

Orthodontic services provided by general dentists

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A survey was mailed to a stratified random sample of general dentists to determine the amount and nature of orthodontic treatment provided by general practitioners to their patients. The response to the survey was 75%, a rate considered excellent for this type of mailing. A large majority of the responding dentists (76.3%) provide orthodontic services to their patients, with 19.3% providing comprehensive orthodontic treatment. The percentage of time spent providing orthodontic services varied greatly among general dentists, with only a very few practitioners spending more than 50%. The number of patients under active treatment also varied widely, with only about 17% of those practitioners providing comprehensive treatment having more than 50 patients. A comparison of the three groups of practitioners showed that there was no relationship between the level of orthodontic involvement (none, limited, comprehensive) and the number of miles from orthodontic specialist or the pattern of referrals to orthodontists. Extrapolation of data from this study to the results of other investigations led to an estimate of the relative percentage of treatment provided by orthodontic specialists, pediatric dentists, and general practitioners. Almost two thirds of orthodontic patients are treated by orthodontic specialists, with pediatric dentists treating less than 4%. Slightly less than one third of all orthodontic patients appear to receive treatment from general practitioners. (*Am J Orthod Dentofac Orthop* 1996;110:211-7.)

Significant changes have occurred in the practice of orthodontics during the last 20 years, with many practitioners being concerned about the "busyness factor." It often is assumed that one of the major reasons behind the observed changes in practice trends is the increasing number of nonorthodontists who provide orthodontic service; however, few studies have addressed the issues surrounding nonspecialist orthodontic treatment. Similarly, although there has been much speculation about the percentage of orthodontic patients treated by nonorthodontists, studies considering this issue also are few and often are found in what might be termed *nontraditional* literature sources.

ORTHODONTICS BY NONORTHODONTISTS

As early as 1973, the manpower study sponsored by the American Association of Orthodontists¹ reported a 14% slow-down in orthodontic practice activity. Gottlieb² in a survey of orthodon-

tic practices sponsored by the *Journal of Clinical Orthodontics* reported a slow-down in orthodontics beginning in the late 1970s and early 1980s. Gottlieb² suggested that this decline was due in part to an increase in the number of dentists—both orthodontist and nonorthodontist—providing orthodontic services, as well as a decrease in birth rate and a softening economy associated with increased inflation rates. Moorrees³ also noted an increased number of general dentists and pediatric dentists providing orthodontic services.

A substantial percentage of general practitioners appear to provide some type of orthodontic service. McGann⁴ conducted a survey of 10,607 general dentists in the United States. The results were published in the first issue of the *GP Ortho News* and indicated that two thirds of the respondents were providing some type of orthodontic care. McGann⁴ reported that those dentists who provided orthodontic services had become busier and better paid.

In 1981, Dugoni and co-workers⁵ reported that 55% of the orthodontic treatment provided through prepayment programs in California was delivered by nonorthodontists. Konchak and McDermott,⁶ in a survey of Canadian dentists, reported that between 20% and 34% of fully banded orthodontic patients in Canada were being treated by general practitioners. A survey conducted by Koroluk and co-workers⁷

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from Indiana University found that 62% of pediatric dentists and 18% of general practitioners provide comprehensive orthodontic treatment. Lastly, an unpublished study conducted by Foley⁸ from St. Louis University reported that 38% of 434 dentists sampled nationwide performed orthodontic procedures and that 19% provided comprehensive orthodontic treatment for their patients.

This study was undertaken to examine the specific nature and frequency of orthodontic care provided by general dentists. Not only was the percentage of practitioners providing orthodontic services considered, but also the nature of those services and the effect that providing orthodontic care had on referral patterns to specialists.

MATERIALS AND METHODS

The sample

A random sample of 1020 general dentists from the 4783 active general practitioners in the state of Michigan was drawn from the database of the American Dental Association (ADA). Michigan is a state with substantial urban and rural populations. For the purposes of comparing data from rural and urban locations, the sample was stratified into two subgroups, based on whether the address of the dentist was in a metropolitan statistical area (MSA) or nonmetropolitan statistical area (non-MSA). An MSA is defined by the United States Census Bureau⁹ as any county with a population of 50,000 or more inhabitants in an urbanized area (city or town). A county also can be considered an MSA if its population is greater than 100,000. A nonMSA is any county that does not meet these criteria.

Survey instrument

This study was performed by means of a survey questionnaire that was mailed to a stratified random sample of general dentists. The survey instrument was developed in a manner typical of this type of research.¹⁰ Several drafts were pretested on a limited sample of general practitioners. After a thorough review of the responses, a final draft of the questionnaire was completed and prepared for distribution. The survey, accompanied by an individualized cover letter, was sent by first-class mail to each dentist in the sample. Two months later, a second mailing of surveys was sent out to all those who did not respond to the first mailing.

The questionnaire asked the respondents about the type of orthodontic services provided, as well as the characteristics of their practices, such as the office location, the number of patients in active orthodontic treatment, the number of orthodontic referrals made monthly, and the amount of continuing dental education in orthodontics taken yearly.

One of the questions asked for information regarding the types of orthodontic treatments provided and how

often they were performed. The questionnaire listed 14 specific orthodontic services, and the respondents were asked to indicate whether these services were performed routinely, occasionally, or not at all.

Statistical analysis

Descriptive statistics (means, standard deviations, ranges, and total number of respondents) were calculated for the response to each question. Contingency tables were used to examine the relationship among various practice characteristics. The chi square statistic was used to test the significance of these relationships. Because of the cumulative nature of Type I errors when multiple tests are conducted, statistical significance was judged at the $p < 0.001$ level.

RESULTS

The survey was closed 3 months after the initial mailing. At this time, a total of 753 questionnaires had been returned, a response rate of 75%, which is considered excellent for this type of mail survey.*

Of the 753 respondents, 675 dentists indicated that they were actively practicing general dentistry within the state and thus were included in the survey. The remaining 78 respondents were eliminated: 52 had retired, 8 were specialists, and 18 were categorized as "unknown." The respondents in the latter group were not in general practice, but no alternative occupation was given.

The nature of orthodontic services

For the purpose of comparison, the type of treatment provided by each of the respondents was grouped into one of three categories according to the services provided:

1. *Comprehensive treatment:* Encompasses those dentists who used multibanded or bonded orthodontic appliances to treat Class I malocclusions. They also may treat more complicated Class II and Class III malocclusions.
2. *Limited treatment:* Includes those who perform any orthodontic treatment not listed in the "comprehensive" category, such as correction of an anterior or posterior crossbite, molar uprighting, correction of rotations, or placement of space maintainers.
3. *No treatment:* Contains data from dentists who indicated that they provide no orthodontic treatment, whatsoever.

The results of this study indicate that 19.3% of general dentists provide comprehensive orthodon-

*Personal communication with J.H. Bentley.

tic services. Limited orthodontic services are provided by 57%, whereas 23.7% do not offer any orthodontic treatment (Fig. 1).

Percentage of treatment time

Ninety-six percent of the sample reported that they spent a quarter or less of their total practice time providing orthodontic services (Fig. 2). About 15% of the dentists providing comprehensive services spent 26% to 50% of their time performing orthodontic treatment with a very small percentage of practitioners spending greater than 50% of their time delivering orthodontic treatment (Fig. 2).

Number of patients

In the group that provided limited orthodontic services, more than half of this subsample did not have any patients in either limited (Fig. 3) or comprehensive (Fig. 4) orthodontic treatment at the time that the survey was completed. Of the dentists in this category, 34% had 1 to 10 patients undergoing active orthodontic treatment.

Those dentists providing comprehensive treatment reported a much greater patient load. Of this subsample 50% stated that they had 11 to 50 patients in active comprehensive treatment, about 17% had more than 50 patients (Fig. 3), whereas about one third had 10 or fewer patients in active treatment.

Office location

One goal of this study was to examine the relationship between the location of the office of the general dentist and the distance to the closest orthodontic specialist. Of the respondents 72% indicated that their office was located 4 miles or less from the nearest orthodontic office; only 9% reported that they were more than 20 miles away from an orthodontic specialist. The distance from an orthodontist was not significantly different among the three categories of dentists (Fig. 5).

There was no significant difference between urban or rural general dental practices with regard to the nature of the orthodontic services provided.

Referral patterns

Another question of interest concerned the pattern of referral to orthodontic specialists. There were no major differences among the three categories of practitioners with regard to referrals (Fig. 6). Of all respondents 55% referred one to four patients to an orthodontist each month,

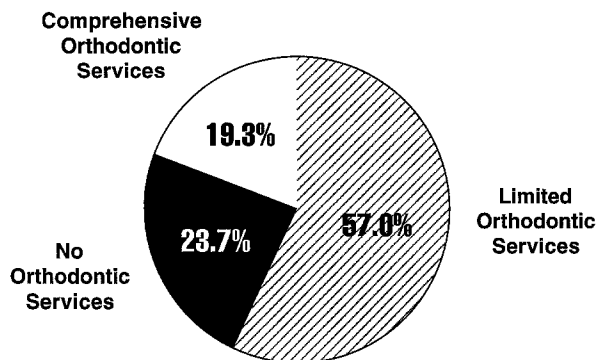


Fig. 1. Distribution of general practitioners providing comprehensive, limited, or no orthodontic services to their patients.

whereas 30% made 5 to 10 referrals. It should be noted, however, that 24% of the subset of dentists providing comprehensive orthodontic care made no referrals to orthodontists, a much larger percentage than in the other two groups.

DISCUSSION

The results of this survey suggest that general dentists provide a substantial amount of orthodontic services for their patients. Only 23.7% of the 675 dentists in this survey reported that they provide no orthodontic treatment. Thus the majority (76.3%) provide orthodontic services, with 19.3% providing comprehensive orthodontic treatment.

As mentioned previously, few investigations have examined the orthodontic service performed by general practitioners. Foley⁸ in a nationwide survey reported that only 38% of general practitioners perform orthodontic procedures, a lesser amount than seen in the current investigation. However, the percentage of general practitioners providing comprehensive orthodontic treatment reported by Foley⁸ (19%) is virtually identical to the findings of the present study. Similarly, a study of Indiana general practitioners⁷ indicated that 17.9% of the practitioners studied provided comprehensive orthodontic services.

The current survey indicated that, although the majority of general dentists practiced some orthodontics, less than 4% spent over a quarter of their time delivering orthodontic treatment. The 1989 Survey of Dental Practice conducted by the American Dental Association¹¹ reported that general dentists spend 1.4% of their time per week delivering orthodontic treatment. The mean amount of time that a Canadian general dentist spends in practice providing orthodontic services is 4.9%.⁶ Thus the amount of time general practition-

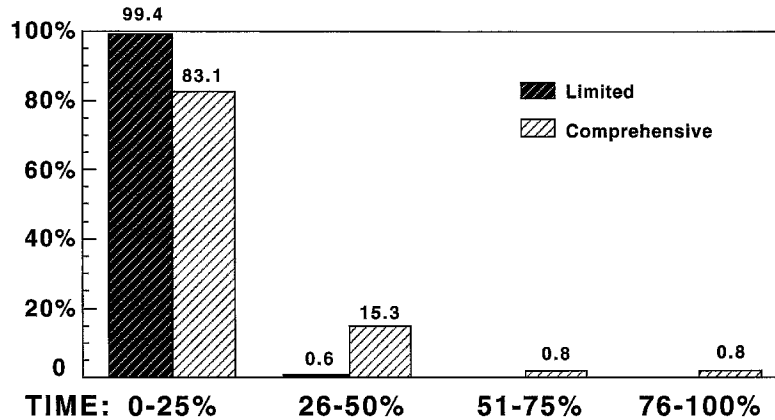


Fig. 2. Percent of time in practice spent providing orthodontic services by general practitioners providing limited or comprehensive treatment.

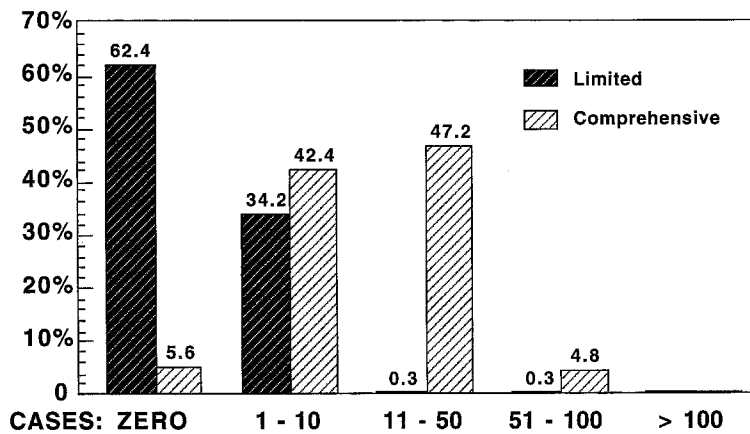


Fig. 3. Number of limited orthodontic cases in active treatment by general practitioners providing limited or comprehensive treatment

ers spend performing orthodontic treatment typically is limited.

Practice location

A specific goal of this study was to determine whether practice location contributes to the general dentist's decision to provide orthodontic services. It was hypothesized that dentists in more rural areas may be faced with an unmet demand for orthodontic services because orthodontic specialists are not located in their vicinity. The results of the study indicate that there is no statistically significant relationship between the decision to provide orthodontic services and the distance in miles from the closest orthodontic office or to the number of orthodontists within a 10-mile radius. These findings support the study of Calderone,¹² who found that there was no relationship between the amount of orthodontics provided by a general practitioner

and the availability of orthodontic specialty services. Thus geographic factors appear to have no significant relationship to the amount of orthodontic services provided by general practitioners.

Referral patterns

Several publications suggest that the more a general dentist provides orthodontic treatment, the greater the generalist's awareness of orthodontic diagnosis and treatment as well as his or her own limitations in providing orthodontic services. It is hypothesized that involved practitioners become more likely to recognize difficult orthodontic cases, leading to increased referrals to orthodontic specialists.^{4,13} This view is supported by the writings of Smith,¹⁴ Preston,¹⁵ and Moyers,¹⁶ all of whom believe that because orthodontic diagnosis and treatment skills are complicated and thus must be learned over time, an increased amount of time

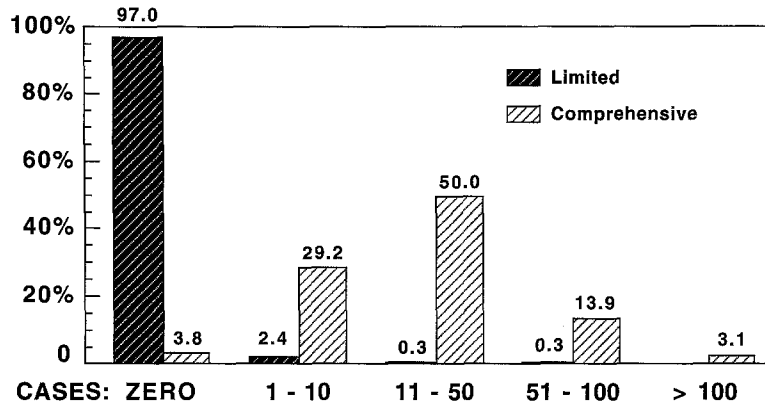


Fig. 4. Number of comprehensive orthodontic cases in active treatment by general practitioners providing limited or comprehensive orthodontic treatment.

spent digesting concepts in diagnosis leads to a greater appreciation for the complexity of orthodontic diagnosis and treatment.

The results of the current study do not corroborate this optimism. The majority of respondents refer one to four patients to the orthodontist each month, regardless of the complexity of the services they provide. Dentists in the *comprehensive* category, however, referred fewer patients to the orthodontic specialist than those in the *limited* and *none* categories. Referral patterns also indicate that dentists in the *comprehensive* category had a decreasing number of referrals over the past 5 years when compared with those in the *limited* and *none* categories.

Orthodontic treatment provided by nonorthodontists

There has been much speculation about the percentage of patients undergoing comprehensive orthodontic treatment who receive their treatment from nonorthodontists. Extrapolation of the data from this study leads to interesting preliminary insights into the magnitude of the situation. For the purpose of this discussion, additional information regarding potential providers of orthodontic services in the State of Michigan can be obtained from the Michigan Board of Dentistry. As of February 1993, there were 6366 licensed dentists; 5524 were listed as general practitioners, 319 as orthodontic specialists, and 86 specialists in pediatric dentistry.* The remaining persons were specialists in other disciplines. For the purpose of this discussion, it is assumed that the vast majority of ortho-

odontic care is provided either by general dentists or by orthodontic and pediatric dental specialists. Further, it is assumed that the percentage of retired dentists is the same for each of the three groups. Thus general dentists comprise 93.1% of potential providers, with orthodontists at 5.4% and pediatric dentists at 1.5%.

On the basis of the data from the current study, 23.7% of general dentists provide no orthodontic services, whereas 57.0% provide limited orthodontic treatment and 19.3% provide comprehensive treatment. Application of these percentages to the licensed practitioners in Michigan indicates that there are 3149 generalists providing limited orthodontic care and 1066 providing comprehensive treatment. If those dental practitioners who provide no orthodontic treatment are removed from the sample, the number of orthodontic providers can be identified, according to the percentage of each provider group (Table I).

The next step in this analysis is to assign a "typical" number of patients to each of the four types of treatment providers. Starr¹⁷ surveyed all practicing Michigan orthodontists and determined that the average active patient load was 375. This estimate is similar to the orthodontic practice study of the *Journal of Clinical Orthodontics*,¹⁸ the findings of which estimated that the average number of active patients per orthodontist was 350, a number that has remained constant for each biennial survey since 1983. The accuracy of this latter estimate has been questioned by Waldman;¹⁹ however, because of the focus (Michigan orthodontists) and response rate (74.5%) of Starr's survey,¹⁷ we chose to use his estimate of the number of active patients (375) as a baseline for each orthodontic practitioner. Assum-

*Personal communication with D. S. Strachan.

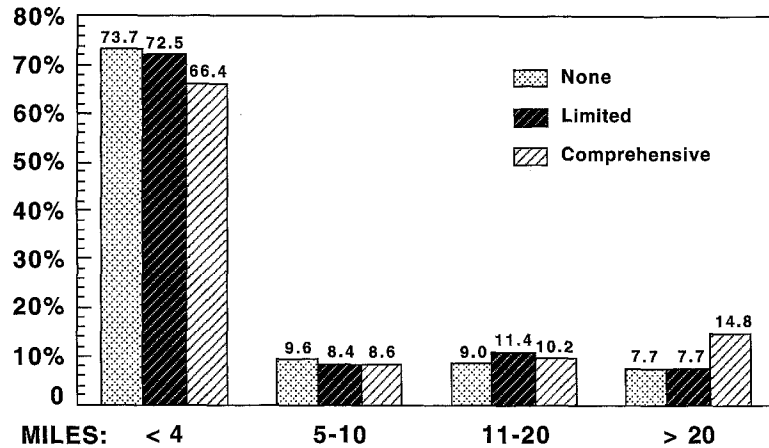


Fig. 5. Number of miles to closest orthodontic office.

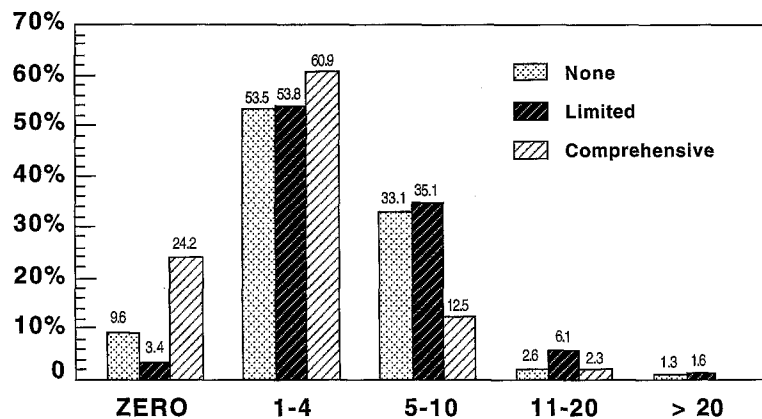


Fig. 6. Number of orthodontic referrals per month by type of orthodontic provider.

Table I. Percentage of practitioners according to type of practice

Practitioner type	N	Percentage (%)
G.P. (limited)	3149	68.2
G.P. (comprehensive)	1066	23.1
Orthodontist	319	6.8
Pediatric dentist	86	1.9
Total	4617	100

ing that each of the 319 licensed orthodontic specialists in Michigan has a full patient load, the total number of patients under treatment by orthodontists is 183,621 (Table II).

The determination of the caseload of pediatric dentists was based on the survey of Koroluk and co-workers.⁶ This study included data on the percentage of time spent providing orthodontic services by pediatric dentists. Extrapolating from their

Table II. Percentage of orthodontic patients according to provider. The breakdown by general practitioner (GP) according to limited or comprehensive category is shown in parentheses and is summarized in the GP Total category

Practitioner type	Number of patients	Percentage (%)
Orthodontist	119,625	65.1
Pediatric dentist	6,926	3.7
GP total	57,070	31.0
(Limited)	(7,250)	(3.9)
(Comprehensive)	(49,820)	(27.1)

Specific tabular data as to the method of determination of the patient load for pediatric dentists and general practitioners is available from the authors.

data, we estimated that the total patient load of the 86 pediatric dentists practicing in the state was 6926 (Table II) or slightly more than 80 orthodontic patients per pediatric dentist.*

The data from the present study was used to calculate the total patient load of general dentists who provide either limited or comprehensive orthodontic treatment. For those general practitioners who delivered comprehensive treatment, we estimate that there were a total of 28,645 comprehensive treatment cases and 21,175 limited treatment cases, totaling in all 49,820 patients (Table II). Practitioners providing limited orthodontic treatment were estimated to have 1325 comprehensive treatment cases and 5925 limited treatment cases with a total number of cases under treatment of 7250 (Table II).

With these arbitrary estimates, 65.1% of all orthodontic cases are treated by orthodontic specialists and 3.7% are treated by pediatric dentists (Fig. 7). Of the 31.0% treated by general practitioners, the vast majority were treated by those persons delivering comprehensive orthodontic care (Table II).

CONCLUSIONS

The results of this meta-analysis of data from several studies indicate that slightly less than one third of orthodontic patients are treated by general practitioners, with an additional 4% treated by pediatric dentists. The findings of the present investigation are similar to those of Konchak and McDermott⁶ who, in a survey of Canadian dentists, reported that between 20.1% and 34.2% of fully banded orthodontic patients in Canada were treated by general practitioners. The values from the current study are substantially less than those reported previously by Dugoni and co-workers⁵ who found that 55% of the orthodontic treatment provided by prepayment programs in the state of California was delivered by nonorthodontists. It should be remembered, however, that the current survey was conducted in a state (Michigan) with a dental specialties act, whereas no specialty act exists in California.

We acknowledge the assistance of Dr. Robert A. Bagramian and Dr. Donald S. Strachan of the School of Dentistry, The University of Michigan, in the formulation

*Tabular data regarding these calculations are available from the authors.

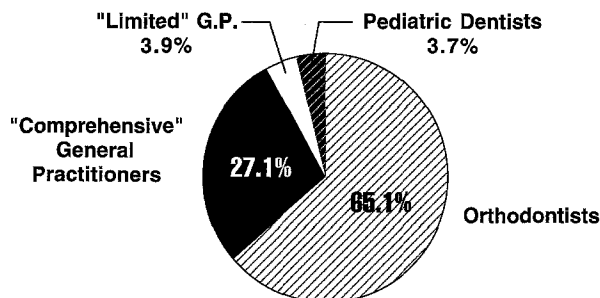


Fig. 7. Estimate of percentage of orthodontic patients by type of provider.

of the survey instrument and in the gathering of the demographic data concerning dental specialists and generalists in Michigan, respectively. We also thank Dr. Lysle E. Johnston, Jr. for his critical review of this manuscript.

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