoride toothpaste at the time of first tooth eruption?	24	61.5%
	Recommend the first dental visit occur by Age 1?	29	74.4%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience examining children aged 0–36 months.	< 25%	8	20.5%
	25%–75%	13	33.3%
	> 75%	12	30.8%
	Missing	4	10.3%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience providing toothbrush prophylaxis for children aged 0–36 months.	< 25%	8	20.5%
	25%–75%	14	35.9%
	> 75%	11	28.2%
	Missing	6	15.3%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience applying fluoride varnish to children aged 0–36 months.	< 25%	9	23.1%
	25%–75%	12	30.8%
	> 75%	12	30.8%
	Missing	6	15.3%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience with assessing fluoride status/intake to children aged 0–36 months?	< 25%	10	25.6%
	25%–75%	11	28.2%
	> 75%	12	30.8%
	Missing	6	15.3%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience with providing oral hygiene instructions for children aged 0–36 months?	< 25%	9	23.1%
	25%–75%	11	28.2%
	> 75%	13	33.3%
	Missing	6	15.3%

(Continues)

TABLE 3 | (Continued)

Question	Variable	N	%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience with providing nutritional counseling for children aged 0–36 months?	< 25%	8	20.5%
	25%–75%	11	28.2%
	> 75%	12	30.8%
	Missing	8	20.5%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience with assigning caries risk status to children aged 0–36 months?	< 25%	9	23.1%
	25%–75%	12	30.8%
	> 75%	12	30.8%
	Missing	6	15.3%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience with providing counseling about teething and non-nutritive habits?	< 25%	11	28.2%
	25%–75%	12	30.8%
	> 75%	9	23.1%
	Missing	8	20.5%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience with recommending the use of fluoride toothpaste at the time of first tooth eruption?	< 25%	9	23.1%
	25%–75%	9	23.1%
	> 75%	11	28.2%
	Missing	10	25.6%
Estimate what percent of your dental students receive at least 1 hands-on clinical experience with recommending the first dental visit occur by Age 1?	< 25%	9	23.1%
	25%–75%	7	17.9%
	> 75%	16	41.0%
	Missing	7	17.9%

Infants, and Children (WIC) clinics could provide an opportunity to enhance students' clinical competencies while simultaneously expanding access to IOH care for underserved populations [12, 13]. Care delivery models such as medical–dental integration, particularly for infants and toddlers at well-child medical visits [27, 28], could provide additional learning opportunities and clinical pathways for more infants to be examined by dentists and dental students. From an accreditation standards perspective, one way to strengthen the profession's commitment to IOH could be an intent statement added to predoctoral standard 2-23 [11], specifically mentioning preventive care for vulnerable life stages including infancy.

State level policies may influence how different dental schools are able to implement IOH experiences. A Current Dental Terminology code (D0145) exists and was designed to facilitate IOH appointments [29]. However, various administrative hurdles and state-by-state variations have been identified with respect to its implementation [30]. As an example, in Texas, providers enrolled in the state Medicaid program, including board-certified pediatric dentists who learn IOH during their residency training, must take an online certification course to be able to bill for the code [31]. Another factor is that some state Medicaid programs may utilize D0145 as a bundled code [32]; this means that the infant oral examination, prophylaxis, fluoride varnish application, and anticipatory guidance are bundled together and only the D0145 code needs to be completed. Other states may require separate code completions for each component of the IOH visit [30]. These nuances in insurance-based utilization of the IOH

code are typically not covered in dental education and may become an additional barrier preventing dental graduates from adopting these procedures in practice.

4.3 | Limitations and Strengths

This study has several limitations. First, its reliance on self-reported data has the potential for response bias, as participants may have either overestimated or underestimated aspects of their curricula, particularly regarding clinical exposure and competency assessments. However, to mitigate this concern, the survey instrument was validated in collaboration with subject-matter experts, ensuring clarity and relevance. In addition, the consistency of our findings with previous literature on IOH education supports the reliability of the data [6, 10].

Second, while the study achieved a 59% response rate—comparable to or exceeding similar national surveys in dental education—the possibility remains that non-responding schools may differ in ways that could influence the overall findings. As a result, generalizability has limitations. However, the diversity of responding institutions, spanning various geographic regions, institutional types, and program structures, strengthens the applicability of the results to broader discussions on predoctoral IOH education [9, 11].

A third limitation is the study's cross-sectional design, which provides a snapshot of current educational practices but does

TABLE 4 | Strategies to enhance infant oral health (IOH) education and clinical experiences in predoctoral dental education

Strategy	Objective	Location
Didactic courses	• Teach IOH subject matter	• Pediatric dentistry curriculum
Clinical training	• Observe IOH visit with faculty and/or residents • Modify clinical operations to support IOH clinical experiences • Simulate cases using mannequins and/or standardized patients	• Residency training locations (at schools with residency programs) • Community-based training locations (at programs with strong community-based partnerships) • Dental school clinics • University-affiliated simulation centers • Classrooms or clinical settings
Interprofessional education	• Teach IOH subject matter content • Integrate preventive medical and dental care, with special emphasis on early childhood	• Didactic interactions with nursing and medical students (e.g. case-based learning) • Integrated clinical experiences in an interprofessional setting
Faculty development	• Calibrate all predoctoral faculty (full-time and part-time) to promote and provide IOH	• Dental school clinical sites
Community outreach	• Promote IOH visits for underserved populations • Screen infant and toddler patients and provide oral health instruction to new parents	• Women, Infants, and Children (WIC) clinics • Early Head Start programs • Pediatricians' offices • Community health fairs • Volunteer events • Give Kids A Smile events
Policy and advocacy training	• Strengthen health systems education within the predoctoral dental curriculum (e.g. policies, insurance, documentation) • Redefine accreditation standards or intent statements to specifically mention infant oral health	• Pediatric dentistry curriculum • Dental public health curriculum • Practice management curriculum • Accreditation standards

not allow for the assessment of longitudinal trends. While a longitudinal approach would yield deeper insights into how IOH education evolves over time, the primary objective of this study was to establish a contemporary baseline of IOH instruction and clinical exposure. These findings serve as a foundation for future research that can track changes and evaluate the long-term impact of curricular modifications.

Last, this study did not incorporate perspectives from predoctoral dental students, whose firsthand experiences could offer valuable insights into the effectiveness of IOH education and their preparedness to provide IOH care upon graduation. While faculty members are best positioned to provide accurate curricular data, student perceptions of the adequacy of their training would complement these findings and provide a more comprehensive evaluation. Future research should incorporate student perspec-

tives through surveys or qualitative interviews to gain a broader understanding of IOH education.

Despite these limitations, this study has several notable strengths. It is among the few recent efforts to systematically evaluate both didactic and clinical components of IOH education across U.S. dental schools. The survey instrument was developed with input from educational experts in the specialty, ensuring that the collected data accurately reflects current curricular practices. By identifying the disconnect between professional guidelines and the clinical realities of predoctoral training, this study provides critical insights that can inform curricular improvements. The results support actionable recommendations, such as expanding community-based education and incorporating simulation-based training, both of which have the potential to enhance IOH education and improve patient outcomes. Adding an intent



FIGURE 1 | A simple pediatric mannequin or life-sized doll can be used to simulate an infant oral health exam in a clinical setting.

statement to CODA Predoctoral Standard 2-23 could strengthen the professions commitment to IOH.

4.4 | Future Directions and Recommendations

Based on the findings of this study, several recommendations can be made to advance IOH education and its impact on pediatric oral health outcomes. First, dental schools should prioritize the development of community-based education programs. Partnerships with community clinics, mobile dental units, and school-based health programs can provide students with the clinical exposure necessary to develop proficiency in IOH care while addressing disparities in access to care for underserved populations [12, 13].

Second, innovative educational technologies, such as simulation-based training and standardized patients, should be explored as supplementary tools for IOH education. These technologies can bridge the gap created by limited patient pools, offering students consistent opportunities to practice clinical skills in

a controlled, realistic environment [10, 11]. Costs may preclude schools from being able to engage in-person standardized patients; but alternatives such as virtual standardized patients or avatar patients generated by artificial intelligence platforms using large language modeling may provide more cost-friendly alternatives.

5 | Conclusion

This study describes the current state of didactic and clinical clock hours dedicated to IOH in U.S. predoctoral curricula, identifying gaps in clinical exposure and curricular consistency. By identifying the disconnect between professional guidelines and the realities of dental education, the study underscores the need for targeted reforms to enhance student preparedness and improve patient access to care. The findings have significant implications for the future of dental education, providing a foundation for innovative strategies to strengthen IOH training and address disparities in infant oral healthcare.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Supporting Information 1: AAPD Infant Oral Health Clock Hours Study.pdf