

## Children's dental treatment in general and pedodontic practices

James D. Bader, DDS, MPH    R. Gary Rozier, DDS, MPH

### Abstract

*Descriptions of dentist and patient characteristics and treatment services provided by general practitioners and pediatric dentists in North Carolina are compared. Although pediatric dentists treated a younger patient population, the nature of the treatment provided was similar to that of general practitioners, who accounted for more than an estimated 85% of all child treatment visits. The general practitioners who treated the most children were younger, and had busier practices with more auxiliary support and insured patients than dentists who treated fewer or no children.*

Over the past several years, concern has been growing among pediatric dentists about the effects on their practices and specialty of the decline in the incidence of dental caries and the increase in the number of pediatric dentists and general practitioners. The decline in caries has been well documented,<sup>1</sup> and the relative and absolute increases in manpower also have been shown clearly.<sup>2,3</sup> The effects on the pedodontic practice and specialty are more speculative, but have been associated with decreased busyness and increased competition with general practitioners.<sup>4</sup> These conditions may have contributed to unmet personal and professional expectations and "migration" of pediatric dentists to smaller cities.<sup>5</sup>

Despite these growing concerns, little current information is available about the nature of dental treatment provided to children by either pediatric dentists or general practitioners. No studies of treatment in general practice have described separately the treatment services delivered to children, although one report does suggest that such treatment forms a relatively small portion of general practice.<sup>6</sup> One recent study of treatment in pedodontic practices is available,<sup>7</sup> and, in addition, orthodontic services and hospital care provided by pediatric dentists have been examined.<sup>8,9</sup> These studies, together with the projection that 24%

of children receiving treatment services receive them from pediatric dentists,<sup>5</sup> represent the extent of recent information in the pedodontic literature concerning the nature of treatment provided to children. Yet, to identify the effects of changes in disease and dental manpower on pedodontic practice, more complete information is needed about both the nature of dental treatment currently provided to children and who provides it.

The dental profession in North Carolina has been involved actively in assessing the supply and distribution of dentists, the treatment needs of the population, and the productivity of dental practices. Because of this active interest, recent data from North Carolina are available that describe quantitatively the treatment provided to children by general practitioners and pediatric dentists. The purpose of this paper is to compare the characteristics of these two groups of providers and the quantitative aspects of their treatment of child patients.

### Methods

Information analyzed in this paper was obtained from two surveys, one of pediatric dentists and one of general practitioners. Both surveys were conducted under the auspices of the University of North Carolina's Health Services Research Center with the approval and support of state dental organizations.

Data for general practitioners were collected during an 18-month period starting in the fall of 1980. The survey was intended as a five-year follow up to a 1976 study of dentists' productivity in North Carolina, and the survey methods and instrument described in that study were duplicated.<sup>10</sup> There were, however, four exceptions: (1) the practice log was modified to obtain additional data about each patient for whom treatment information was recorded [age, sex, race, and utilization pattern as perceived by the dentist]; (2) only general practitioners were included in the survey; (3) the stratified probability sample was weighted

by dentist age to adjust for a slight under-representation of older dentists responding to the original survey; and (4) two days of treatment information were recorded in each practice, rather than one.

A random sample, stratified by age and geographical region, of the 1,512 general practitioners known to be in active private practice in the state was drawn from licensure data. Of 245 survey forms mailed, 167 were returned; of those, 146 contained both complete practice description questionnaires and logs recording patient and treatment information, a final usable response rate of 59.6%. Comparison of the respondents with the population universe revealed one discrepancy in the distribution of the sample in terms of age of the dentist. With one exception, the proportional composition of the respondents in five-year age groups was extremely close to that of the population. Dentists younger than 30 years of age represented 4% of respondents compared to 12% of dentists in the state. No significant difference in dentist age was found between the first half and the last half of the responses received.

Data for pediatric dentists were collected in a similar survey in the spring of 1980, from which preliminary analyses have been reported.<sup>7</sup> Of 36 pediatric dentists known to be in full-time private practice in the state, 31 returned the survey. Twenty-nine of these respondents provided completed questionnaires and treatment logs, an 81% usable response rate. No age bias was evident for the seven pediatric dentists for whom data were not available.

For both the general practice and pedodontic data, all analyses of treatment were performed on data sets that included only patients 13 years of age or younger. Distributions of treatment services were established using eight categories of treatment: (1) diagnostic [examination and radiographs]; (2) preventive [prophylaxis, scaling, topical fluoride application, sealant placement, and oral hygiene instruction]; (3) primary tooth restorative; (4) primary tooth surgery; (5) primary tooth endodontics; (6) permanent tooth restorative; (7) permanent tooth other [surgery, endodontics, prosthodontics, and periodontics]; and (8) orthodontic services. Dentist and auxiliary time data, when presented, reflect only time spent as principal provider of treatment services.

For general practitioners only, analyses were performed for subsets of the responding dentists grouped by the number of child patients seen during the two days of treatment data collection; results reflect mean values for dentist characteristics and unweighted total distributions for treatment services. The grouping criteria were selected to provide similar sized groups for analysis, and reflect general dentists who saw 0, 1-3, 4-6, 7-9, and 10 or more child patients during the two-day period. Differences among these groups of

practices were tested using Chi square and analysis of variance tests, where appropriate, with an alpha level of 0.05. Because of differences in sampling methods and response rates between the pedodontic and general practice surveys, no statistical tests were applied to comparisons of these data.

## Results

The results are presented in three sections, the first two of which focus only on general practitioners. In the first section the characteristics of general practitioners are analyzed by the number of children treated, and the characteristics of their child patients also are noted. In the second section, the nature of treatment provided by general practitioners is examined. The third section compares the provider, patient, and treatment information pertaining to pediatric dentists with that of general practitioners. The tables and figure present results for both general practitioners and pediatric dentists to facilitate these comparisons.

### Characteristics of General Practitioners and Patients

Table 1 presents characteristics of general practitioners and their practices grouped by frequency of child treatment. These mean data exhibit several relationships. As the number of children seen increased, hours worked per week by the dentist, the amount of hygienist and assistant support, and the total number of patient visits (all ages) per day increased while dentist age decreased. In addition, and as expected by the grouping of practices, the percentage of total provider time devoted to treatment of children increased. The percentage of patients that were children also increased, indicating that increases in number of child visits were not simply a function of increases in total patient visits. Analyses of variance indicated significant differences among the five groups for dentist age and number of hours worked, as well as for hygienist and assistant hours worked. The mean number of referrals to pediatric dentists per month was small in all of the practice groups. When referrals are expressed as a percentage of children treated, however, it is evident that in practices seeing more children, proportionally fewer are referred. Differences among the four groups of practices in which children were seen also were significant for the remaining characteristics presented in the table. Among the four groups of practices, total provider time varied little per patient visit, from 22 to 25 minutes, although the components of the total, dentist, and auxiliary time were quite different in the practices seeing the most children.

In addition to the characteristics displayed in Table 1, there were also significant differences in some categorical practice characteristics as well. Twenty-three per cent of dentists who saw no child patients were

**Table 1.** Mean Practice Characteristics of Pediatric Dentists and of General Practitioners by Number of Child Visits During the Two-Day Sample

Characteristic	General Practitioners					Pediatric Dentists
	Number of Child Visits					
	0	1-3	4-6	7-9	10+	
Percentage of sample	18	23	23	21	16	100
Dentist age	57	49	44	41	39	41
Hours worked/week	32	35	37	36	38	38
Number of patients/day	12	17	18	21	27	19
Hygienist hours worked	12	20	27	29	36	13
Assistant hours worked	45	52	53	54*	74	74
Number of patients referred to pediatric dentists/month	2.0	1.7	0.9	1.0	1.3	•
Percentage of child patients referred	100	7	2	1	1	•
Dentist treatment time	0	14	15	14	9	18
Auxiliary treatment time	0	10	10	9	13	4
Percentage of total provider time devoted to children	0	4	11	16	16	•
Children as a percentage of total patients	0	7	15	21	26	92

in multiple dentist practices, compared to 5% of those dentists who saw the most children. Although a majority of dentists in each group reported having either an adequate or excessive patient load, the proportion of dentists reporting too few patients was smaller for those dentists seeing the most children (14%), than for all other dentists (30%). In addition, practices seeing more children tended to report greater percentages of patients with public and private dental insurance.

The mean age of children treated in the sample general practices was 8.9 years. White children comprised 89% of the child patient sample, compared to 72% of the state population for the 0-13 age group.<sup>11</sup> Female children comprised 52% of the patients, compared to 49% of the population. Dentists classified 83% of the children as regular utilizers of dental care and 9% as sporadic utilizers. Utilization status was

unknown for 3%, and 4% were categorized as emergency patients. The distributions of children's age, race, and sex were not different among the practices grouped by frequency of child patient treatment, but the pattern of utilization status did vary. Larger proportions of patients classified as regular utilizers were associated with practices seeing child patients more frequently.

#### Nature of Treatment Provided

Table 2 displays the overall distribution of services provided by general practitioners by area of dentistry, as well as distributions associated with the practices grouped by frequency of child patients. A majority of all services were diagnostic and preventive. Analysis of the services provided in these two areas indicate that 46% of all patient visits included

Area	General Practitioners					Pediatric Dentists	
	Overall	Number of Child Visits					
		1-3	4-6	7-9	10+		
<b>Table 2.</b> Percentage Distributions of Services for Pediatric Dentists and for General Practitioners Grouped by Frequency of Child Visits	Diagnosis	28.7	28.7	28.7	29.0	28.5	31.1
	Prevention	43.2	40.4	37.9	40.9	48.0	35.7
	Primary restorative	7.3	14.7	8.4	7.4	5.3	15.7
	Primary surgery	4.2	1.5	5.3	5.6	3.1	4.5
	Primary endodontics	0.9	1.5	0.6	0.7	1.1	1.9
	Permanent restorative	10.4	5.2	13.1	11.5	9.3	5.9
	Permanent other	3.0	7.4	3.6	2.9	2.1	1.3
	Orthodontics	2.3	0.7	2.5	2.2	2.7	4.0

an examination, 19% involved radiographs, 53% included a prophylaxis (approximately equally divided between rubber cup polishing only and full scaling and polishing), and 34% included a topical fluoride application. Among all practices, only four patients received sealants, 0.2% of all services. Primary restorative services were mostly one- and two-surface amalgams, 36% and 39% of all primary restorative services, respectively, while stainless steel crowns represented 8% of these services. Of permanent restorative services, 52% were one-surface amalgams. Endodontic procedures on primary teeth consisted of pulp capping and pulpotomies (31% and 56%). The majority of orthodontic services were space maintainers and tooth guidance appliances. Among the 146 general practices, three "comprehensive orthodontic appliances" were inserted in the two-day period, and 10 were adjusted.

Differences in treatment emphasis among the practice groups are both evident and significant. Practices with higher frequencies of child patients tended to perform proportionally more preventive services, and fewer restorative and surgical services for both primary and permanent teeth. However, the practices with the fewest number of children broke these patterns with respect to permanent restorative and primary surgical services.

#### **Comparison with Pedodontic Practice Data**

Patients in pedodontic practices who were 13 years old or younger represented 92% of all patients in these practices. These patients tended to be younger than those treated in general practices, 6.9 versus 8.9 years. Data for practice characteristics of pediatric dentists are included in Table 1. In most respects, these characteristics resembled those of general practices seeing children more frequently. Two differences between these two groups are apparent, however. Pedodontic practices tended to have minimal hygienist support, and tended to substitute dentist treatment time for that of auxiliaries, although total provider time per patient was within the range seen in general practices. Pedodontic practices saw a similar proportion of females (51%), but a smaller proportion of white patients (82%) than did general practitioners. The proportion of patients classified as routine utilizers was 82% with 5% seen as emergency patients, both figures similar to those for general practices.

Table 2 indicates that the distribution of treatment services in pedodontic practices differed somewhat from treatment provided to children in general practices. The principal differences were smaller proportions of preventive services and permanent tooth restorative services, and a larger proportion of primary restorative services. To control partially for differences in treatment related to the dissimilar age

distributions of children seen in pedodontic and general practices, treatment services provided by all general practitioners were compared to those of pediatric dentists for two groups of children, those 1-7 years old, and those 8-13 years old. For the younger group, two differences were evident. Primary restorative services represented a greater proportion of pediatric dentists' treatment (20.8% versus 12.8%), while preventive services represented a similar increased proportion of general practitioners' treatment. All other differences were minor. For the older group of children, pediatric dentists again provided proportionally more primary restorative services (8.4% versus 4.8%), while general practitioners performed permanent restorative services at a similarly increased rate. Again, no other differences were as large. Thus, while the differences in Table 2 are, to some extent, related to differences in the ages of children treated, pediatric dentists provided somewhat greater proportions of primary restorative services for all ages of children.

The proportions of patient visits in pediatric dentistry practices involving an examination or prophylaxis were smaller than in general practices (44% and 39%), but the proportion involving radiographs was greater (31%). Sealants represented a larger, but still minor share of total services (1.0%). Stainless steel crowns comprised 10% of all primary restorative services, while one- and two-surface amalgam restorations represented 23% and 39%, respectively. One-surface amalgams represented 47% of all permanent restorations. Pulp capping and pulpotomies occurred in similar relative proportions as in general practice, 29% and 49% of primary endodontics. Finally, the proportion of treatment devoted to orthodontic services was also similar to that provided in general practice, consisting principally of space maintenance and tooth guidance appliances. One comprehensive appliance was inserted and 19 were adjusted among the pedodontic practices. This represents a lower proportional insertion rate and a similar proportional adjustment rate (expressed as a percentage of total services) as compared to general practices.

Estimates of the total number of children's dental visits in the state and the proportions of those visits that occurred in pedodontic and general practices can be made from these data by multiplying the mean number of child visits per day in the sample practices by the mean number of days worked per week and weeks worked per year reported by the general practitioners and pediatric dentists, and by the number of active practitioners of each type in the state. When these calculations are performed, the results indicate that dental visits were being made at the approximate rate of 1,108,400 per year by North Carolina children during the period studied, and that general practi-

tioners accounted for 86.2% of these visits overall, 75.0% of all visits for children six years and under, and 91.1% of all visits for children from 7 to 13 years of age.

## Discussion

### Limitations of the Data

The results presented are drawn from a limited data base, a single state, and cannot be considered as representative of the current situation in the nation. With respect to North Carolina, the sample of pediatric dentists seemed to be representative of all those in the state,<sup>7</sup> but the response rate for the general practitioner survey was lower, and age bias is known to be present. Since younger general practitioners are under-represented, the results probably understate the amount of treatment provided by general practitioners. Three temporal factors also may have biased the results, although the influence of these factors is impossible to predict. First, the surveys were not contemporaneous, the survey of pediatric dentists having occurred over a shorter period and at least six months prior to the survey of general practitioners. Second, the short, two-day treatment samples may be sensitive to seasonal or scholastic cycles. Third, since only two days of treatment data were collected, scheduling patterns that varied by the day of the week could influence the numbers of children seen in general practices, or the types of treatment provided in pedodontic practices.

Nevertheless, the sampling methods and relatively large sample size provide reasonable assurance that the information is at least an approximation of the treatment activity of pediatric dentists and general practitioners in North Carolina. The state ratio of pediatric dentists to general practitioners approximates the national ratio (1.9 per 100 versus 1.8 per 100)<sup>12</sup> and the age distribution of North Carolina dentists resembles the national distribution.<sup>13</sup> By extension then, the basic relationships among general practitioners and pediatric dentists, illustrated by the results of this survey can provide some insight into national issues affecting pedodontists.

### Relationships Between Pediatric Dentists and General Practitioners

One relationship of interest is the seeming similarity in the treatment provided by pediatric dentists and general practitioners. The differences noted in the distribution of services by area were not large, and when patient age was controlled they seemed to be principally a result of proportionally more primary restorative services provided to children of all ages by pediatric dentists. The complexity of the services rendered cannot be examined directly, but indirect

comparisons, such as the proportions of single- and multiple-surface restorations and stainless steel crowns, or rates of primary endodontics do not suggest that pediatric dentists routinely encounter patients with more complex treatment needs. In addition, although practitioner time per child was greater in pedodontic practices, total provider time per child was about the same. It is not clear if this greater amount of time provided by pediatric dentists was due to behavioral problems, a generally younger patient population, the greater attention devoted to primary restorative dentistry, the relatively infrequent delegation of preventive services to hygienists, or a combination of these factors. It is clear, however, that great differences in the nature and complexity of treatment provided in pedodontic and general practices are not reflected by these data.

A second relationship of interest is the large "market share" of children's visits held by general practitioners (86.2% overall). Since earlier data are not available for comparison, it is not known how this proportion has changed over time. However, some observations from the pattern of children's treatment among general practitioners suggest that this share is unlikely to diminish in the near future. The general practitioners treating greater numbers of children tended to be younger, and child visits accounted for more than 20% of all visits in these groups of practices. This pattern is undoubtedly a result of several factors including a lack of training and experience leading to a reluctance to treat children on the part of older practitioners, the phenomenon of dentists growing old with their patients, and greater reliance by younger dentists on child patients as an important part of an increasingly constrained patient pool. It is this last factor that suggests that child treatment will remain an active part of general practice. The observations that practices with larger numbers of child patients also have increased proportions of patients with some form of dental insurance, greater overall patient visit rates, and less frequent reports of non-busyness suggest that these practitioners have incorporated child patients into their practices in successful efforts to maintain or increase production. Since more young dentists are entering practice than older dentists are leaving, the pressures to obtain an adequate number of patients can be expected to continue, and this pattern of increased attention to children's treatment will persist.

## Conclusions

From comparisons of survey responses of general practitioners and pediatric dentists in North Carolina, the following relationships were determined.

1. The frequency with which general practitioners

- treated children was related directly to practitioners' age, busyness, and size of practice.
2. General practitioners accounted for more than 85% of all dental visits by children 13 years old or younger, but tended to treat older children than pedodontists.
  3. The distributions of treatment services provided by general practitioners and pedodontist were quite similar.

The authors thank the Health Services Research Center, University of North Carolina, for its support in this study.

Dr. Bader is an associate professor, Department of Community Dentistry, 00841, University of Kentucky College of Dentistry, Lexington, KY 40536. Dr. Rozier is an associate professor, Department of Health Policy and Administration, University of North Carolina School of Public Health, Chapel Hill, NC. Reprint requests should be sent to Dr. Bader.

1. First International Conference on the Declining Prevalence of Dental Caries, Glass R, ed. *J Dent Res* 61:1304-83, 1982.
2. AADS Task Force on Advanced Dental Education. Recommendations for the 80s: final report of the task force. Washington, DC; American Association of Dental Schools, 1980.
3. Waldman H: Verifying an oversupply of pedodontists: some added factors. *J Dent Child* 50:101-5, 1983.

4. Meskin L, Davidson GB, Walker PO: Entering the 80s: pedodontic practice characteristics and practitioner satisfaction. *Pediatr Dent* 3:241-45, 1981.
5. Meskin L, Davidson GB, Walker PO: Too many pedodontists? If so, what then? *Pediatr Dent* 4:119-23, 1982.
6. Bader J, Kaplan A: Treatment distributions in dental practice. *J Dent Ed* 47:142-48, 1983.
7. Dilley GJ, Rozier RG, Machen JB: Pedodontic manpower and productivity in North Carolina—a pilot project. *Pediatr Dent* 4:115-18, 1982.
8. Association of Pedodontic Diplomates. Survey of orthodontic services provided by pedodontists. *Pediatr Dent* 5:204-6, 1983.
9. Davis MJ, Bierenbaum HJ: Hospital care in pedodontics: a survey of current practices. *Pediatr Dent* 4:245-48, 1982.
10. DeFriesse GH, Konrad T: The dental office practice productivity study: methodology, in *Planning for Dental Care on a Statewide Basis*. Bawden J, DeFriesse G, eds. Chapel Hill; The Dental Foundation of North Carolina, 1981 pp 85-89.
11. US Department of Commerce, Bureau of the Census. 1980 census of the population, vol 1, chapter C, General Social and Economic Characteristics, part 35, North Carolina. Washington; US Govt Printing Office, 1973.
12. American Dental Association Bureau of Economic and Behavioral Research. Distribution of dentists in the United States by state, region, district, and county. Chicago; JADA, 1979.
13. DHEW Bureau of Health Manpower. Dental manpower fact book. DHEW pub no (HRA) 79-14. Washington; US Govt Printing Office, 1979.

## Moving? Changing Your Name?

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Members Only: Social Security Number:  
\_\_\_\_\_

To ensure prompt delivery of *Pediatric Dentistry* complete this form. Be sure to affix mailing label (if available) in the space provided.

If you are moving to a foreign country ADD \$3 per issue for each remaining issue on your current subscription. Make checks or money orders payable to: American Academy of Pedodontics. Allow 10 weeks for the change to become effective.

Members: Mail your change of name/address to: American Academy of Pedodontics, 211 E. Chicago Ave., Suite 1036, Chicago, Ill. 60611. Nonmembers: Mail your change of name/address to: American Academy of Pedodontics Editorial Office, 1411 Hollywood Blvd., Iowa City, Iowa 52240.