Research in Pediatric Dental Postgraduate Programs and Residencies: Results of a Survey

Allison Rhodes, DDS Stephen Wilson, DMD, MA, PhD

Dr. Rhodes was a resident, The Children's Hospital Denver, he is now in private practice, Madison, Wis; Dr. Wilson is professor and chair of Pediatric Dentistry, University of Colorado School of Dentistry, Chief of Dentistry, The Children's Hospital, Denver, Colo.
Correspond with Dr. Wilson at wilson.stephen@tchden.org

Abstract

Purpose: The purpose of this study was to determine various aspects of the research experiences in postgraduate and residency training programs in pediatric dentistry.
Methods: A survey was developed and sent to all directors of postgraduate and residency training programs in pediatric dentistry. The survey consisted of 21 items on various topics related to research experiences of the postgraduate students and residents. The items varied in structure, but most contained response sets deemed appropriate for the intent of the question. The directors were asked to complete the survey and return the questionnaire in a self-addressed stamped envelope within a 3-week period. If a program did not respond within 6 weeks, a follow-up survey was sent. The response sets were collated and analyzed with descriptive and nonparametric statistics.
Results: Forty of 55 programs responded with usable data sets. All reporting programs indicated that research experiences occur for residents and all have access to statistical assistance. Eighty-seven percent devote clinical hours to student research and 50% of the students share data or protocols. Only a minority (7%) of programs has not published student research in the last 5 years. Interference with revenue-generating clinic times (45%), lack of faculty understanding/interest in research (40%), and lack of financial resources (32%) were the 3 major obstacles for postgraduate research.
Conclusions: Despite research being accomplished in postgraduate programs in pediatric dentistry, variability in key factors (eg, devoted research time) is common among programs. The impact of this variability on the profession and its advancement of scientific endeavors are unknown. (*Pediatr Dent.* 2004;26:75-78)

KEYWORDS: PEDIATRIC DENTAL RESEARCH, TRAINING PROGRAMS, SURVEY

Received February 4, 2003 Revision Accepted June 23, 2003

Pediatric dentistry is an ever-changing profession. Each year, published research helps to reshape trends, provide optimal patient care, and educate the practitioner about oral health and disease as it relates to the pediatric or special health care needs patient. This research comes from various resources including postgraduate institutions and private practice, although the majority comes from the institutions primarily because of the emphasis and mission of most educational or hospital institutions.

Research is a requirement for receiving a certificate from an accredited pediatric dentistry training program. The Commission on Dental Accreditation (CODA) requirements for each student in these training programs includes initiation and completion of a research paper using data collection, analysis, and elements of the scientific method, and the results must be reported in a scientific forum. Some training programs also offer a master's or doctorate program as part of a graduate program and may have other requirements as well. Program directors should help to instill the importance of evidence-based learning in residents and endeavor to continually upgrade the standard of care by sharing the research with the rest of the community.

Research trends in pediatric dentistry have been reported.[1-3] Loevy et al[1,2] have indicated that, of those members of the American Academy of Pediatric Dentistry (AAPD) who presented papers or posters at the 1989 and 1990 annual sessions of the American Association of Dental Research, approximately 48% of presentations or posters are converted into publications. Furthermore, most articles are not published in *Pediatric Dentistry*, the journal of the AAPD, but rather other professional periodicals. Although the topics presented varied, cariology, dental materials, and behavior were the most popular.[1,2]

Table 1. Number of Residents in Each Year of Pediatric Dentistry Programs

	N*	Minimum	Maximum	Sum	Mean
First year	40	1	8	161	4 ± 1.5
Second year	40	1	8	155	4 ± 1.6
Third year	25	0	5	27	1 ± 1.6

*Those programs who responded to the survey.

Nainar reviewed the publications in *Pediatric Dentistry* and *The Journal of Dentistry for Children* published over a 30-year period (1969-1989), and found that the most frequent topics published were related to oral medicine, pathology, and surgery.[3] Evidence for the process and mechanisms of research activities in training programs remains minimal. The focus of this paper is to evaluate current mechanisms involving research activities underway in the various accredited pediatric dentistry training programs.

Methods

This study consisted of a survey sent to all 55 program directors of accredited pediatric dental programs as listed by the AAPD. The survey contained 21 questions, some of which contained multiple response sets. The program director was asked to complete the survey and return it within a 3-week period. For programs that did not respond within 6 weeks, a follow-up survey identical to the first was sent.

The data was collated in a spreadsheet format and imported into SPSS-PC+, version 11.5 for statistical analysis. Analysis included descriptive and chi-square statistics. Most statistics were rounded up to the next highest number and reported as a whole integer.

Results

Forty of 55 programs returned surveys including the first and second mailings combined. Thus, the overall response rate was 72%.

The numbers of residents in each respective year for the 40 programs that responded are listed in Table 1. The mean number of residents in their first and second year at each program was 4, and the mean number of third-year residents was 1. Each program had both first- and second-year residents and only 8% of the total number of students in the programs were third-year residents.

Responses regarding faculty at the institutions are listed in Table 2. The mean number of full-time faculty at each program was 4, with a maximum of 12 and minimum of 1. The total number of full-time faculty in the reporting institutions was 159. Sixty-five percent of the full-time faculty have advanced degrees (either master's or PhD) and 50% are board certified. The mean number of part-time faculty per program was 6, with maximum of 15 and in some instances, none. The total number of part-time faculty in the reporting institutions was 224. Of those part-time faculty, 29% have advanced degrees, and 41% are board certified. Sixty-eight percent of full-time faculty and 26% of part-time faculty participate in resident research.

Table 2. Descriptive Statistics for Faculty in Pediatric Dentistry Programs

	N*	Minimum	Maximum	Sum	Mean
Full-time					
Number	40	1	12	159	4 ± 2.4
Advanced degree	40	0	8	103	3 ± 2.2
Boarded	40	0	8	80	2 ± 1.7
Part-time					
Number	39	0	15	224	6 ± 3.9
Advanced degree	38	0	10	66	2 ± 2.2
Boarded	39	0	10	91	2 ± 2.4

*Those programs who responded to the survey.

The courses taught to residents regarding statistics varied greatly among programs. All residents are taught statistics, and 80% are taught solely in their first year. Ninety percent of programs teach some sort of research design, and 72% are taught this in their first year. Ninety-seven percent of programs have literature reviews as part of their educational process, 77% participate in reviews in their first and second years combined, and 10% of the programs have reviews in all 3 years. One hundred percent of programs participate in the reading of articles from the American Board of Pediatric Dentistry (ABPD) reading list. Seventy-two percent of the programs spread the reading of ABPD articles over the first and second years combined, and 8% over 3 years. Ninety-two percent of programs offer training/consultation through mentorship with a pediatric faculty mentor. Seventy-two percent of programs have both first and second years involved, and 18% have first, second, and third years involved. Eight percent of programs have no residents involved. Sixty-five percent of programs have some sort of faculty mentorship (other than pediatric) available. Forty-eight percent of programs have both first and second years involved in this mentorship.

All programs indicated that they had access to a statistician, and of those, 57% did not have to pay for statistical services. The majority of residents obtain their statistical training from medical schools or other facilities (52%). Twenty percent receive training from both medical and pediatric dental staff. No residents receive training from independent contractors alone.

The survey shows that 87% of programs devote clinical hours (8 a.m. to 5 p.m.) to student research. Research hours listed were a minimum of 1 quarter/semester/time slot in

Table 3. Type and Frequency of Research Done in Programs

Combinations of research*	Frequency (%)
Other	2 (5)
1	2 (5)
1, 2	1 (3)
1, 2, 3	1 (3)
1, 2, 3, 4	3 (8)
1, 2, 3, 4, 5	7 (18)
1, 2, 3, 5	2 (5)
1, 2, 3, 5, 6	1 (3)
1, 2, 4	1 (3)
1, 2, 4, 5	5 (13)
1, 3, 4	1 (3)
1, 3, 4, 5	1 (3)
1, 4	3 (8)
1, 4, 5	8 (20)
1, 4, 5, 6	1 (3)
1, 5	1 (3)
Total	40 (100)

*1=clinical; 2=clinical lab (eg, restorative materials tested in a lab exclusively); 3=traditional basic science (eg, microbiology in a lab); 4=survey; 5=epidemiological; 6=other.

each respective year. For first-year residents, 42% have less than 4 hours/week and 45% have 4 to 8 hours/week. In regards to second-year residents, 40% have less than 4 hours/week, 35% have 4 to 8 hours/week, and 2% have more than 8 hours/week. Other scheduling formats were reported such as more devoted time to projects that required a lab, time varying with each project (such as certificate vs master's), and generally more than 8 hours a week for third-year residents.

When asked if residents share data or protocols, 50% said yes and 50% said no. No significant relationship was found between the total hours of allotted research time in the programs and number of presentations or publications. Table 3 shows the types of research completed in the last 5 years from each program.

Published research by residents in the last 5 years reportedly did not occur in 7% of programs. Thirty-five percent of programs reported 1 to 3 publications, 15% had 4 to 5 published, 25% have had 5 to 10 published, and 12% had more than 10 papers published. There was a significant positive correlation between the number of papers published and the percent of faculty who are both board certified and have advanced degrees (r=0.42, $P<.009$). Presentations at national meeting have not occurred in 17% of programs. Twenty-two percent of programs reportedly had 1 to 3 presentations, 10% had 4 to 5 presentation, 7% had 5 to 10 presentations, and 42% had more than 10 presentations over the past 5 years. A significant positive correlation occurred between the number of presentations and the percent of faculty who are both board certified and have advanced degrees (r=.41, $P<.008$). Ninety-seven percent of programs responded that residents should be able to share databases/resources with other programs.

Resident research was evaluated in 100% of the programs, with 50% evaluated by regular periodic evaluation and the rest in other formats such as presentations to faculty, and submission of completed manuscript to an advisor. Few programs had only one type of evaluation process.

The biggest obstacles for postgraduate research in decreasing order are:

1. time away from the clinic (affecting revenue)=45%;
2. lack of faculty understanding/interest in research/knowledge/time=40%;
3. lack of financial resources to support student research=32%;
4. lack of space for research=22%;
5. lack of resident interest=20%.

Although 22% of programs responded that there were no obstacles and research is well accomplished, an additional 22% of programs reported that research is accomplished but also reported at least 1 obstacle.

Discussion

Information on the research activities associated with pediatric dentistry residency programs is limited with only 1 other publication indirectly investigating this issue.[4] At least 3 papers in recent years have suggested that the research topics investigated by pediatric dentists are broad in scope and reflective of conditions associated with clinical care.[1-3] The research requirement of pediatric dentistry training programs imposed by CODA would suggest that research-derived information would be produced at a relatively steady pace; however, no information is available to confirm this assumption. The present study investigated various aspects of research endeavors associated with pediatric dentistry training programs.

The ratio of residents to full-time faculty was approximately 2, and this ratio decreased to below 1 when both full-time and part-time faculty were counted. These ratios suggest the possibility of an excellent opportunity for faculty to shape and impact the thinking of graduate students or residents during training and, hence, the profession as a collective whole. What remains unclear are key factors of educational perspective, scope, and types of research experience, various philosophies of the faculty towards research and the implications these factors have on the outcome of pediatric dentistry practitioners and profession either for a short- or long-term basis.

In terms of the full-time faculty, a majority has advanced degrees and half are board certified. Again, it is unclear how this composite picture compares to the profession as a whole. According to the ABPD, approximately 35% of the eligible pediatric dentists are board certified, but the number of those

with graduate degrees is not known. Likewise, according to the American Dental Association (ADA), information on those with advanced degrees (ie, master's, PhD's) is not available. Eighty-three percent of all active licensed dentists who are educationally qualified to announce as a specialist are ADA members. Most likely, the part-time faculty in general may be more representative in terms of the percent of practitioners who have advanced degrees and are board certified.

The ability to obtain statistical and research design support for research in programs does not seem to be a significant issue, as all programs had access to a statistician. A slight majority of programs were able to find statisticians and did not have to pay for statistical services. Since most of the programs found statistical assistance from the institutions of which they probably were associated, it seems likely that the institutions had statistical resources. However, the extent to which programs can identify statistical resources and the degree of impact of such resources (eg, statistical and research design guidance through the project, latency of time between submission of data for analysis to a final report of the analysis, and assistance in interpretation of the analysis during final development and writing of manuscripts) on the timely accomplishment of research in programs is uncertain.

Although there was a significant association between the numbers of papers or presentations and those programs with faculty who are both board certified and have advanced degrees, there was no association between the number of papers or presentations and the total time allotted to research in the programs. This finding suggests that the configuration of faculty in terms of their training and background may be more of a facilitating factor for the generation of research activities than the actual time allotted to residents to conduct research. Although speculative, this finding suggests that it may be beneficial for the AAPD and educational leadership to investigate means of sharing faculty expertise among programs through initiatives encouraging faculty communication, electronic exchange of ideas or research activities, and the development of educational "centers."

Apparently only a small percentage of programs have not published research by residents within the last 5 years. As expected, the percentage of programs with 10 or more publications in the last 5 years is small (ie, 12%) and probably a reflection of the emphasis on research by those few programs. Although a slightly higher percent of programs did not have residents who did presentations than published research, this may reflect a myriad of issues such as financial support for travel, perceived broader knowledge dissemination to the professional audience through publications than presentations, and institutional policies and requirements for faculty (eg, tenure-track positions).

The most frequent type of research done by students involved clinical, survey, or epidemiological studies. The type of research reported by Loevy et al and Nainar was not classified into broad categories like those used in this study; however, the research topics they do list are primarily clinical in nature.[1-3]

The major obstacles reported for resident research were not unexpected and most likely a reflection of common factors inherent in most training programs. Many of these obstacles can be distilled and related to financial aspects of training programs including interference with resident (and probably faculty) revenue-generating periods and dedicated research-funding sources and facilities. These obstacles apparently have not changed much in recent years, despite proposed models for sharing of resources among training programs.[4] There does not seem to be a source of data that can add insight to the number and magnitude of impediments to research, perceived or otherwise, that may have been present or are changing throughout the decades of training pediatric dentists. It may be wise to begin such documentation to assist in relating impediments to some measures of the rate of knowledge production and dissemination.

This study did not discriminate among measures of the quality of publication or presentations. Future investigations should address this shortcoming and include appropriate variables designed to elicit degrees of research quality such as presentation format (ie, oral vs table clinic), awards for scholarly efforts (ie, Graduate Student Research Award and McDonald Award), and peer-reviewed publications.

The findings of this survey must be tempered in terms of generalization to all programs. Because of the anonymity of the research design, it was impossible to determine who did and did not respond and whether they were based in a university, hospital, or both. Hence, the programs that did not respond may not have the same research experiences and opportunities for their students/residents and faculty distribution and involvement in research as those who did.

Conclusions

1. Research activity in the majority of pediatric dentistry training programs results in dissemination of information through published formats.
2. A majority of faculty in training programs have advanced degrees and there is an association between those with advanced degrees and research productivity.
3. Interference with generation of clinic revenue and faculty lacking research skills are perceived as major obstacles for research in training programs.

References

1. Loevy HT, Goldberg AF. Dominant research interests of pediatric dentists: Dental materials, craniofacial biology and cariology. *Pediatr Dent.* 1995:17:375-376.
2. Loevy HT, Curtis KL, Goldberg AF. Conversion rate of research abstracts to publications in pediatric dentistry. *Pediatr Dent.* 1997;19:432-433.
3. Nainar SM. Profile of pediatric dental literature: 30-year time trends (1969-1998). *J Dent Child.* 2001;68:303, 388-390.
4. Wilson S. Defining and implementing interprogram research and clinical programs. *Pediatr Dent.* 1997;19:218-221.