

Clinical Dental Practice and Management

3

CHAPTER OVERVIEW

The goal of the dental profession is to maximize the oral health of all individuals. Achievement of this goal will require the combined efforts of dental education, dental research, dental practice, industry, government, and the public.

For purposes of this discussion, clinical practice includes, but is not limited to, those oral health services provided by dentists in the dental office and those community-based programs such as community water fluoridation, oral cancer screening and sealant programs.

Clinical care is influenced by the demographics of the population, patterns of dental disease, and the expectations of both patients and providers. Demographically, the United States population is growing older, and more ethnically and culturally diverse. There is increased recognition of the impact of the role of race, culture, beliefs and behavior on health outcomes. This growing awareness may lead to a paradigm shift from a medical model of oral health care based on disease to a health model based on health promotion.

Changes underway in the clinical practice of dentistry will make improved oral health for all Americans a real possibility in the next two decades. To help make that possibility a reality, this chapter examines the following issues and discusses their likely impact on clinical practice and practice management.

This chapter discusses six major areas:

- ◆ Trends, disease patterns and use of dental services;
- ◆ New concepts in patient-based diagnosis, treatment planning and disease management;
- ◆ Market force issues affecting demand;
- ◆ Technological advances affecting the dental workplace;
- ◆ The dental workforce, including its composition and the role of allied health personnel; and,
- ◆ The organization of dental practices.

1. CLINICAL DENTAL PRACTICE AND MANAGEMENT TODAY

The dental profession's success in reducing caries, periodontitis, and tooth loss has dramatically improved the oral health status of the United States population. Tooth loss can be categorized by extent—complete loss of teeth (or complete edentulism) and partial loss of teeth, ranging from one to many (partial edentulism). Many factors have contributed to this improvement in the nation's oral health including the widespread use of fluoride, an increase in preventive services, and more clinical time dedicated to the prevention and treatment of oral diseases.

Despite these advances, demand for dental services is at an all-time high. Higher income and educational levels and increased access to dental insurance have resulted in increased care and changing expectations among both dental professionals and patients. In 1996, 65% of persons two years of age and older visited a dentist (U.S. Department of Health and Human Services [USDHHS], 2000a).

DENTAL DISEASE PATTERNS AND USE OF DENTAL SERVICES

Clinical dental care is influenced largely by the demographics of the population, patterns of dental disease, and the expectations of both patients and providers. The population is growing. Demographically, it is becoming older and more culturally diverse. The average American has fewer caries and is retaining more teeth into old age. As measured by DMFS (decayed, missing, and filled surfaces) the decline in caries was 64% from 1971-1974 to 1988-1994 (USDHHS, 2000b; and Miller et al, 1987). According to *Healthy People 2010*, 25% of children have 80% of pediatric dental caries.

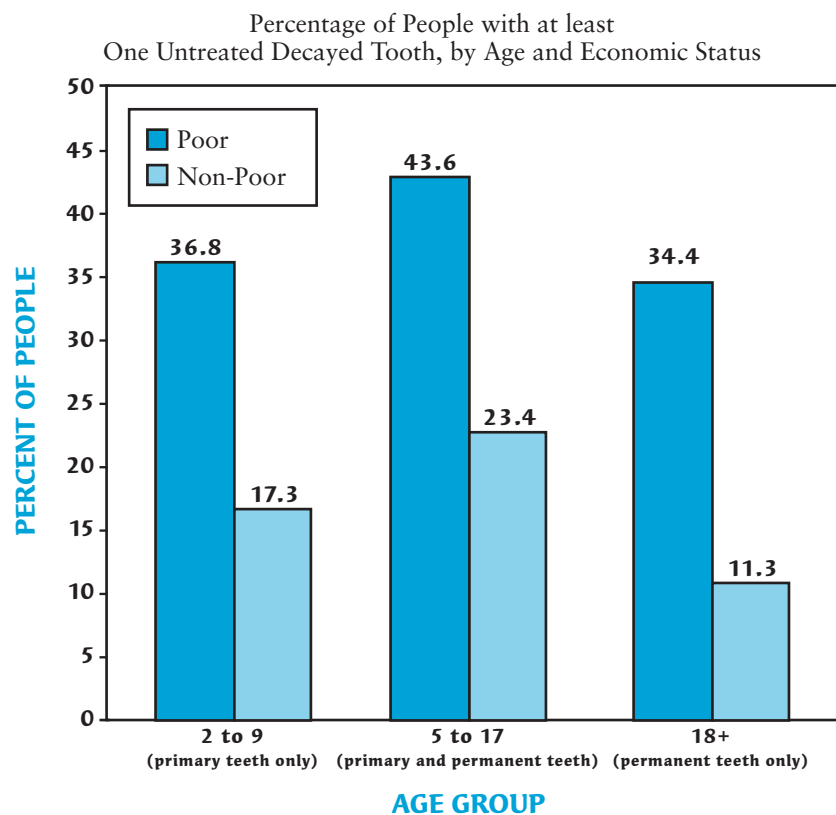
However, poor people continue to experience more caries than non-poor people and they are less likely to receive treatment (USDHHS, 2000b). See Figure 3.1. Epidemiological evidence demon-

strates that dental disease rates and dental needs are highest in low-income and special needs populations.

Oral Health Status and Trends

The proportion of untreated dental caries in school children has been declining overall, but has increased among children six to eight years old. The average number of DMFS (decayed missing filled surfaces) per child among children 6-18 years old was 1.9 in 1991, down from 4.4 in 1974. By age 17, only 16% of children are caries free in their permanent dentition. However, 85% of 14 year-olds do not have dental sealants (USDHHS, 2000a). As shown in Table 3.1, complete edentulism is decreasing for all ages, with a corresponding increase in ratio of partial edentulism versus complete edentulism (Miller et al, 1987).

FIGURE 3.1



Source: USDHHS, 2000b.

TABLE 3.1

Percentage of People who are Edentulous, by Age Group

Age Group	1971-1974	1988-1994
35-44	9%	3%
45-54	16	9
55-64	33	20
65-74	46	29

Source: USDHHS, 2000a.

Dental caries is the single most common chronic childhood disease—five times more common than asthma and seven times more common than hayfever (USDHHS, 2000b). Caries, periodontal diseases, and the management of other conditions, such as wear of hard tissue, oral infections, oral cancer, developmental disorders, intentional and unintentional injuries, chronic and disabling conditions such as temporomandibular disorders, craniofacial pain, Sjögren's syndrome, and systemic diseases, present difficult treatment and prevention issues (USDHHS, 2000b). The treatment of older people is particularly complex. Dental therapies are frequently intricate, and the elderly also have chronic medical conditions, which complicate patient management.

The prevalence of root caries, strongly age-dependent, is increasing. Among adults 60-64 years old, 54% had at least one decayed or filled root surface; among adults 18-19 years old 7% had at least one decayed or filled root surface.

According to the Third National Health and Nutrition Examination Survey (NHANES III), 23% of dentate adults 30-90 years old had significant gingival recession, 35% had periodontitis, and 50% had sulcular bleeding upon probing (Miller et al, 1987; Albander et al, 1999; Albander and Kingman, 1999; and Kingman et al, 1988). Ninety-two percent of all persons, regardless of age, had calculus. Signs of gingivitis and periodontitis were more prevalent in males than females, and more prevalent in certain racial and ethnic groups.

As the United States population ages and a larger percentage of older Americans retain some or all of their teeth, the need for preventive, restorative, arrestive, prosthodontic services, and regenerative periodontal services will continue to increase. Thus, the clinical practice of dentistry faces challenges from many directions. It must address the needs of those whose care has lagged behind that of the gen-

eral population. At the same time, it must address the increasingly complex demands of its more fortunate patients and its aging patients.

In addition, new research suggests the possibility of linkages between oral diseases and systemic disease. This and other research findings could lead to an increased relationship between oral health and overall health. For some

patients, a shift is occurring from need-based dentistry—that is, care directed at alleviation of pain, caries control, management of periodontitis, and replacement of teeth—to desire-based dentistry. The latter is characterized by services which may be viewed as elective and addresses improvements in self-esteem and quality of life. Dentistry must effectively integrate the new technologies and clinical advances into dental practice for all people.

Reports on changes in the use of selected dental services reflect an increase in the frequency of diagnostic and preventive services, with a concomitant decrease in frequency of restorative and other invasive procedures. For example, from 1980 to 1995 the percent change in use of various procedures were (Eklund et al, 1997; and Eklund, 1999):

- ◆ Prophylaxes increased by 20% in newborn to five-year-olds and 30% in people aged 65 and older.
- ◆ Oral exams increased by 29% in newborn to five-year-olds and 75% in people aged 65 and older.
- ◆ Periodontal services increased by 89% in 25- to 34-year-olds and 586% in people aged 65 and older.
- ◆ Amalgam and resin restorations decreased by 45% in newborn to five-year-olds, and 21% in people aged 65 and older.
- ◆ Simple extractions decreased by 40% in newborn to five-year-olds, and 43% in people aged 65 and older.
- ◆ Use of complete dentures decreased by 75% in 35- to 44-year-olds and 50% in people over 65 years of age. No data are available on complete dentures supported by implants.

- ◆ Endodontic procedures decreased for individuals through age 64. Due to the increase in retention of teeth in older adults, endodontic procedures increased by 56% for people over 65 years of age.
- ◆ The absolute number of edentulous patients increased despite the decrease in the percentage of the population that was completely edentulous.

Market Forces Affecting Demand

THIRD PARTY COVERAGE

Private Coverage

Dentistry is an approximately \$60 billion industry. Individuals pay about 48% (\$28 billion) of dental expenditures out of their pockets directly to dentists. Another 48% of dental expenditures is reimbursed by employer-sponsored insurance (Health Care Financing Administration [HCFA]). Together these two sources of payment account for approximately 96% of all dental expenditures. About 160 million Americans do not have private dental insurance. (Also see Chapter 4, Financing of and Access to Dental Services.)

With dental expenditures increasing at a more rapid rate than expenditures for most other goods and services, employers are seeking ways to hold down the increasing dental premiums. This may result in more cost sharing by enrollees, reduction in dental benefits, and more negotiated discounts on services.

There is a relatively strong demand for dental services. Capitated managed care plans are not likely to become a significant factor in the dental marketplace. Given the relative tightness of supply, dentists are more likely to maintain busy patient schedules without participating in capitated managed care plans (Bailit, 1999).

As an inflation-adjusted benefit, there has been a steady decrease in the constant dollar value of dental insurance. A strong economy contributes significantly to the demand for dental services. This discussion assumes that the economy will continue to be strong. Should the economy weaken, the demand for dental services is likely to also weaken.

Evidence that dental disease is linked to morbidity and even mortality could recast the significance of dental insurance from a discretionary to a required benefit. Additionally, pressure to expand dental benefits under Medicare may come from the "baby boomer" generation as it moves into retirement (Niessen, 1984). Members of this group have had

access to dental services throughout their lifetime.

Publicly Funded Third Party Payment Programs

Government funding of dental care for low-income populations is decreasing. Medicaid, the primary funding vehicle for low-income, medically compromised, physically challenged, and nursing home populations, is under-funded. Less than 1% of Medicaid funds are spent on dental services compared to approximately 5% of the total United States health care dollar spent on dental services (HCFA). State coverage of Medicaid dental services for adults is discretionary, with many states providing coverage for emergency services only.

Given the high administrative overhead involved in treating Medicaid recipients, low levels of patient compliance, and the reimbursement rates that are often less than half of market value, many dentists do not participate in Medicaid.

COMMUNITY-BASED ORAL DISEASE PREVENTION PROGRAMS

Dental professionals traditionally have played a leadership role in the implementation of community-based preventive programs. Community-based prevention programs, such as community water fluoridation, sealant programs, or oral cancer screening will continue to play an important role in improving the public's oral health. Fluoridation, for example, benefits more than 150,000,000 Americans, and is the most cost-effective means to prevent dental caries.

The dental profession will continue to support community-based preventive programs, such as water fluoridation. This support will be needed to strengthen local, state and federal public health capacity to track disease patterns, develop policy, and assure that people are linked with appropriate education, preventive, and clinical services.

Future research and technology may result in new community-based preventive programs that help prevent caries, periodontal diseases and other oral diseases and conditions. (See Chapter 7, Dental and Craniofacial Research.) Implementing these programs will require efforts by dental professionals, perhaps working with other health professionals, such as school nurses to prevent sports injuries and child care workers to prevent early childhood caries.

THE DENTAL WORKFORCE

Numbers of Practicing Dentists

The American Dental Association (ADA) Future of Dentistry report of 1983 predicted two changes in the composition of the nation's dental workforce. First, that report anticipated that declining first-year enrollments in dental schools would result in fewer graduates beginning in 1983. Second, it anticipated that the total number of practicing dentists would increase throughout the remainder of the century—despite the declining number of graduating dental students. Both of

these changes have occurred (ADA, 1983).

The number of dental school graduates declined from a high of 5,756 in 1982 to a low of 3,778 in 1993, a decrease of 34%. Since 1993, graduates increased steadily to 4,041 in 1999 (ADA, *Surveys of Predoctoral Dental Education*). The decline of graduates during the 1980s slowed the rate of growth of practitioners. As shown in Table 3.2, the number of professionally active dentists and private practitioners increased during the 1990s. However, their growth rates were slightly less than the growth in the United States population. As a result, dentist-to-population ratios started declining around 1995 and

TABLE 3.2

Census Counts and Projections of U.S. Resident Population, Professionally Active Dentists, Active Private Practitioners, Professionally Active Dentists and Active Private Practitioners per 100,000 U.S. Resident Population, 1976-2020

Year	U.S. Resident Population (in thousands)	Professionally Active Dentists	Active Private Practitioners	Professionally Active Dentists Per 100,000 U.S. Resident Population	Active Private Practitioners Per 100,000 U.S. Resident Population
1976	217,563	110,276	100,051	50.7	46.0
1978	222,095	117,044	106,672	52.7	48.0
1982	231,664	126,985	116,208	54.8	50.2
1987	242,289	137,817	126,357	56.9	52.2
1991	251,802	150,762	138,094	59.9	54.8
1992	254,933	152,925	140,349	60.0	55.1
1993	258,103	155,087	142,603	60.1	55.3
1994	261,312	157,228	144,581	60.2	55.3
1995	264,561	158,641	146,089	60.0	55.2
1996	267,850	160,388	147,247	59.9	55.0
1997	271,180	160,781	147,778	59.3	54.5
1998	274,552	163,291	151,309	59.5	55.1
1999	277,966	164,664	152,151	59.2	54.7
2000	281,422	166,049*	153,431*	59.0	54.5
2005	294,108	170,476*	160,318*	58.0	54.5
2010	306,524	173,942*	163,328*	56.7	53.3
2015	319,205	177,076*	166,088*	55.5	52.0
2020	332,145	179,930*	168,528*	54.2	50.7

* Preliminary estimates for 2000, 2005, 2010, and 2020.

Source: ADA, 2001b; and U.S. Department of Commerce, Bureau of the Census, 1990 and 2000 Census.

have continued to decrease (ADA, 2001b). Overall, there has been a 0.91% decline in the ratios.

Women Dentists

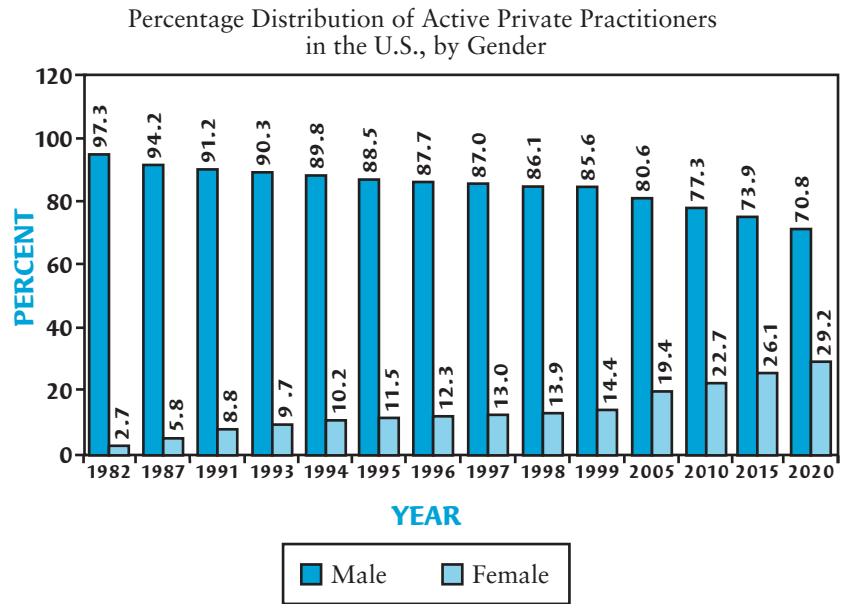
Since the mid 1970s, women have entered dental schools, and subsequently dental practice, in increasing numbers. The expansion of the number of women in dentistry has been one of the major dental workforce trends during the last quarter of the last century and will continue during the initial decades of this century. Such a fundamental demographic shift raises questions regarding the effect of that shift on workforce requirements. This section will describe similarities and differences between male and female dentists in practice characteristics that could potentially have an impact on workforce requirements.

According to the ADA census of dentists, *Distribution of Dentists*, the total number of active private practitioners¹ in the United States increased from 116,208 in 1982 to 152,151 in 1999, a 30.9% increase. The number of female active private practitioners increased from 3,029 to 21,960 during this same period, an increase of 625%. Figure 3.2 shows the percent distribution of active private practitioners in the United States by gender. In the early 1970s, there were very few women dentists. By 1982, female dentists comprised 2.7% of the dentist workforce; by 1999 they comprised 14.4%.

The increase in the female dentists resulted from an increase in female dental school graduates during the same period. Between 1982 and 1999, female dental graduates increased 72.6%, from 838 to

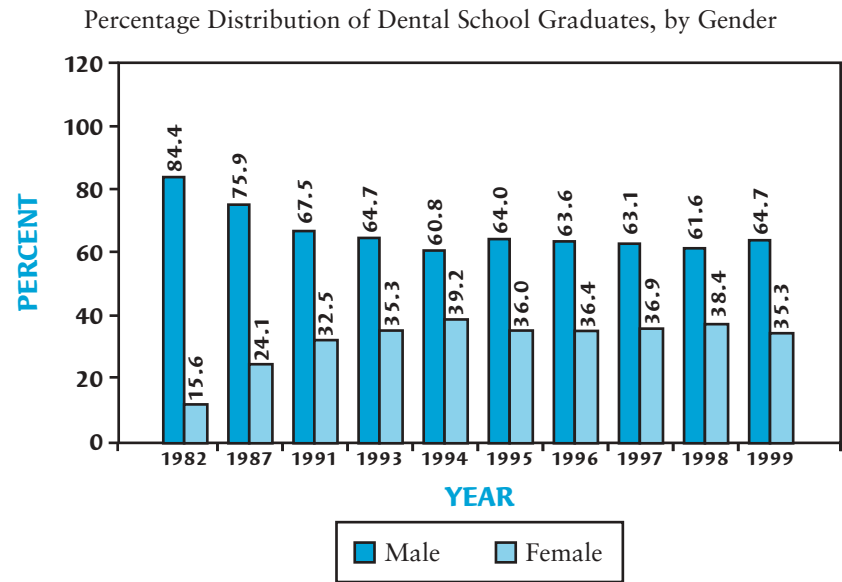
1,446, while the overall number of graduates decreased by 23.8% (from 5,371 to 4,095). The percent distribution of graduates by gender is depicted in Figure 3.3. By 1982, women comprised

FIGURE 3.2



Source: ADA, *Distribution of Dentists*; and ADA, 2001b.

FIGURE 3.3



Source: ADA, *Surveys of Predoctoral Dental Education*.

¹ Active private practitioners are defined as dentists whose primary and/or secondary occupation is private practice (full- or part-time).

15.6% of total dental graduates; their percentage increased to 39.2% in 1994. Since then, the percent distribution of female graduates leveled off, fluctuating from year-to-year in the high thirty percent range (ADA, *Surveys of Predoctoral Dental Education*).

Even if the trend in percent of female graduates has stabilized, the number and percent of females practicing dentistry will continue to increase. The ADA's *Dental Workforce Model* forecasts that 29.2% of active private practitioners will be female by 2020.

Part-Time Practice

Among male private practitioners, the percentage that worked part-time (defined here as spending less than 30 hours per week in the office) increased from 10.2% in 1987 to 14.7% in 1999. Among females, the increase was from 26.3% to 29.9% (see Table 3.3). Overall, the percentage of those working part-time has increased for both sexes.

Although the percentage distribution of part-time dentists is higher among females in all three years, in 1987 it was 2.6 times that of their male counterparts – by 1999, it was only two times as high (ADA, 1989; 2001a).

Further analysis of part-time trends by gender and age revealed that among the youngest dentists, those less than 40 years of age, both males and females exhibited increases in part-time hours. The percentage distribution of part-time female dentists has consistently been 5 to 6 times that of their male counterparts during the three survey years (ADA, 1989; 1997; 2001a). Intuitively, higher part-time distribution among females less than 40 years of age can be related to childbearing and/or child-rearing responsibilities. But it can also be related to the age distribution of female dentists within the age category of "less than 40 years old." Within this age category, female dentists tend to be younger and, therefore, involved in the starting and establishing their practices. These processes that can account for the higher part-time distribution.

Among those 40-59 years of age, the percentage part-time practice for both women and men increased slightly between 1987 and 1994 and has been almost stable between 1994 and 1999. For this age cohort, the percentage distribution of part-time female dentists has been about 3 times that of male dentists (ADA, 1989; 1997; 2001a).

About 40-46% of male dentists 60 years of age or older have consistently been part-time practitioners between 1987 and 1999 (ADA, 1989; 1997; 2001a). There were too few female dentists in this age category to report the percentage working part-time. However, there have been shifts in the age distribution of women dentists during this period. Between 1987 and 1999, the female dentist population has aged (e.g., in 1987, 81.4% were less than 40 years of age compared to 46.6% in 1999). Therefore, it is likely that this shift in age distribution has resulted in a convergence of the percent of older male and female dentists working part-time.

TABLE 3.3

Percentage Distribution of Part-Time Active Private Practitioners, by Gender and Age Group

	1987	1994	1999
Male	10.2%	13.6%	14.7%
Less than 40 years old	4.6	4.9	5.6
40 to 59 years old	8.1	8.7	8.7
60 years of age or older	40.5	42.1	46.2
Female	26.3	29.8	29.9
Less than 40 years old	25.4	29.6	31.3
40 to 59 years old	27.7	29.0	28.6
60 years of age or older	N/A*	N/A*	N/A*

* The number of respondents was too low to report data.
Source: ADA, 1989, 1997, 2001a.

As indicated in the section on dentists' productivity, there is no significant difference between productivity of men and women dentists on an hourly basis (Beazoglou et al, 2001). Also, full-time women dentists work as many hours as full-time male dentists. The same is true for part-time men and women dentists. Thus, the major impact of women

on the workforce is that a larger percentage currently practices part-time. As shown in Table 3.3 about 30% of women dentists and 15% of male dentists indicate they work part-time (ADA, 1989; 1997; 2001a). Currently, 14.4% of the dentist workforce is female. A rough approximation of the impact of women on workforce output is the percentage difference in men and women dentists who practice part-time (15%) multiplied by the percent of women in the dentist workforce. This calculates to about a 2% reduction in total dental output. Even in 2020, the impact of women dentists on output will be comparatively small. Then, 29.2% percent of the dentist workforce is predicted to be women. If the current gender difference in part-time practice persists, then in 2020, the impact of women on total output will be less than a 5% reduction.

Specialty Training

The ratio of general dentists to dental specialists has remained stable at 4:1 for many years, but evidence suggests that this ratio may decrease to 3:1 early in the 21st century. While the number of dental school graduates has declined, the number of graduates of specialty training programs remained steady at 1,200. Ultimately, this trend will shift the percentage of specialists to one-third of practicing dentists.

Dental Workforce Diversity

By the year 2020 the United States population is expected to grow to 332,145,221. The rate of growth is expected to be 10% per decade from 1990 to 2020. During this period it is anticipated that 55% of the growth in the United States population will be due to immigrants and their descendants. Growth will be greatest among Hispanics and African Americans (Murdock and Hogue, 1998).

Since 1990, however, there has been a 23% decline in dental school enrollment of Hispanics, African Americans, and Native American students (Valachovic, 2000). Asian/Pacific Islanders represented 24.5% of first year enrollees in 1998. Consequently, at the very time the United States population is becoming increasingly diverse, the future supply of dentists is becoming less representative of the population it will serve.

Productivity of Dentists

The supply of dental care services is frequently associated with the number of providers licensed to practice in an area. An additional refinement for workforce calculations is the dentist-to-population ratio. The ratio relates the number of dentists to the size of the population. However, the dentist-to-population ratio is a crude determinant of the dental workforce needs of a community, especially when making comparisons over time. The ratio implicitly holds constant many factors that affect both the population's need and desire for dental care as well as dentists' ability to produce those services.

One of the factors that the dentist-to-population ratio holds constant is dentists' productivity (i.e., the amount of dental output, measured as real gross billings per hour). Improved productivity means that fewer dentists can produce the same amount of dental services compared to previous years. Ignoring productivity changes is likely to lead to serious miscalculations for workforce policy.

In their recent study, Beazoglou, Heffley and Bailit, showed that total dental output (total production of dental services) of the dental delivery system tripled between 1960 and 1998, growing at an annual rate of 2.95% (see Table 3.4). Change in dental output results from an increase in the number of dentists or from improved productivity per dentist. Over the entire period, the contributions to the increase in dental output from increases in the number of dentists and in dentists' productivity (i.e., the amount of dental output, measured as real gross billings per hour) were almost equal: the number of dentists increased 1.85 times, and dentists' productivity increased 1.64 times.

It is useful to divide the period from 1960 to 1998 into three different periods, based on changes in productivity and the number of dentists (see Table 3.4). During the period from 1960 to 1974, dental output grew much faster than the population: 5.01% compared to 1.18% annually. The reason for the leap in dental output was the rapid rise in productivity per dentist, which grew at 3.95% annually. Growth in the number of dentists was actually less than the growth in population.

During the second period, from 1974 to 1991, dental output continued to expand more rapidly than the United States population but the difference was much smaller, 1.84% compared to 0.96% annually. All of the increase in dental output came from an increase in the number of dentists, which

rose at about 2.0% annually. Dentists' productivity actually declined by 0.13% annually because the over-abundance of dentists compared to demand for dental care made it difficult for dentists to stay busy.

During the period from 1991 to 1998, dental output continued to grow more quickly than the population. However, the growth in dentists' productivity had recovered from its stagnant period during the 1980s to expand at 1.05% annually. Its contribution to output was equal to that of the increase in the number of dentists.

Thus, there are two ways to increase dental services: one through increases in the number of dentists and the other through increases in existing dentists' productivity. The two methods are related. If an over-abundance of dentists compared to demand occurs, productivity is retarded, slowing the increase in dental output. As the dental market tightens, dentists stay busy and productivity is enhanced. Improvements in technology

indicate, given the existing number of allied personnel (across all general practitioner dental practices), the effect on dentist output if the number of allied personnel were to be changed – assuming all other factors remain constant.

Several factors contribute to changes in dentists' productivity (Beazoglou et al, 2001). Table 3.5 shows the percentage increase in dental output per hour from a 10% change in each of these factors separately, holding the other factors constant. For example, a 10% increase in dentist hours would increase dental output by 2.92% while an increase of 10% in dental hygienist hours would increase output by the almost equal amount of 2.74%. If more than one factor is changed their contributions are additive. Thus, 10% increases in both dental hygienists and dental assistants hours would increase dental output by 4.02%. These productivity enhancements can be realized by increasing the staff hours of these personnel. Moreover, these increases can be realized with the current scope of duties for these personnel, as they exist in the various states.

Increasing the number of dentists' hours by producing more dentists may not be the most cost-effective way to increase productivity and subsequently dental services. Interestingly, once other factors are held constant, neither gender nor age is a significant factor in productivity. Female dentists are just as productive as male dentists. Also, older and younger dentists can produce at the same rate.

TABLE 3.4

Annual Growth Rates in the U.S. Population, Dental Output, and Output per Dentist, 1960-1998

	1960-98	1960-74	1974-91	1991-98
U.S. Population	1.02%	1.18%	0.96%	0.98%
Dental Output	2.95	5.01	1.84	1.80
Output per Dentist	1.31	3.95	-0.13	1.05

Source: Beazoglou et al, 2001.

enhance productivity, but the full impact of technical change will also be affected by market conditions.

Appropriate use of staff and office space can enhance dentists' productivity (Beazoglou et al, 2001). The type of analysis described next will discuss these issues. This analysis is different from the previous discussion of dentists' productivity per hour. It is like a recipe for efficient production of dental services given the various factors (such as number of staff, staff hours, office space, etc.) that contribute to changes in dentists' productivity. However, the analysis does not indicate which factor is more important in a fundamental sense. Of course, the inputs of dentists are critical because dental services cannot be produced without dentists. Although this productivity analysis does not measure the productive effect of expanded duties for allied dental personnel, it is valuable because it does

National Dental Workforce Projections

To develop a national dental workforce policy, one must understand the productive capacity of the dental workforce. One dental workforce objective could be to keep the productive capacity of the dental workforce constant in relation to the United States population in 2020 compared to 2000.

In 2000:

- ◆ United States population was 281,421,906;
- ◆ Active private practitioners numbered 153,431; and,
- ◆ Dentists-per-100,000-population ratio was 54.5.

TABLE 3.5

Percent Change in Dental Output
Associated with a 10 Percent Increase in an Input

Dentist Hours	2.92%
Hygienist Hours	2.74
Dental Assistant Hours	1.28
Other Staff Hours	1.69
Office Space	1.77
Gender (male=1)	1.14*
Dentist's Age	-0.42*

* Not significant at 5% level.
Source: Beazoglou et al, 2001.

In 2020, the United States population is projected to be 332,145,221. Without factoring in productivity improvements, the required number of active private practitioners to maintain the 54.5 dentists per 100,000 population is 180,995, an increase of 27,564.

However, it is extremely improbable that for the next 20 years the growth in the level of dentist productivity would be zero. Therefore, assuming 1) that dentists' productivity grows at the same rate between 2000 and 2020 as it did between 1991 and 1998 (i.e., 1.05% annually) and assuming 2) the number of dentists in 2020 remained the same as in 2000, the same number of dentists—adjusted for productivity—would be equivalent to 35,646 additional dentists in 2020; far more than the required 27,564.

In conclusion, the national supply of dental services is likely to increase due to enhanced dental productivity. Moreover, there is potential to increase dental output by increasing the number of allied dental personnel working in dental offices. These factors indicate that a major increase in the aggregate number of dentists is probably not necessary at this time. Nevertheless, this issue must be followed continuously so that the nation will be ready to act if circumstances change.

Geographic Distribution of Practicing Dentists

The distribution of dentists varies substantially by geographic area. Reports indicate specific geographi-

cal areas are either currently experiencing or predicting declines in the number of practicing dentists (Dohm, 1999; Cooksey, 1999; and Smetanka, 2000). North Dakota anticipates losing 40% of its dentists to retirement in the next decade. South Dakota expects that 35% of its dentists will retire in the coming decade. Minnesota data indicate that dentist-to-population ratios, which improved through the 1980s, have reverted to 1973 levels in the last decade (Born, 2000). Other states indicate that they have sufficient numbers of practicing dentists, and some states have expressed concerns regarding an over-abundance of dentists.

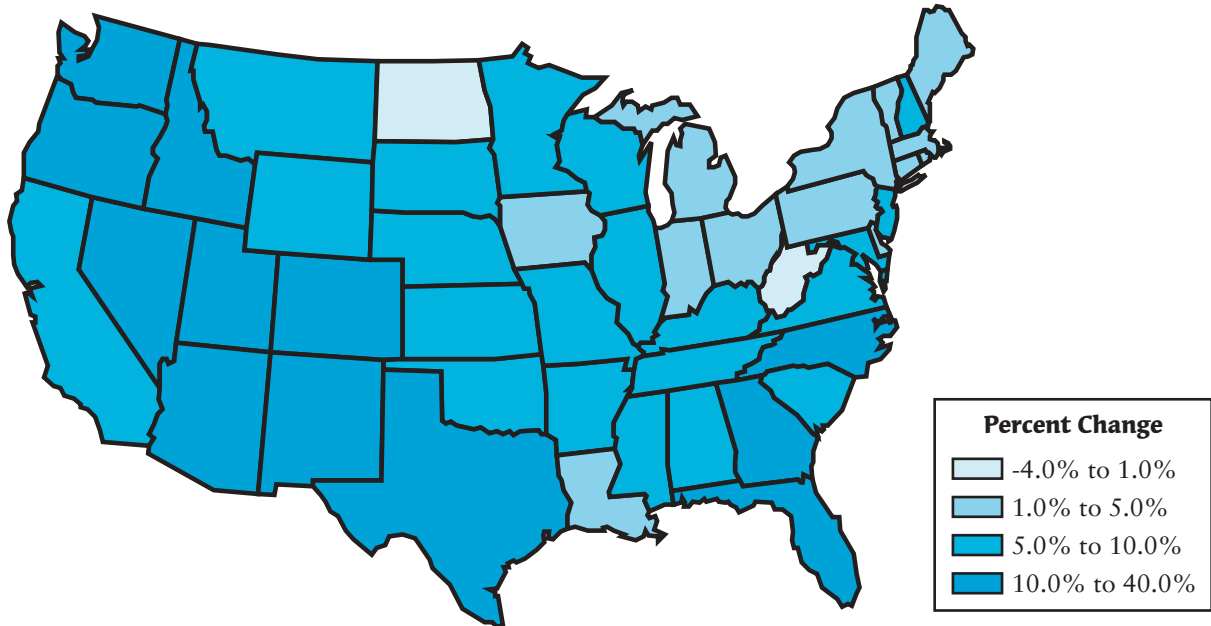
There are rather pronounced geographic imbalances in the dental workforce. One of the reasons for these geographic imbalances is the rapid shifts that are occurring in the United States population, which increased from 248.7 million to 281.4 million between 1990 and 2000—a 13.2% increase. The largest increases occurred in the Western and Southern states: Nevada, Arizona, Colorado, Utah, Idaho, Georgia, Florida, Texas, North Carolina, Washington, Oregon, and New Mexico all showed 20.0% or greater increases in their populations. Ohio, Rhode Island, Maine, Connecticut, Pennsylvania, West Virginia, and North Dakota showed smaller gains (less than 5.0%). Only the District of Columbia lost population with a decrease of 5.7%. (See Figure 3.4.)

Similar to the pattern of population growth, the largest increases in the number of active private practitioners were seen in the Western and Southern states: Nevada, Utah, Washington, Wyoming, Idaho, Florida, Arizona, North Carolina, South Carolina, Colorado, and Delaware all showed greater than 11.0% increases in the number of active private practitioners. Connecticut, Iowa, Wisconsin, Michigan and West Virginia showed less than 1% increases in the number of active private practitioners. Minnesota, the District of Columbia, and Missouri lost dentists between 1993 and 1999. (See Figure 3.5.)

While the number of dentists increased nationally and for almost all states, the dentist-to-population ratios declined in about one-half of the states between 1993 and 1999. (See Figure 3.6.) Several rapidly growing states, such as Nevada, Arizona, and Georgia saw their dentist-to-population ratios decline although they registered large increases in the number of dentists. Their populations were simply growing too quickly for the increase in dentists

FIGURE 3.4

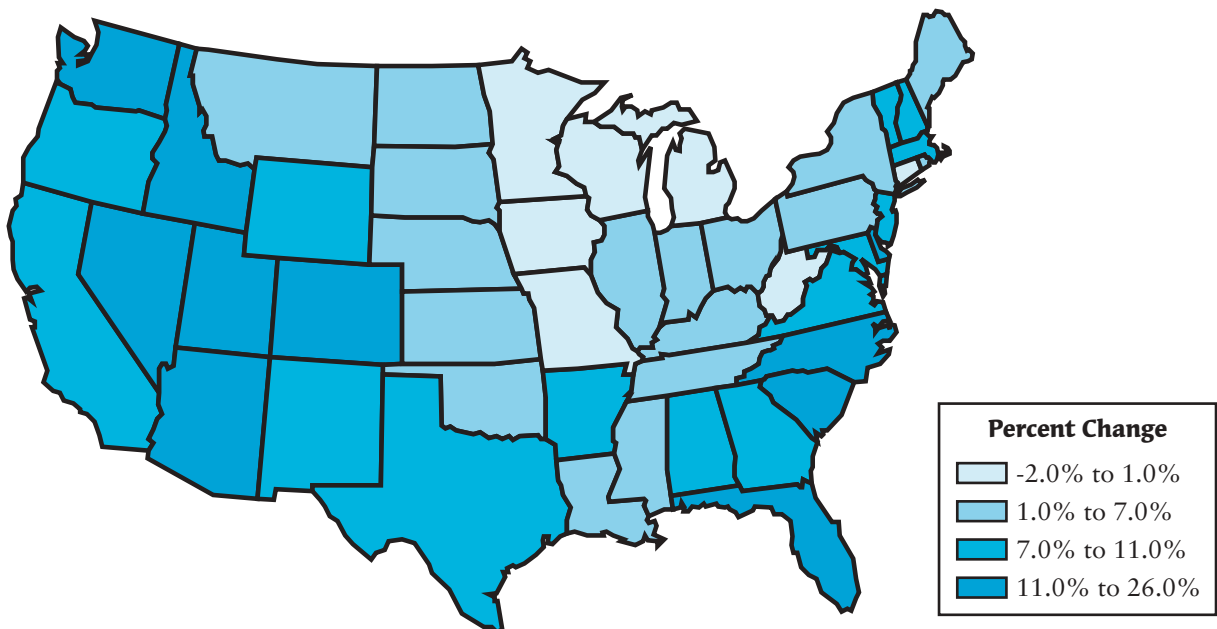
Percentage Change in the U.S. Population, by State, 1993-1999



Source: U.S. Department of Commerce, Bureau of the Census, 1990 and 2000 Census.

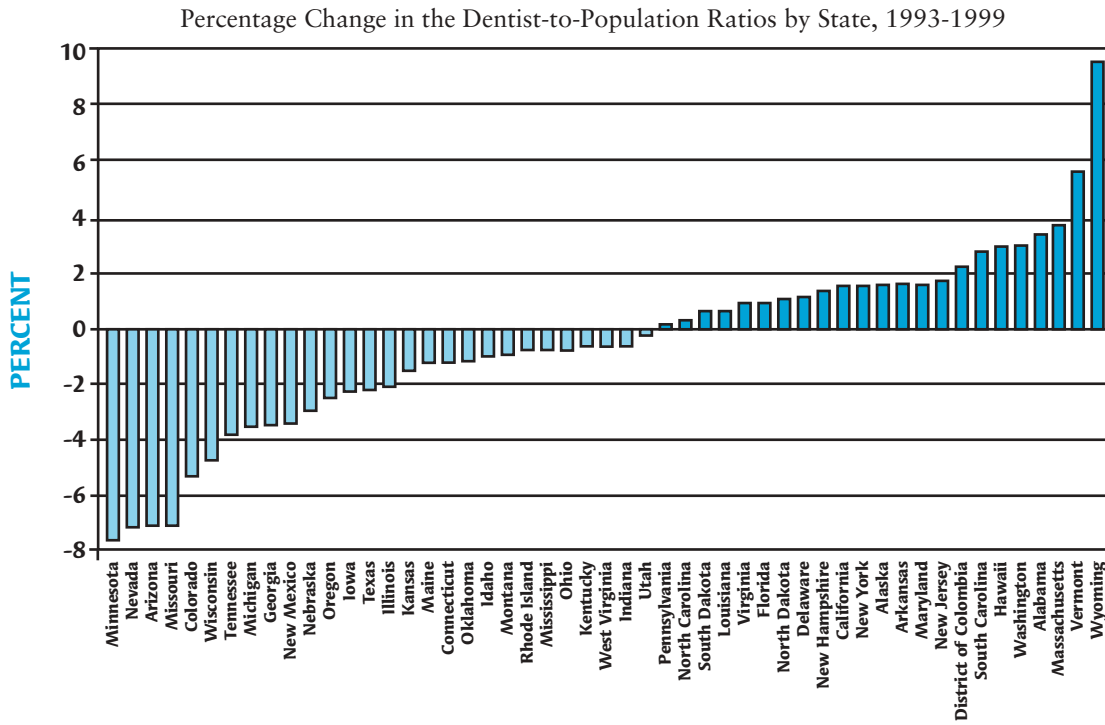
FIGURE 3.5

Percentage Change in the Number of Active Private Practitioners, by State, 1993-1999



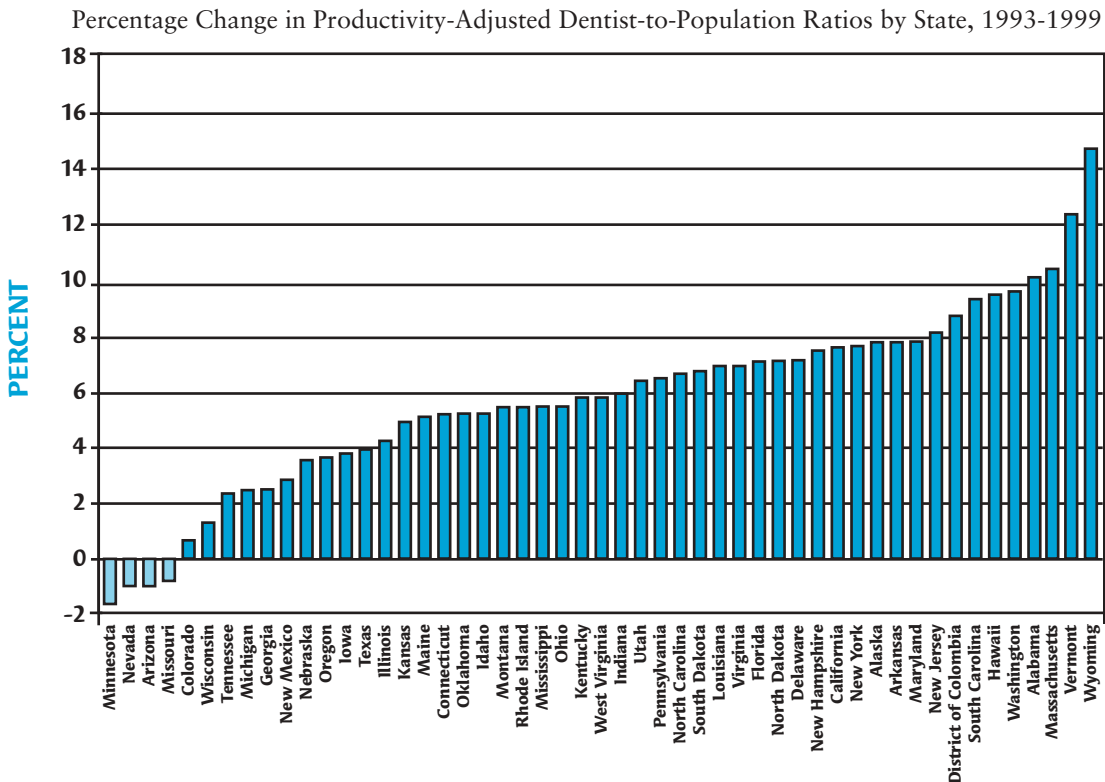
Source: ADA, *Distribution of Dentists*.

FIGURE 3.6



Source: ADA, *Distribution of Dentists*; and U.S. Department of Commerce, Bureau of the Census, 1990 and 2000 Census.

FIGURE 3.7



Source: ADA, *Distribution of Dentists*; U.S. Department of Commerce, Bureau of the Census, 1990 and 2000 Census; and Beazoglou et al, 2001.

to keep pace. Other states, such as Minnesota, Missouri, Michigan, Nebraska and Wisconsin showed declines in their dentist-to-population ratios even though their populations were not growing as quickly as the national average. The number of active dentists in those states grew little or not at all.

Nearly one-half of the United States states showed an increase in the dentist-to-population ratios. Most of these states have not expressed significant concerns regarding the adequacy of the size of their dental workforce. Some have expressed concerns that they may be entering a period of over-abundance of dentists.

As mentioned before, dentist-to-population ratios are crude measures of the adequacy of the dentist workforce and should be used with caution. Clearly, this admonition also applies to regional workforce assessments. When the dentist-to-population ratios are adjusted for productivity increases a different picture emerges (see Figure 3.7). The productivity-adjusted ratios show an increase in the productive capacity of the dentist per 100,000 population for most states between 1993 and 1999. However, some states have lost productive capacity, even with adjustments for increases in productivity.

In summary, the national dentist workforce seems to be adequate. Moreover, it can remain adequate if major new programs are not enacted, declines in dental school graduates do not occur, and productivity continues to rise. However, circumstances can change. The nation and the dental profession must follow the national workforce trends carefully and be ready to act when circumstances warrant action.

Regional workforce issues do exist and may become more pronounced in the future. However, given these widely varying workforce conditions among the states, it is apparent that one overall national policy will not fit the specific needs of various states. States with a sufficient number of practitioners will require a different policy than those states in which the number of dentists is declining. Those latter states face potentially serious workforce issues that should be addressed with their state-specific needs and circumstances in mind.

THE ORGANIZATION AND MANAGEMENT OF DENTAL PRACTICE

In 1997, 92% of active professional dentists were in private practice. Of these, 79% were sole pro-

prietors (Valachovic, 2000). Most dental school graduates plan to own their practice.

As owners of their practices, dentists must be skilled business managers as well as dedicated clinicians. They are the "CEOs" supervising production, expenses, and employment challenges of a business. As employers, dentists supervise the training, delegation of duties, and schedules for employees. This supervision also includes OSHA regulations, infection control, and waterline safety. Ethical considerations in patient management and business practices will remain an essential component to successful dental practice.

ALLIED DENTAL HEALTH PERSONNEL

The dentist's ability to expand the service capacity of his or her practice lies, in part, in the ability to delegate tasks to dental assistants and dental hygienists. Research from the 1970s has demonstrated that many functions could be delegated safely, effectively, and with quality comparable to those provided by dentists (Mullins et al, 1979; and Mullins et al, 1983).

Delegation of many functions to dental assistants and dental hygienists has proven to be beneficial to dentists and their patients (Mullins et al, 1979; and Mullins et al, 1983). As a result, the role and duties of dental assistants and dental hygienists is expected to increase.

Dental Hygienists

The number of dental hygienist graduates has increased from 3,953 in 1990 to 5,023 in 1997, an increase of 27.1% (ADA, 2000).

Although the number of graduating hygienists has increased during the past ten years, the availability of trained hygienists to dental practices appears to be reduced. In an unpublished survey of Minnesota dentists, 36% of those dentists responding indicated that they were unable to take new patients because of a lack of dental hygienists (Minnesota Dental Association, 2000). The average time required to hire dental hygienists was 23 weeks and the average time to hire a new registered dental assistant was 17 weeks in 2000 (Minnesota Dental Association, 2000).

Dental Assistants

Graduates of dental assisting programs increased

slowly through the 1990s but began declining in the 1997/98 academic year, from 5,958 in 1980 to 4,967 in 1997 (ADA, 2000).

Dental assistants are an important part of the allied dental personnel team. The American Dental Association contracted with International Communications Research to conduct a survey of allied dental workforce needs in 1999. Two-thirds of private practitioners employ full-time chairside dental assistants and more than half employ part-time chairside dental assistants (International Communications Research, 2000). In 1999, newly created positions accounted for 24.2% of hirings and in the coming year, 32.5% of responding dentists expected to fill a new chairside assistant position. The time to fill a position varied and was frequently extensive. Among those who hired a chairside assistant in 1999, it took an average of 5.3 weeks to fill the position with the majority (65.1%) indicating one to four weeks.

Many dentists perceive a problem with the availability of chairside dental assistants. Two-thirds (64.9%) of private practitioners felt there was not an adequate supply of chairside dental assistants in their area. A shortage of chairside dental assistants was reported to be disruptive to the practice and to affect the quality of patient care, have financial implications, and impact patient satisfaction. Two-

thirds (65.4%) of private practitioners felt a shortage of chairside dental assistants made it more difficult to provide quality care. Half felt it caused longer work days for dentists (50.1%) and longer appointment times for patients (50%). Nearly half (46%) indicated it caused longer waiting times for patients.

Dental Laboratory Technicians

Graduates of dental laboratory technician (DLT) programs decreased from 722 in 1989/99 to 490 in 1998/99. The number of accredited DLT programs peaked in 1984 with 59 and declined to 34 in the 1998/99 academic year. First-year student capacity is 1,016, yet first-year enrollment in 1998/99 was less than half of the potential capacity—487 students (ADA, 2000). This suggests that accredited DLT programs represent a diminishing source of technicians.

On the job training, supplemented by structured instruction and foreign-trained technicians, represent potential future sources of dental technicians. Conversely, if a shortage of DLTs becomes pronounced and overhead costs increase, United States dentists may find increasing amounts of laboratory procedures completed outside the United States.

II. CLINICAL DENTAL PRACTICE AND MANAGEMENT IN THE FUTURE

Given the improvement in the oral health of children and adults, and increasing knowledge of oral disease patterns and treatment options, it can be expected that future clinical practice will incorporate more diagnostic-based data into treatment plans along with prognosis for dental treatment (Anusavice, 1995).

For example, research suggests that patient recall intervals may need to be determined based on the susceptibility of patients to various oral diseases. Thus, as risk assessment strategies improve, high-risk individuals may require more frequent recall appointments than those at lower risk. Treatment plan presentation will continue to educate patients about their oral diagnoses, treatment options, risks and prognosis for various oral conditions.

FUTURE CHANGES IN ORAL HEALTH PATTERNS AND CLINICAL PRACTICES

Young people will experience fewer caries and this

pattern will continue into adulthood. In younger populations, individual risk assessment technology will become an increasingly applied practice (Douglass and Sheets, 2000).

The overall effects of the assumed changes will be that middle-aged and older populations will demand increased restorative, prosthodontic, endodontic, and periodontal care.

Older adults are currently retaining more of their teeth and will receive significantly higher rates of diagnostic, preventive, periodontal, esthetic, and endodontic care. For the next 20 years, these cohorts, who in earlier years experienced these high levels of disease, will continue to be high users of dental services. Services may include replacement of restorations, replacement of missing teeth, treatment of root caries, periodontal, and endodontic care.

With higher incomes and higher expectations of retaining their teeth, the demand for services from this segment of the population should remain

strong. Dental restorations have a finite life span. Materials fail, caries recur, teeth fracture, dental restorations wear, and esthetics change. The longevity of the new resin and resin-bonded restorations is yet to be determined. Implant-supported restorations will be used increasingly to replace lost teeth. Increased use of periodontal surgeries for pre-prosthetic and pre-implant treatment is anticipated as teeth retained into older age fracture and wear. Thus, it is anticipated that replacement of existing restorations will be a larger proportion of the dental practice.

Preventive services will increase as adults seek to maintain their oral health. This trend could increase significantly if research on the relationship between oral infections and systemic health strengthens.

New diagnostic and therapeutic tools to enhance risk assessment may include:

- ◆ Assessment of salivary function and cariogenic bacteria;
- ◆ Refined caries diagnosis utilizing digital radiography, optical fluorescence, and possibly ultrasound and electrical impedance;
- ◆ Selection of appropriate antibacterial therapy; and,
- ◆ Development of "smart restorations" that incorporate the release of fluorides and antibacterial agents over time.

Dental esthetic services will increase as the demand for all types of cosmetic services increase (American Society of Plastic Surgeons, 1999). An increase in implant services is also expected.

Absent major increases in third party coverage, the number of root-form dental implants placed each year in the United States will increase approximately 4% per year (about 610,000 in 2003). The much smaller number of non-root-form implants (for example, blades and subperiosteal) will gradually decrease as the availability of improved dental bone augmentation materials continues to expand care options for orofacial trauma. The convenience-driven shift from two-stage tooth-form implants to one-stage and immediate-loading designs will continue (Medical Data International, Inc., 1999). Future dental consumers will be more aware of the relationship of oral and systemic diseases, oral care products, technology, and oral health clinical services. Such information will be widely available through electronic media; and, oral health will become increasingly associ-

ated with overall health and success and achievement.

In addition to the changes in demographics and disease trends, economic factors will affect the demand for clinical services. If the economy remains strong, demand for services should remain strong as well. Even if costs increase, it is likely that more educated, affluent individuals will continue to avail themselves of both needed and elective dental services. However, an economic downturn of significance could create market force changes that could decrease the demand for clinical services, especially those of an elective nature. It is not clear what the effect of such a downturn would have on access to dental care for low income or other underserved populations.

TECHNOLOGICAL ADVANCES IN CLINICAL PRACTICE MANAGEMENT

Advances in technology are quickly transforming the dental workplace. New information management technologies and advanced diagnostic and treatment tools are improving diagnosis, patient care and patient care management. A major challenge for dental practice managers will be to achieve a coordinated, systematic, and secure approach to the integration and application of information technology. Many of the issues in sharing data and setting up such systems are not solely technical in nature, but rather involve legal, economic, and political considerations (Schleyer, 1999; and Willis et al, 1997).

The infrastructure for communicating patient information will evolve to a point where the information is readily available and where computers will anticipate the need for information and will provide it. Within the dental office, dentists will have access to all patient charts, radiographs, and other pertinent data. Scheduling likewise can occur chair-side. Computers will enhance communication between dental offices, and also between dental offices and other health care professionals.

Computers will become more effective tools for patient education both within and outside of the dental office. Scientific advances will require dentists to become increasingly techno-literate evaluators and users of new and improved technologies. More hours and a greater percentage of the typical dentist's continuing education time will be devoted to techno-literacy. This need will be partially addressed by technology vendors. However, the market for unbiased and accurate information

regarding the clinical capabilities and limitations of new technologies will continue to expand.

New technologies will be designed and marketed so that individual practitioners access their capabilities only when needed and, when possible, remotely. While computers will become smaller, less expensive, and possess more applications, dentists will invest significant dollars into information technology when it adds clear value to the practice.

Clinical Practice Management

Data collection and documentation will move to a digital form and will extend or augment what new applications in areas such as clinical decision support. New technologies will significantly improve productivity and information management.

Use of digital radiography, computerized charting, intraoral cameras, and probes for periodontal charting in the dental workspace will provide paperless charts and provide patient information anywhere in the office. Patient information such as digital x-rays, digital photos, and other documentation will be transmitted electronically to third parties for pre-authorization and treatment verification. Online adjudication, likewise, will be transmitted electronically to dental offices, greatly reducing treatment delays. Software for rapid electronic filing of claims is already available, often integrated with practice management software, and may also be provided to dental offices by claims administrators. Patients, in the future, will be able to access their own dental records electronically. Voice-activated technology will facilitate the collection of patient data, free dental assistants for other tasks, and increase the productivity of dentists and dental hygienists.

Dental practices in the future are likely to integrate electronic clinical data with practice management data. This integration of front and back office data will improve office efficiency.

A barrier to the universal adoption of such technologies is that digital information is subject to alteration and falsification. However, recent legislation, such as the Health Care Insurance Accounting and Portability Act, stipulates the use of encryption technology to safeguard the integrity and confidentiality of health care information.

Patient Diagnosis Technologies

Trends in the development of new diagnostic tools

and therapeutics combined with an aging population may require dental professionals to incorporate more medical treatment into dental practice, in addition to the traditional dental-surgical approach.

Computers will be used to facilitate the collection of clinical data and physiological parameters. Also, computers will provide analyses of collected samples (for example, saliva and tissue samples) as well as interpretation of these data. In effect, computers will provide practitioners with the data they need to make sound clinical decisions. Examples include (1) an emerging new screening tool, which images and analyzes cell samples obtained by brush biopsy and (2) the periodontal probe software that facilitates monitoring of changes.

Advanced optical technology used in diagnostics will be developed. As digital radiography software becomes increasingly refined, it will become more widely used to assess changes in bone density and changes in mineralization and demineralization of teeth and jaws.

Other technological advances that are not computer based are anticipated as well. Greater use of intraoral cameras will further enhance patient understanding of oral conditions and their treatment. New biochemical assays and interpretive methodologies are expected to improve diagnostic and prognostic capabilities.

Treatment Technologies

Computers will serve as decision-support tools in planning treatments that require the integration of multiple disciplines and types of clinical information. Software programs will help the dentist filter, evaluate, and prioritize information essential for establishing suitable treatment plans. Computers are also expected to play an increasing role in delivering care. The universal incorporation of CAD/CAM technology into individual dental practices is cost-prohibitive; however, as this technology expands, it will become affordable.

Current methods of taking physical impressions may be replaced by electronic transmission of both digital impressions and shades to dental laboratories for fabrication of customized restorations.

CAD/CAM technology is already being used in orthodontic practice for minor tooth movement. This technology could make orthodontic treatment more widely available. Advances in tissue engineering and nanotechnology will eventually result in treatment at the cellular, molecular, and atomic levels. Nanorobots and nanocomputers will enable the

regeneration of both hard and soft tissues, and through the maintenance of friendly oral microflora in the mouth, prevent the occurrence of disease (Coontz and Szuromi, 2000).

Advances in real-time visualization, miniaturization of instrumentation, and increasingly atraumatic methods will decrease the morbidity associated with invasive treatment.

Air abrasion and laser technology will find increased application. Rotary instrumentation will become more electronically driven rather than air-driven. Infection-control methods will improve.

Epidemiological Studies and Outcomes Assessment Technologies

As more patient data are stored on computers, a variety of outcomes analyses of patient records will become possible at three levels: patient, practice, and population. Computers will aid dentists in the assessment of a patient's health status over time.

Diagnostic codes will provide a basis for assessing treatment efficacy when measured against established parameters and will assist in assessing outcome data for patients and dental practices. It will be possible to collate local and regional data into larger dental epidemiological databases—important tools for assessing treatment efficacy.

Technologies for Communication with Colleagues and Patients

Advanced communication technologies may create new bridges among dentists. Advances such as videoconferencing and real-time on-line collaboration will make various forms of "teledentistry" possible and practical. Legal, licensure, and political considerations may prove more difficult to address than technical ones.

The nature of the patient-dentist relationship is likely to continue to evolve. Communication with patients will become more electronic, and also more automated. Some practice management systems already send automated recall reminders by e-mail. In the future, patients will likely have access to all or part of their own dental and medical records, and professionals will be able to exchange patient records electronically.

The Dental Workplace

Dental equipment will become more ergonomi-

cally friendly and more amenable to infection-control practices. Manufacturers will develop methods to further minimize biofilms in waterlines. Magnification, either through surgical microscopes and/or conventional magnifying eyeglasses, will increase in use. Equipment and instruments will become smaller and central delivery units will be available with ports that allow simple hookup for an array of mobile equipment for specific procedures. When not in use, this equipment would be stored outside of the operatory.

The Dental Workforce

Many factors will affect the required number of dentists. Aging and demographic changes in the dentist workforce need to be carefully evaluated on a continuing basis. Dentists' productivity should be monitored. The availability of allied dental personnel is critical.

Demand for dental services also plays an important role in workforce requirements. Dental expenditures are the usual measure of demand. Predicting growth in per capita dental expenditures is difficult because it depends on the growth in the overall economy, socioeconomic shifts in the population, changes in therapeutic and preventive interventions, and the impact of changing oral disease rates as well as dental fees. If major new funding programs become available or if major new treatment opportunities emerge, per capita utilization may increase. If, as younger Americans grow older, they need fewer dental services because they have experienced less oral disease than earlier generations, per capita utilization may decrease. The same could result if major new preventive breakthroughs materialize. If the demand for dental services grows more rapidly than expected, an increase in the supply of dental care services may be needed to meet that increased demand. Alternatively, if demand does not grow rapidly, dental care capacity could be adequate.

Unless trends change, there could be increasing difficulty in attracting students to dental assisting and dental laboratory technology programs. Retention issues related to dental hygiene could continue unless some action is taken.

Given an uncertain future, flexibility is a desirable strategy for workforce policy. If more dental capacity is needed in 2020 than available through productivity increases, an attractive workforce option is to increase the number of allied dental

personnel working with dentists. As mentioned in the previous section, the payoff in productivity would be substantial. This is a cost-effective way to generate additional dental services, without the training expense and long-term commitment necessary to increase the number of dentists.

It is worth repeating that regional issues do exist and may become more pronounced in the future. However, given these widely varying conditions among the states, it is apparent that one overall national policy will not fit the specific needs of various states. States with a sufficient number of practitioners will require a different policy than those states in which the number of dentists is declining. Those latter states face potentially serious issues that should be addressed with their state-specific needs and circumstances in mind.

Educational Technology

Technology will have a significant role in the new system for professional development. Through the assistance of the electronic medium, dentists will be able to supplement areas of care through a diagnosis of their own learning needs. Once the practitioner's desired knowledge base or skill level is determined, a customized curriculum could be developed and accessed. Advanced educational technologies will also present new opportunities for learning. Self-customizing educational software will assess the knowledge level, ability, and maybe even the learning style of the learner—whether novice or expert—and customize itself to his or her needs. This could result in a significant increase in the effectiveness and efficiency of the learning process.

Simulations, virtual reality, and other innovations will make new ways of learning available (for example, virtual dissection, diagnosis, and treatment).

Professional Development and Continuing Education

Given the rapid rate at which research and technology is expanding the scientific and practice knowledge base, continuous development of cognitive and clinical skills will be a standard expected of tomorrow's practitioners. The cycles of learning and practice will shorten.

A new system of professional development directed by dental schools, licensing boards and dental industry will be required to keep pace with the

explosion in science and technology. Dental schools and professional dental associations will continue to lead the way with more structured, organized systems involving curriculum, competencies, and outcomes.

The traditional lecture format will be increasingly supplanted by self-directed learning with measurable outcomes. A more highly organized system of curriculum, competencies, and outcomes will be needed to facilitate learning that keeps pace with new developments. Ideally, this system would be designed to serve as a basis for continued competency as well as quality assurance. It will be essential that the ADA and/or the Commission on Dental Accreditation develop criteria and guidelines for learning programs and paths established for licensed dentists. Appropriate evaluation of curricula and outcomes, and measures such as certification, would be necessary to ensure validity, content, quality, and methods.

Professional development will be more custom-ized and available in multiple formats from a variety of sources. There will be less interruption of the practice while the dentist learns new skills. A potential downside to technology-based learning might be to further disengage practitioners who already conduct their practices in relative isolation. Professional development will continue to be selected based on the value it adds to the dental practice and the improvement it has on the health of the patient.

Specialty Practice

New technology and procedures may drive additional groups of clinicians to seek recognized specialty status. The overlap of practice scope between dental specialties and between dental and medical specialties will continue.

Although most dental care will continue to be provided by general dentists, it is plausible that self-referral to specialists may increase somewhat—as the typical American grows older, better educated, wealthier, and shows greater interest in health issues. This trend will increase the overall demand for "specialty care" and may result in a need for more practitioners in some specialties. However, it seems likely that general dentists will perform more clinical tasks traditionally associated with specialty practices.

Assuming continued economic prosperity in the United States, there will be a need for dentists trained in preventive care, treating underserved pop-

ulations, orthodontics, periodontal services, endodontic services, and oral and maxillofacial surgery.

The demand for preventive dental services is expected to continue to grow. Preventive dentistry needs will be strengthened if it is clearly demonstrated (by intervention studies) that improved oral health leads to improved cardiovascular, respiratory, endocrine, and reproductive well-being. Indeed, well-demonstrated oral-systemic links could profoundly affect the traditional dental delivery model in the United States (Loesche, 2000). If these studies result in significant increases in third party dental coverage, this could produce a sudden, large, and disproportionate increase in the percentage of dental users. Such a scenario would further augment the demand for oral preventive services.

Although caries rates have declined in children, the need for dental services provided by pediatric dentists will likely increase due to the higher caries rates in young children (newborn to two years), special needs patients and low-income children (USDHHS, 2000a). This trend will be amplified by an increased tendency of Americans to avail themselves of the services of pediatric dentists as consumer awareness and average wealth increases.

The need for practitioners treating the underserved and public health dentists will increase as the numbers of underserved populations increase. Also, the need for community-based preventive and service programs will require increased numbers of public health dentists and practitioners treating the underserved.

Orthodontics for both children and adults will continue to thrive. Combined surgical-orthodontic protocols will continue to benefit patients with complex needs. Pediatric dentists, general dentists, and periodontists will continue to perform some adjunctive orthodontic procedures.

The need for periodontal services will continue to increase. New computer-based technologies will likely make treatment more affordable.

A growing demand for regenerative and cosmetic periodontal plastic surgery will also contribute to this demand. Moreover, the increasingly well-publicized link between oral infection and systemic health will result in dentists assuming a larger role in clinical oral medicine in collaboration with physicians and other providers (McFall, 1989). Perio-

dontal services will be performed by periodontists, general dentists, and to a limited degree, dental hygienists. The growth of esthetic dentistry may increase the need for more endodontic care. Endodontists and general dentists will continue to perform the bulk of endodontic procedures. The demand for endodontic services will remain high as many patients opt to maintain teeth rather than accept extractions.

The percentage of the population that is completely edentulous will decline in the future, however, the absolute number of individuals with at least one edentulous arch will increase through 2020 suggesting that the demand for traditional removable prosthodontic services will not decrease in the short term.

The demand for fixed prosthodontic services is expected to remain strong. A major medical breakthrough that significantly increases life span would increase the aggregate demand for prosthodontic services. The surgical placement of dental implants will remain part of the specialties of both periodontics and oral and maxillofacial surgery. Surgical placement of implants by prosthodontists and general dentists will continue to increase. Prosthodontists and general dentists will continue to direct the scope of implant restoration.

The scope of practice of oral and maxillofacial surgery will continue to expand. With a number of training programs offering a medical degree and additional training in facial reconstructive and plastic procedures, the boundaries between the specialties of oral and maxillofacial surgery, otolaryngology, and plastic surgery will continue to blur.

Dental Care Delivery

The dominant dental delivery modes will continue to be solo practices and small group practices (Valachovic, 2000). Special needs populations, such as medically compromised patients and nursing home residents, have access problems that extend beyond funding. Models of care delivery, such as school-based programs, hospital dental programs, mobile dental service, and portable dental practices will be needed to meet the oral health needs of these individuals. Health science centers with a critical mass of oral health expertise will become repositories for meeting the needs of complex patients.

III. PATHWAYS AND STRATEGIES FOR CLINICAL DENTAL PRACTICE AND MANAGEMENT IN THE FUTURE

The guiding vision for this discussion has been that in ten to fifteen years, every individual who needs oral health care will access that care from oral health care providers who are educated and skilled in the current best practices using the latest and most appropriate technology.

Achieving this vision requires a strategy that addresses the availability, accessibility, and acceptability of oral health care. The pathway is apparent: the future promises the diagnostic and technological advances necessary to improve the oral health of the entire United States population. There is new understanding of the etiology and pathogenesis of oral diseases and oral disease prevention, diagnosis, and treatment. Dentistry is experiencing improved efficiencies in practice, integration of computers into practice, and enhanced information transfer.

The objective is to make oral health care available, accessible, and acceptable to all. A key pathway toward achieving this objective is the development of suitable facilities and personnel.

Strategies to assure available facilities and personnel should begin with a comprehensive and ongoing assessment of the dental professional workforce. Additionally, the current dental workforce models should be continually evaluated, updated, and refined so that the most accurate predictions possible are available for the number, type and distribution requirements of dental personnel.

The dental profession, in collaboration with dental schools, federal and state governments, and private foundations, should develop endowed programs for scholarships and debt relief to enhance recruitment of lower-income, academically qualified students into dental education (DDS, DA, DH) to assure diversity in the dental workforce.

Stipend support and positions for post-graduate residency training must be made available to increase the numbers of dentists capable and willing to provide care to low-income and special needs populations.

Collaborative broad-based strategies for increasing the availability of all allied health personnel and insuring their retention in the dental workforce are needed. Recruitment should begin early, include traditional and non-traditional students, and, if necessary, extend to international efforts.

Increasing the number of dental hygienists and

dental assistants through recruitment and retention initiatives can enhance the productive capacity of the dental workforce. The dentist should remain responsible for diagnosis, treatment planning and assessment and supervision of delegated duties.

A task force should be convened which includes the dental profession, the dental laboratory industry and dental laboratory schools to address dental laboratory personnel recruitment, training and retention issues.

While the dental delivery system may continue as a predominantly private, solo practice model, new models are needed that expand capacity and provide quality care for the entire population including low-income, medically compromised, physically challenged and nursing home residents.

Strategies to assure that appropriate skills, knowledge, technology, and best practices are available and applied to dental care should begin with efforts to assist dentists.

Computers and associated information technology will become increasingly important in:

- ◆ Data collection, documentation and transmission;
- ◆ Diagnosis and treatment;
- ◆ Outcomes assessment; and,
- ◆ Communication with patients and colleagues.

Scientific advances in diagnostics and treatment as well as information technology will require dentists to become more techno-literate and sophisticated in their evaluation and application of such technology.

Efforts also should be undertaken to ensure the timely transfer and incorporation of new technologies into dental practice to enhance the effectiveness and efficiency of information transfer and clinical care. Application of systems that protect the confidentiality of patient information between dentists, dental specialists, physicians and other health care providers must be promoted.

As the use of diagnostic codes increases, dental practices will be in a stronger position to contribute to the development of the knowledge base of dentistry (i.e., outcomes of care) and eventual patient care modalities. Databases amassed from dental

practices will augment epidemiological, clinical and laboratory research endeavors.

Strategies to assure the acceptability of oral health care in the future should involve strong, collaborative efforts by the appropriate arms of the dental profession and other parties of interest to develop a long-range strategy for increasing the diversity of the dental workforce. Further, changing population demographics will require assessment and evaluation of risk-based care and, in the aging population, a greater understanding of chronic medical conditions.

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Financing of and Access to Dental Services

4

CHAPTER OVERVIEW

Most Americans today receive the oral health care services that they need and want. As noted in Chapter 2, the nation's overall oral health is improving. The inflation rate for dental services has been moderate, and dental care accounts for a smaller proportion of overall economic resources compared to previous generations.

Indeed, the near- and long-term outlooks for the affordability and accessibility of dental care for the majority of Americans remain excellent, a situation that owes in no small part to dentistry's outstanding record of prevention, efficiency and cost-control. However, dental care has not reached every corner of American society to the extent it has reached the majority of Americans.

Millions of children and adults from low-income families, people with disabilities, and the low- and fixed-income elderly—especially those in nursing homes—among others, have difficulty obtaining dental care. This is especially unfortunate because most oral disease is easily and economically prevented and treated. Providing basic preventive and restorative care to these groups is achievable, provided that law- and policy-makers at the state and federal levels are willing to work with the dental profession, other members of the health community and other stakeholders toward that goal.

The market for dental services is a well-functioning, competitive market. The overall performance of the general economy influences dentistry just as it does other sectors. Market conditions within and outside dentistry affect the amount and types of services provided, the geographical distribution of dentists, average income levels of dentists and auxiliary personnel, the financial strength of dental practices, and the number of applicants to and graduates from dental schools.

For the purposes of this discussion, access is viewed as the means of approaching and entering into the use of dental services. The availability of dental care does not, in and of itself, constitute access. Rather, access occurs when care is available and people are able and willing to utilize it. Access to dental services in the United States is a matter of degree. Not surprisingly, people in middle and high-income groups, those with extended education, and those who live in areas with abundant dental personnel have greater access to care. For individuals with meager incomes, especially those who live in areas with few dental personnel, access is more difficult. For individuals who have disabilities and other special problems, access to care can be exceedingly difficult.

This chapter discusses the trends in dentistry, the status of dental health in America and identifies future challenges for the financing of and access to dental care, including:

- ◆ Status of oral health in the United States;
- ◆ Unmet needs for dental services and the major barriers that prevent some people from receiving the dental services that they need and want, and how these barriers can be reduced or eliminated;
- ◆ Demand for dental services, changes in demand in recent years, and future patterns of demand; and,
- ◆ How people pay for dental services, important trends in the demand for dental prepayment, and how changes in dental prepayment may impact use of dental services and access to dental services.

I. FINANCING OF AND ACCESS TO DENTAL CARE TODAY

Any discussion of access and financing in the dental sector must begin with an assessment of the oral health of the nation. The goal of the dental profession is to produce optimal oral health for all Americans as efficiently as possible. Improvement in oral health is an important indicator of dentistry's progress toward that goal.

Changes in the oral health of the population also have a significant impact on the demand for dental services. As fewer Americans experience dental disease, and as the severity of the disease declines among the people who have it, fewer and less expensive dental services should be required to treat oral conditions. Additionally, the maintenance of oral health and the treatment of disease, when it occurs, are important elements in the patients' demand for services. In addition, as stated in the Surgeon General's report, oral health is integral to general health (U.S. Department of Health and Human Services, 2000).

NATIONAL TRENDS IN ORAL HEALTH

During the past 20 years there has been dramatic improvement in the oral health of the American population. Children have fewer dental caries than ever before. Comparisons of findings from four national probability surveys demonstrate that the number of dental caries has declined substantially. For the first time, recent analysis shows reductions in caries also have occurred among American adults (Brown et al, *In Press*; Brown and Swango, 1993). The number of untreated carious lesions has been reduced by almost one half since the early 1970s. This reduction occurred in all age groups from 18 to 45 years.

Caries is the dental disease that historically has engaged the most dental personnel and resources. Caries reduction has translated into adults requiring fewer restorations.

Untreated Caries in Permanent Teeth of Children

The average number of untreated carious permanent teeth among children age 6 to 18 years dropped by 76.9% between 1971-74, as measured by NHANES I¹, and 1988-94, as measured by NHANES III¹ (Brown et al, 1999). The decrease

represents a reduction of just over one untreated carious permanent tooth per child. In 1991, the midpoint of the NHANES III survey, there were approximately 45,605,000 children in this age category. Untreated caries in children declined by nearly 50 million teeth in this age group. The categories with the highest levels of untreated carious teeth in NHANES I experienced the largest absolute declines from NHANES I to NHANES III. Percentage decreases of 75-80% were achieved in all main categories of age, gender, poverty and race.

Although disparities based on income and race continue, absolute differences between these groups have narrowed markedly. African Americans had rates of untreated caries twice as high as Whites in NHANES I and NHANES III. However, the absolute disparity between African American and White children in the number of untreated dental caries declined to 0.24 teeth (NHANES III) from 1.12 teeth (NHANES I).

Children living in poverty continued to have more untreated carious lesions in their permanent dentition in the early 1990s than did non-poor children. Nevertheless, these children also experienced dramatic improvement both in the percent without caries, the average number of untreated carious permanent teeth, and in the extent of untreated caries among those with the condition. As illustrated in Figure 4.1, the difference in the average number of untreated carious teeth in children at or below the poverty level compared to those above 300% of the poverty level narrowed substantially between NHANES I and NHANES III, from 1.36 teeth to 0.35 teeth (Brown et al, 1999).

Although the condition of carious permanent teeth among children represents an oral health problem, its prevalence and extent have diminished for all poverty and race categories examined. During the two-decade interval between the two NHANES studies there has been a substantial improvement in the prevalence of untreated carious permanent teeth among children 6-18 years old.

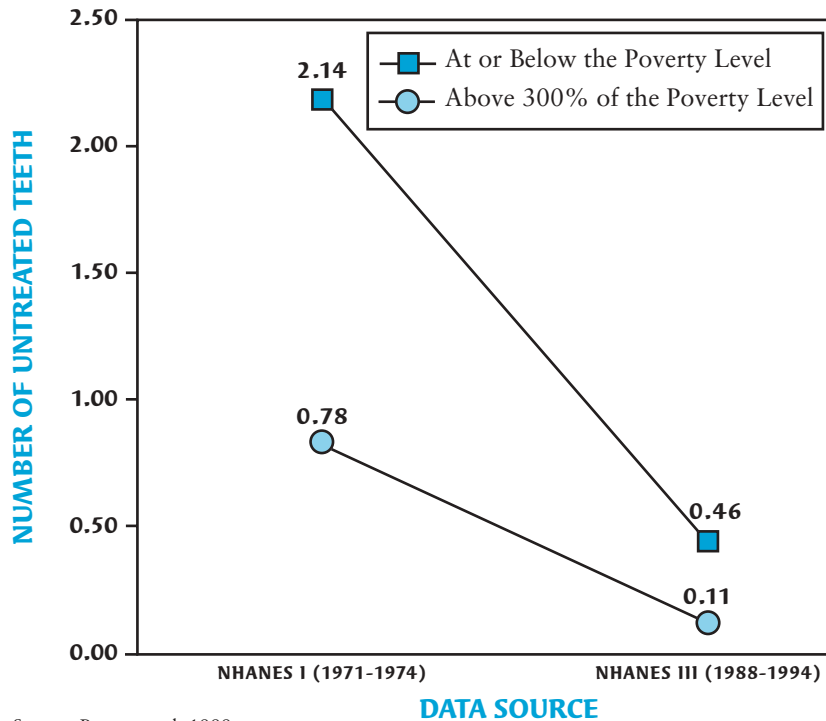
Untreated Caries in the Primary Teeth of Children

Children aged two to ten years old also have

¹ Data reported and discussed here are based on analysis of data from two of the National Health and Nutrition Examination Surveys, or NHANES I and NHANES III. The NHANES is a periodic survey conducted by the National Center for Health Statistics of the Centers of Disease Control and Prevention. A major purpose of this survey is to measure and monitor indicators of the nutrition and health status of the United States' civilian, noninstitutionalized population.

FIGURE 4.1

Average Number of Untreated Carious Permanent Teeth
Among Children 6 to 18 Years Old at or Below the Poverty Level
Compared with Those with Income Above 300% of the Poverty Level



Source: Brown et al, 1999.

shown improvement in the amount of untreated caries in the primary dentition (Brown et al, 2000a). Overall, the average number of untreated carious primary teeth dropped 55.6% between the NHANES I and NHANES III studies. This improvement occurred in both the group two to five years old (primary dentition period) and the group six to ten years old (mixed dentition). Untreated caries in primary teeth has diminished both in prevalence and extent across time for broad segments of two to ten year old children (African American and White, male and female). However, the reduction in untreated decay among children aged two to five years old who were at or below the poverty level was not found to be statistically significant.

Cumulative Caries

Trends in cumulative caries experience (both treated and untreated caries) and the percent of caries that was treated also demonstrate improvement for both the primary and permanent dentitions

of United States children between the early 1970s and the early 1990s (Brown et al, 2000b). However, the extent and scope of the improvements are somewhat different in the two dentitions (primary and permanent).

Cumulative caries in permanent dentitions declined by over 60% among the 6-11 year olds and over 50% among the 12-18 year olds. These improvements were seen in children living below the poverty level as well as children living above poverty.

Cumulative caries experience was less diminished in the primary dentitions of United States children, aged two to ten years old. This was especially true of preschool children among whom only primary teeth typically are present. The amount of caries in children, aged two to five years old living below poverty was the same in the early 1990s as it was in the early 1970s. Among children living above poverty the picture was somewhat better.

Their average cumulative number of decayed or filled primary teeth declined from 1.16 to 0.78.

Adult Edentulism

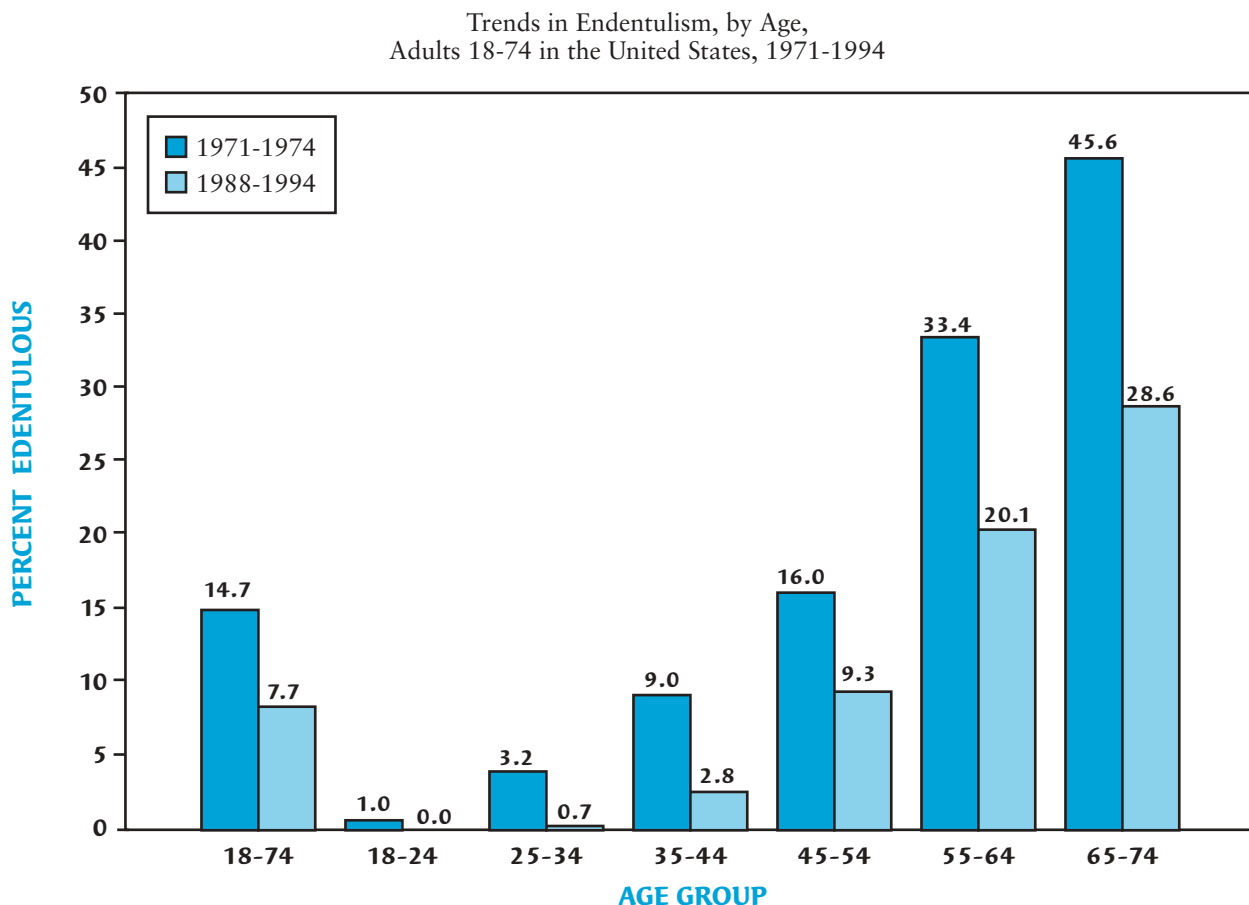
Adults of all age groups are retaining more teeth. As shown in Figure 4.2, total loss of teeth or edentulism occurs in a smaller percentage of today's elderly Americans compared to previous generations (Brown and Lazar, 1998). Despite the significant decrease in complete edentulism, almost 30% of the population over 65 years old are edentulous and will require substantial care.

ACCESS TO DENTAL CARE SERVICES

Most Americans can and do access dental services, and the dental care delivery system efficiently provides care for those who demand it. Nevertheless, important barriers impede access for too many people.

Most policy analyses of access to dental care have focused on two approaches: a "demand approach to

FIGURE 4.2



Source: Brown and Lazar, 1998.

dental care" and a "needs approach to dental care." The two concepts derive from very different disciplinary frameworks (Tuominen, 1994).

A clear distinction must be drawn between demand and unmet need for services in order to understand how future access to care is likely to evolve and what interventions are likely to be effective in altering access to care for some subpopulations in the future.

Unmet Need Approach for Determining Access to Dental Services

The need-based approach uses normative judgments regarding the amount and kind of services required by an individual in order to attain or maintain some level of health. The level of unmet need in a society is usually determined from health level measurements based on epidemiological founda-

tions or other research identifying untreated dental disease. The underlying assumption is that those in need should receive appropriate care. Once the level of need is determined, the quantity of resources that should be devoted to such a social problem is then determined based on a matching of unmet need and appropriate care.

Evaluation of unmet need is important for identifying populations in which access, for whatever reason, may be a problem. Epidemiological and health research in dentistry are designed to identify population-based dental care problems such as segments of the population with unmet need. An understanding of the economic and social conditions surrounding such groups, their reasons for not seeking professional dental care, and the role that price plays in determining effective demand helps analysts to identify weaknesses in the existing care system and establish a foundation for effective remedies.

In private practice most care is provided to those who are willing and able to pay the dentist's standard fee for the services rendered. Individuals with unmet needs who are unable or unwilling to pay the provider's fee generally do not effectively demand care from the private practice sector. These individuals with diseases not treated in private practice are likely targets for new public policies intended to improve their access to care. To be effective these new policies must have the necessary resources to translate unmet need into effective demand. With existing programs, too often such resources are inadequate (Barnett and Brown, 2000).

Demand Approach to Dental Care

Since most dental care in the United States is provided through private markets, an assessment of the demand for dental services is important for understanding access to dental care (Brown, 1989; Brown and Lazar, 1998; and Tuominen, 1994). The demand for dental services is significantly responsive to changes in dental fees - the higher the fees, the lower the demand. Other factors that influence the level of demand include income, family size, population size, education levels, prepayment coverage, health history, ethnicity, age, and other conditions.

Most factors that positively influence demand for dental care have been expanding. The United States economy has grown robustly for most of the past two decades, resulting in an increase in discretionary income among Americans (Beazoglou et al, 1993; Brown et al, 1994). People are becoming more knowledgeable about dental health and what is required to maintain it. As the population has become more affluent and educated, the value placed on oral health has increased. In addition, the desire for esthetic dentistry has grown and will probably continue to do

so. All of these factors have enhanced the demand for dental services. Disease levels and trends also are important to obtain a complete view of the conditions influencing the demand for care.

Dental caries has been the primary foundation of the demand for dental services in modern times and as shown earlier, dental caries has been declining in almost all segments of the child population and to a lesser degree in adults up to about the age of 45 years (Brown, 1989; Brown et al, 2000a; Brown et al, *In Press*). With this decline comes a decline in the need for dental services to treat caries. The population 45 years of age and older experienced caries in substantial amounts during their younger years and will require continued management of the consequences of the original caries.

Due to changing disease patterns, the dental sector is going through a transition from a service mix that has been predominately therapeutic to a service mix that will be mostly preventive. As seen in Table 4.1, cleanings and examinations more than doubled between 1959 and 1999, while amalgam

TABLE 4.1

Percentage of Patients Receiving Selected Dental Services from Private Practitioners in the United States, by Year

Procedure	1959	1969	1979	1990	1999*
Oral Examination	20.1%	27.8%	30.1%	42.8%	45.4%
Prophylaxis	19.9	25.5	24.9	38.6	37.2
Fluoride Treatment	0.9	4.0	6.8	9.8	10.6
Amalgam, 1 Surface	20.1	15.9	8.5	5.3	3.0
Amalgam, 2 Surfaces	20.6	16.4	9.6	7.2	4.0
Crown	1.6	2.9	5.2	5.3	5.9
Root Canal	1.7	2.9	3.2	2.6	3.3
Extraction	13.0	9.8	5.4	4.9	3.7
Resin - Anterior	NA	NA	NA	4.4	4.2
Resin - Posterior	NA	NA	NA	1.9	4.8

* The data for 1999 were derived prior to the publication of the ADA 1999 *Survey of Dental Services Rendered* report; and may, therefore, differ slightly from the published report. Source: ADA, 1994 and 2001.

restorations declined by 75% (American Dental Association [ADA], 1994 and 2001). The decline in amalgams is partly compensated by an increase during the 1990s in the number of posterior resins and other cosmetic materials provided, a trend that should continue in the future.

A study by Eklund et al, also reports these service mix changes (Eklund et al, 1997). In an insured population, there were marked declines between 1980 and 1995 in restorations, crowns, dentures, and extractions. Endodontic procedures declined in younger patients but were stable or increasing in older patients. Over the same time period, there were increases in diagnostic, preventive, and periodontal services (Eklund et al, 1997). Changes of this magnitude will have profound effects by reducing the demand for some services and enhancing the demand for others. The total effect of changes in disease patterns is likely to diminish overall demand but other factors, such as a growing economy, are likely to increase demand. The timing and impact of these factors, in combination, on the demand for dental services are not well understood.

FINANCING OF DENTAL SERVICES

This section discusses the financing of dental services as part of the evaluation of the universal and greatest barrier to receiving care; that is, cost.

Total dental expenditures in 2000 were about \$60 billion. Nominal expenditures have increased at annual rates ranging from 5-7% since 1982. Real expenditures have increased at 1.4%. The increase in real dental expenditures has been slightly less than the rate of growth in the real Gross Domestic Product (GDP) over this period. The major drivers of dental expenditures are the general wealth of the population, employer and public contributions to dental prepayment premiums, the perceived need for and value of dental services, and oral health status.

Dental Care Payment Arrangements Influence Demand

An important factor related to the demand for dental services, and thus access, is the availability, extent and character of third party financing for services (Tuominen, 1994). Individuals who value dental services are willing, under certain conditions, to have prepayment plans purchased on their behalf

by their employers. Employers as the purchasers of prepayment plans shape the demand for dental prepayment. They seek to provide employees with desired benefits while at the same time attempting to control the costs of fringe benefits for their companies.

Several factors determine the demand for dental prepayment (Feldstein, 1978). Other than premium cost, another factor that affects the demand for dental prepayment is family financial resources. Other things being equal, families with larger incomes will express greater demand for dental prepayment. The value that an individual places on good oral health also influences the demand for dental prepayment and the demand for dental care. In turn, the value that an individual places on oral health is influenced by income, education and cultural factors.

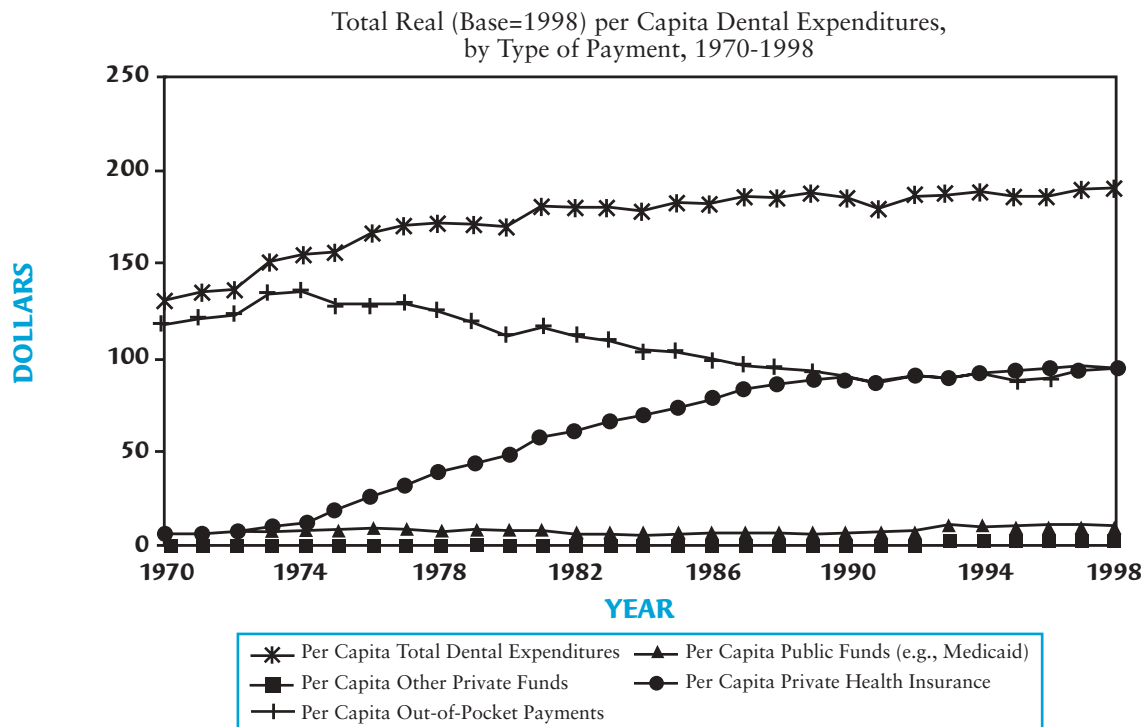
More specifically, dental coverage is generally viewed as a method of prepaying comparatively small, predictable expenses rather than insuring against large, unpredictable expenses. Since dental prepayment is often viewed as a budgeting mechanism rather than insurance, this raises the issue of whether the vast majority of Americans could access dental services even without dental prepayment. This may be the case. In fact, for many years dental prepayment was rare; only in the last thirty years has it become widespread. As shown in Figure 4.3, private dental prepayment expenditures have been increasing over the last 30 years; although leveling off in the late 1990s (Health Care Financing Administration [HCFA]). Nevertheless, most observers believe that dental prepayment enhances demand for dental services and would not be available if people did not value it.

Sources of Payment for Dental Care

Four basic sources of funds to pay for dental care are employer-based prepayment plans, direct patient payment, public prepayment, and free from the provider (e.g., charitable) services.

Health Care Financing Administration (HCFA) data indicate that until the early 1970s, more than 95% of the cost of dental care was paid for directly by patients (Figure 4.3). Through the 1970s and the 1980s, employer-based private prepayment grew rapidly. By the early 1990s more than 40% of all Americans were covered by some form of private dental prepayment. Direct patient payments, as a proportion of total financing, has declined. Today, self-pay and private prepayment account for nearly

FIGURE 4.3



Source: Health Care Financing Administration and U.S. Department of Labor, Consumer Price Index, Bureau of Labor Statistics.

equal amounts of payment for dental care, each at about 47% of the total, with government-financed care accounting for 4%, and other private funds accounting for about 2%. (HCFA expenditure data do not include free/charitable dental services.)

As noted, private prepayment dental plans enhance demand for care, and thus, access. Prepayment encourages people to receive routine preventive care and early detection of dental problems. Enrollment in employer-based dental prepayment is about 105 million people and has increased slowly in the past 10 years with the expanding economy. As part of the general shifts in the financing of dental care, membership in indemnity plans is declining and enrollment in Preferred Provider Organizations (PPO) is increasing. However, Dental Health Maintenance Organization (Dental HMO) plan membership is not growing at the same rate as PPOs. To date, capitated managed care has had relatively little impact on dental expenditures in most geographic areas of the country.

Public financing of services for economically disadvantaged populations has remained fairly constant. Annual federal and state government dental

care payment for the 35 million people eligible for Medicaid is about \$40 to \$70 per person compared to the approximately \$200 to \$300 per person spent among the non-poor. While improvements are being made in some states, Medicaid reimbursement levels, ranging from 10-50% of market fees, are grossly inadequate.

Patients pay approximately 47% of total dental expenditures, or \$25.8 billion (HCFA). This includes cost sharing and contribution to premiums for patients with dental prepayment and the full out-of-pocket payments for those without prepayment. This pattern of out-of-pocket patient costs has been relatively stable for the past 10 years.

Federal and state government payment for dental services was \$2.3 billion in 1998, 4.2% of total dental expenditures (HCFA). Most public funds support state operated Medicaid programs for low-income individuals that meet state program criteria. Medicaid dental services support is provided mainly to children. Few states cover indigent adults for basic dental services.

On average dentists receive less than half their usual and customary fees when paid by Medicaid

(United States General Accounting Office, 2000). The 1997 State Child Health Insurance Program (SCHIP) extends public funds to approximately 10 million near-poor children. Enrollment in this program has only reached 25% of the target population (HCFA, 2000).

A few states (e.g., Indiana and Michigan) have substantially increased dental Medicaid fees and expenditures and improved program administration. These changes have led to significant growth in dentist participation, patient utilization, and total expenditures (Drs. Stephen Eklund and Mark Mallat, Personal Communication, September 1, 2000).

Medicare covers dental services only when associated with the treatment of medical conditions, although some medical managed care plans offer limited dental benefits to attract elderly enrollees. In 1998, the Medicare program provided \$200 million for dental care (HCFA).

Approximately 110 million Americans have private dental prepayment (Wassenaar, 2000). From the late 1980s until the present the percentage of employees with dental prepayment declined modestly (Blostin and Pfunter, 1998), but the trend has reversed in the past several years of strong economic growth (Long and Marquis, 1999). Although less than half of the population has private dental prepayment, these patients account for 60-65% of patients in the average dental office (ADA, 1998). Dental expenditures and sources of financing information also are available from the 1996 Medical Expenditure Panel Survey (MEPS) (Cohen, 1997) and the 1987 National Medical Expenditure Survey (NMES) (Edwards and Berlin, 1989). These data allow for breakdowns of dental expenditures by major demographic variables such as age and income, which are not available from HCFA.²

The 1987 NMES survey indicates that \$1.6 billion, 5.0% of total expenditures, was provided without charge to the patient by providers (Manski et al, 1999). This estimate includes charitable care, professional courtesy, and bad debt. When this estimate is adjusted to 1998 dollars, it amounts to \$2.9 billion or \$19,936 per dentist. This compares favorably to the estimated \$2.0 billion (1998 dollars), 3.7% of total expenditures, from public sources for 1987.

Another estimate of the size of the charitable component of free care is available from the ADA's

1997 *Survey of Current Issues in Dentistry* (ADA, 1998). This survey indicates that 73.5% of private practitioners provided some charitable care in 1996. The total estimated value of this care is \$1.3 billion (1998 dollars). The average amount of charitable care per dentist (based on all private practice dentists in the United States) was \$8,637 (1998 dollars). The total value of charitable care is equivalent to about two-thirds of total expenditures from public sources reported above using the 1987 NMES data.

In addition, dentist volunteers have been providing care to needy patients through Donated Dental Services programs sponsored by state dental societies (Fox, 2000). According to the National Foundation of Dentistry for the Handicapped, Donated Dental Services programs are active in 26 states, include about 8,000 volunteer dentists, and have provided free care to about 30,000 persons at an approximate value of \$34 million.

Types of Dental Care Payment Arrangements

EMPLOYER-BASED PAYMENT PROGRAMS

Figure 4.4 presents estimates of the number of people enrolled in three types of private, group dental prepayment plans for the past six years: indemnity, PPO, and Dental HMO (National Association of Dental Plans, 2000).

INDEMNITY INSURANCE PLANS

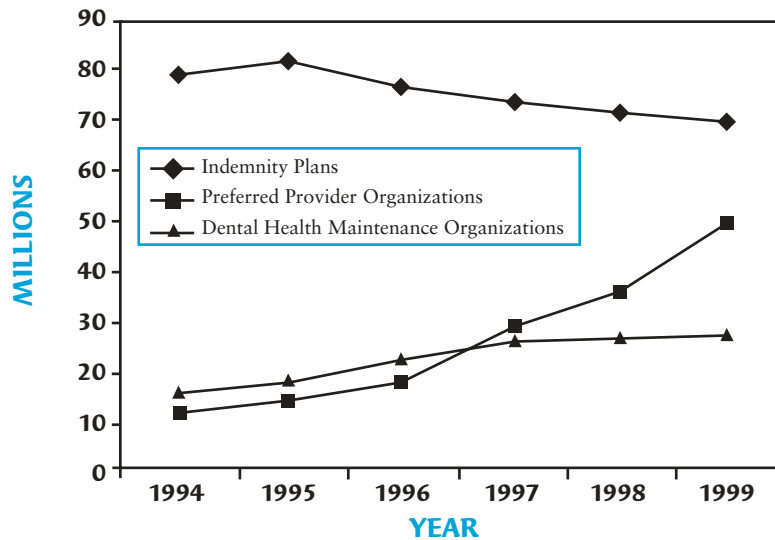
In the past, indemnity plans have been the dominant form of employer-based prepayment. Under the provisions of indemnity style coverage, the third party payer provides payment of a specified dollar amount for defined services, regardless of the actual charges made by the provider.

As recently as 1994, 75-80% of employer-based prepayment enrollments were estimated to be with indemnity plans. Dental HMO and PPO plans together represented only about 20% of enrollment. By 1999, about half of all people with group private dental prepayment were enrolled in indemnity plans. In absolute terms, the decline in the number of people covered by indemnity plans has been more modest, from about 80 million in 1994 to about 66 million in 1999.

² Dental expenditures in the 1987 NMES are based on charges. In the 1996 MEPS dental expenditures are based on the sum of payments for care received. Fortunately the 1996 MEPS also includes a measure of charges. In order to maintain consistency in terms of what is being compared over time, the results presented in this section are based on the total charges for dental services.

FIGURE 4.4

Enrollment in Indemnity Plans, Preferred Provider Organizations, and Dental Health Maintenance Organizations for Members with Employer-Based Prepayment, 1994-1999



Source: National Association of Dental Plans, 2000.

MANAGED CARE PLANS

Preferred Provider Organizations have experienced 20-30% annual growth in membership from 1994 to 1999. In contrast, enrollment in Dental HMOs leveled off in 1997 to about 19% of the employer group prepayment population. Forty-seven percent of Dental HMO members are from three states: California, Florida, and Texas (National Association of Dental Plans, 2000).

Dentists who participated in PPO plans reported that just over one-quarter (25.9%) of their patients were enrolled in PPO dental plans. Dentists participating in capitation dental plans reported a similar percentage of their patients in capitation plans (20.7%). However, a 1994 ADA survey of all dentists found much lower levels of patient participation in these two types of plans (ADA, 1995). At that time, only 3.1% of dentists' patients were enrolled in capitation dental plans and 2.1% of their patients were enrolled in PPOs.

A 1998 ADA survey of dentists in private practice, *1998 Survey of Capitation and Preferred Provider Dental Plans*, showed that dentists' participation in PPO plans has increased since a previous survey conducted in 1996 (ADA, 1997 and 2000). Almost 50% of responding dentists (47.7%) reported participating in PPO dental plans in 1997 com-

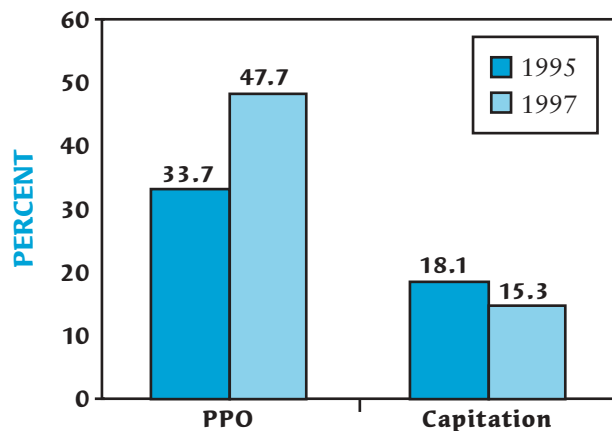
pared to 33.7% in 1995. (See Figure 4.5.)

Capitation dental plans (or Dental HMOs) showed a different trend, with the percentage of dentists declining in the period covered by the two ADA surveys. One of the reasons frequently mentioned for the decline in Dental HMO plans is that the cost of providing the services is greater than the remuneration received. As a result, some dentists left the programs. Others felt the way to resolve this imbalance was to limit the type and/or amount of treatment provided. Still other dentists offered services, procedures or materials that were not covered benefits, requiring the patients to assume greater financial burden than they had previously expected.

The ADA's 1998 *Survey of*

FIGURE 4.5

Percentage of Dentists Participating in Preferred Provider Organization (PPO) and Capitation (Dental HMO) Plans, 1995 and 1997



Source: ADA, 1997 and 2000.

Capitation and Preferred Provider Dental Plans also asked dentists about their satisfaction with the plans (ADA, 2000). The largest percentage of dentists who participated in a PPO plan (44.5%) were somewhat satisfied with their largest PPO plan. About one-quarter of participating dentists (27.8%) were somewhat dissatisfied with the plan. Of those dentists reporting some level of dissatisfaction, the

largest percent were unhappy with the plan's fees (71.7%). The next most frequently mentioned reason for dissatisfaction was limitations placed on dentists by the plan (34.7%).

More than half of dentists who participated in capitation dental plans (54.0%) expressed some level of dissatisfaction with their largest capitation plan. Dissatisfied capitation plan dentists were most likely (54.0%) to list reimbursement levels as the most common reason. One-fourth of the responding dentists were dissatisfied with limitations placed on the dentists by the plan. Other most frequently cited source of dentist dissatisfaction included co-payment issues, paperwork, and patient compliance problems.

DEFINED CONTRIBUTION DENTAL PREPAYMENT PLANS

In addition to employer-based prepayment products, defined contribution plans are emerging. Under a defined contribution plan, the employer provides an agreed amount to a discretionary health services fund for each employee. The employee can use the fund to purchase the insurance coverage of his/her choice.

Defined contribution plans are a potentially important alternative to defined benefit plans. The enrollee has discretion to expend these funds as needed but there is no group risk sharing. While this approach currently represents a small portion of the prepayment market, several varieties of these plans have begun to develop. Two of these plan types will be discussed here (direct reimbursement and Medical Savings Accounts).

SELF-FUNDED PAYMENT ARRANGEMENTS

Direct Reimbursement

Direct reimbursement is a self-funded program in which the individual is reimbursed based on a percentage of dollars spent for dental care provided, and which allows beneficiaries to seek treatment from the dentist of their choice (ADA, 1999). Hybrid plans are developing with this concept. Growth varies according to region.

Medical Savings Accounts

Medical Savings Accounts (MSA) are available on a limited basis. MSAs are tax-exempt accounts, similar to Individual Retirement Accounts (IRA) (Goodman and Musgrave, 1994). Contributions

are not taxed, and the account balance grows tax-free over time. The funds accumulated in MSAs can be used to pay for routine eligible medical expenses. Money not spent in the account can be rolled over to the next year or transferred to an IRA. MSAs are usually considered supplemental to other basic coverage. At a minimum, an individual would want also to have a catastrophic health insurance policy as a safety net to protect against very high costs.

PUBLICLY FUNDED PAYMENT ARRANGEMENTS: THE DENTAL SAFETY NET

Medicaid

The poor and near-poor often cannot pay for dental care from their own resources. To date, public programs such as Medicaid have not provided adequate financial access to care. Thirty-two state Medicaid programs do not cover adult dental care, except for emergency services. Most Medicaid programs do provide coverage for indigent children and parents, mainly single mothers, enrolled in the Aid to Families with Dependent Children (AFDC) program (Bailit, 1999).

In addition, states are required by Federal law to provide basic dental care to all Medicaid eligible children under the Early and Periodic, Screening, Diagnosis and Treatment (EPSDT) program. About 20 million children are covered by EPSDT. Nevertheless, only 20-30% of Medicaid eligible children see a dentist annually and an unknown, but much smaller, percentage receives comprehensive preventive and curative care.

State Children's Health Insurance Program (SCHIP)

The 1997 Federal legislation establishing State Children's Health Insurance Program (SCHIP) promises to extend dental benefits to about 10,000,000 children not currently covered by Medicaid. The bill provides no direct legislative mandate for dental services, but Federal matching funds are available for states that cover dental benefits. To date, most states have enacted SCHIP through Medicaid expansions. Nine states have established dental programs separate from Medicaid, and three (Colorado, Delaware, Montana) have excluded dental services altogether in their initial filings. Pennsylvania offers dental care in only part of the state. Since most states have enrolled SCHIP-eligible children through an extension of their

Medicaid programs which themselves have had limited impact, the overall impact of SCHIP on access to dental care may be limited (Bailit, 1999).

Bureau of Primary Health Care, Health Resources and Services Administration

Another source of financial support for dental services is the Bureau of Primary Health Care, Health Resources and Services Administration. The Bureau gives grants to private non-profit Migrant and Community Health Centers to provide comprehensive health care, including dental services, to the poor and migrants. Approximately 56% of the 671 Migrant and Community Health Centers offer dental services, and in 1997 they provided dental care to 1.13 million people (Bailit, 1999).

The Indian Health Services

Several federal agencies provide direct services to specific, often disadvantaged, populations and to military personnel. The Department of Health and Human Services' Indian Health Service (IHS) provides oral health services to Native Americans and Alaska natives in dental facilities located in predominantly Native American communities and reservations. The IHS also purchases care from privately practicing dentists located near Native American communities (Bailit, 1999).

The United States Department of Veterans Affairs (VA)

The Department of Veterans Affairs (VA) provides the largest network of hospital based dental programs in the United States. VA Dental Services meet the oral health needs of eligible veterans. VA dentists have training and expertise in caring for medically compromised patients, many of who are homeless or reside in nursing homes or long term care facilities. A large part of VA practice provides oral health care to patients with complex medical problems such as substance abuse, psychiatric and psychomotor disorders, oral cancer and HIV (Bailit, 1999).

Dental Schools

Dental schools are an important source of care for the poor and individuals with disabilities. In part, this is because most schools are part of academic health centers that are located in older urban areas. A large percentage of patients treated at these cen-

ters come from the local neighborhood and have low incomes, making dental schools their primary source of dental care (Bailit, 1999). In addition, the majority of dental schools are public institutions that receive some state support. As such, the general public and state legislatures expect schools to function as safety net providers.

Some schools have dental clinics that provide care to low-income children who are covered by the Medicaid program or have no insurance coverage. These clinics are usually partially subsidized by state, county and municipal funds even though they bill Medicaid where possible. There are no comprehensive national data available on school-based dental clinics.

UTILIZATION OF DENTAL SERVICES

Whether, and how often, individual Americans obtain dental care are frequently studied as measures of access. Several reports have focused on the extent, determinants and likelihood of dental visits (National Center for Health Statistics [NCHS], 1972). Measured as the number of visits per year or the number of individuals with at least one visit during the previous year, these studies have provided useful information about dental services use.

The second measure of utilization is expenditures for dental services. Expenditures are a dollar measure of the extent of utilization of resources once entry into the dental delivery system occurs. Expenditures are influenced by a combination of several factors including, but not limited to, professionally determined need for care, ability to pay, perceived value of oral health and local supply and availability of providers.

Visits and Expenditures

VISITS

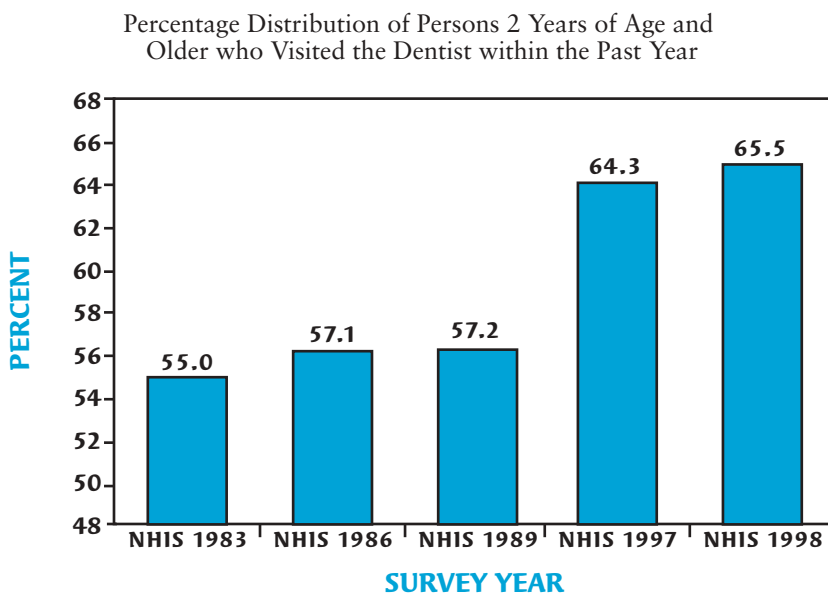
Americans seek dental care in considerable numbers. In 1996, Americans visited dentists about 294 million times (Manski et al, 2001).

The available data on use of dental care is characterized by variability from one source to another (Brown and Lazar, 1999). One survey suggests that 75% of the adult population have an annual dental visit (ADA, 1997), while another source puts the figure at 42% (Manski, 1987). Some of the differences between these and other estimates are likely to be due to differences in survey methods. All sources

of data agree that there are important differences in the use of dental care among subgroups of the population even though the true rate of annual dental visits in the United States is currently uncertain.

According to data from the National Health Interview Survey (NHIS), annual utilization of dental care in the United States has increased gradually over the past several decades. In 1983, 55.0% of the population 2 years and older reported a dental visit in the prior year, while in 1998 the annual rate was reported to be 65.5% (Jack and Bloom, 1988; Bloom et al, 1992; NCHS, 2000a; and NCHS, 2000b). Figure 4.6, which is based on data from NHIS, shows this gradual increase.

FIGURE 4.6



Source: National Center for Health Statistics, *National Health Interview Surveys*.

EXPENDITURES

According to the Health Care Financing Administration (HCFA) estimates, in 1998, \$53.8 billion was spent for dental services, representing 4.6% of total health expenditures. For the past seven years the annual rate of increase in dental

expenditures ranged from 5-11%. This is more than twice the rate of general inflation. Between 1993 and 1998, dental care expenditures were rising faster than hospital and physician services expenditures. This represents a historic shift in the comparative rates of growth between the two sectors. Many observers believe this is the result of the much larger penetration of managed care into the medical sector. It may also reflect the changing mix of dental services sought by the public with significant increases in cosmetic dental services.

In real dollars (base=1998), the increase in expenditures has been smaller, increasing from about \$43 billion in 1982 to \$53.8 billion in 1998, an average annual increase of 1.4%. This is only slightly greater than the rate of increase in the United States population, which is 1.1%. Factoring out population changes, real per capita expenditures (including both those with a visit and those without) have been almost level from the early 1980s through 1998, ranging from approximately \$185 to \$192 in 1998 dollars. As mentioned previously, the percent of the population who visited a dentist within a year increased during this same period (see Figure 4.6).

These trends imply that real dental expenditures among those with a dental visit have declined. To verify this implication, dental expenditure information from the 1996 Medical Expenditure Panel Survey (MEPS) and the 1987 National Medical Expenditure Survey (NMES) is helpful.³ Based on large national probability samples, MEPS and the NMES allow for examination of dental expenditures by major demographic variables.⁴

Average nominal dental expenditures (based on those with a visit) increased from \$295.55 in 1987 to \$435.80 in 1996. However, when these expenditures are expressed in 1998 dollars (i.e., adjusted for inflation), the NMES and MEPS data show a decrease in

³ Dental expenditures in the 1987 NMES are based on charges. In the 1996 MEPS dental expenditures are based on the sum of payments for care received. Fortunately the 1996 MEPS also includes a measure of charges. In order to maintain consistency in terms of what is being compared over time, the results presented in this section are based on the total charges for dental services.

⁴ Estimates of total national dental expenditures derived from the 1996 MEPS and the 1987 NMES are in line with national estimates from HCFA. For example, in 1996, HCFA estimated national dental expenditures at \$47.5 billion while the MEPS estimate for 1996 was \$50.3 billion. Although these numbers vary slightly, the two sources are in basic agreement.

average expenditures from \$541.99 to \$475.52 (see Table 4.2). While this per capita decrease in expenditures is not directly reflected in the per capita HCFA expenditure data (see Figure 4.3), when the HCFA expenditure data are adjusted to the increasing proportion of the population with a dental visit, a decline in real expenditures per patient is apparent.

As shown in Table 4.2, declines in inflation-adjusted per capita expenditures between 1987 and 1996 occurred in most demographic subgroups. Exceptions are in the youngest age group (2-4 year olds), African Americans and races noted as other, and those individuals with household income below 100% of the poverty level. The declines in all other groups is likely to reflect improving oral health and thus less need for restorative services.

Demographic Variations in Visits and Expenditures

GENDER

As shown in Table 4.3, the percent of females that visit a dentist has consistently been higher than males. Females also spend somewhat more on average than males (see Table 4.2). This difference narrowed between 1987 and 1996.

AGE

Dental care utilization also differs by age. Increasing utilization by both the youngest and oldest individuals in the more recent NHIS surveys is apparent (Table 4.3). The increase in young children may be due to an increasing realization of the importance of oral health in the young, and the increased utilization in the elderly is partly due to the reduced incidence of total edentulism in adults. The

TABLE 4.2

Real (Base=1998) 1987 NMES and 1996 MEPS Per Capita Expenditure Data For Persons 2 Years of Age and Older who Visited a Dentist⁵

	1987 Charges	1996 Charges	P-Value
Overall	\$541.99	\$475.52	.000
Age			
2 to 4	126.32	154.72	.099
5 to 17	625.58	536.59	.045
18 to 34	459.95	400.37	.026
35 to 54	553.53	475.50	.007
55 to 64	627.32	514.91	.008
65 and over	570.99	533.63	.428
Race			
White	558.52	478.11	.000
African American	403.34	408.13	.913
Other	444.43	545.82	.105
Ethnicity			
Hispanic	508.80	435.60	.148
Non Hispanic	543.74	478.71	.000
Poverty			
Below Poverty	371.24	420.07	.362
100%-200%	427.27	371.42	.095
201%-400%	538.97	478.92	.036
>400%	607.10	515.68	.000
Gender			
Male	517.60	461.90	.021
Female	562.19	486.76	.001

Source: Agency for Health Care Policy and Research, 1987 National Medical Expenditure Survey (NMES) and 1996 Medical Expenditure Panel Survey (MEPS).

role of edentulism in utilization of dental care is demonstrated clearly in the literature (Meskin and Brown, 1988). As fewer additional American adults become edentulous, more adults will seek regular dental care as older adults.

⁵ Per capita estimates were derived by ADA staff using NMES (Edwards and Berlin, 1989) and MEPS (Cohen, 1997) data available from the Agency for Healthcare Policy and Research (AHCPR).

TABLE 4.3

Percentage Distribution of Persons 2 Years of Age and Over who Visited the Dentist within the Past Year⁶

	NHIS 1983	NHIS 1986	NHIS 1989	NHIS 1997	NHIS 1998
Age					
2-4	28.4%	31.3%	32.1%	44.1%	44.3%
5-17	67.0	70.3	69.0	78.3	79.0
18-34	57.0	58.1	56.9	60.2	61.1
35-54	57.4	60.5	61.4	66.8	68.1
55-64	51.3	51.2	54.0	60.8	62.6
65 and over	38.6	41.7	43.2	54.1	55.8
Gender					
Male	53.0	54.9	54.9	62.2	63.0
Female	56.9	59.2	59.4	66.4	67.9
Race					
White	57.0	59.2	59.3	65.8	67.0
African American	41.8	43.6	44.5	57.7	58.5
Other	NA	NA	52.4	58.3	59.3
Ethnicity					
Hispanic	NA	NA	46.4	53.3	54.2
Non-Hispanic	NA	NA	58.2	65.7	66.9
Poverty					
<100%	NA	NA	NA	50.0	50.5
100%-199%	NA	NA	NA	49.2	51.0
200%-299%	NA	NA	NA	61.3	62.5
>=300%	NA	NA	NA	76.4	76.8
Poverty					
Below Poverty	NA	NA	41.3	50.0	50.8
At or Above Poverty	NA	NA	61.5	67.0	68.3

Source: National Center for Health Statistics, *National Health Interview Surveys*.

⁶ Data presented in this table for 1983-1989 came directly from the National Center for Health Statistics (NCHS) "rainbow series" *Vital and Health Statistics* reports. The 1989 poverty data, as well as all data for 1997 and 1998 were derived by ADA staff using public use data files available from NCHS.

RACE & ETHNICITY

As shown in Table 4.3, over time, dental visits have increased for both the White and African American population. Throughout the time period of 1983-1998, a higher percentage of the White population visited the dentist compared to the African American population. However, the difference has narrowed from 15.2 percentage points in 1983 to 8.5 percentage points in 1998. As for dental expenditures, Table 4.2 shows that Whites who visited a dentist spent more, on average, than African Americans in both 1987 and 1996. Again, this difference was smaller in 1996.

Non-Hispanics are more likely to visit a dentist than Hispanics. In contrast to racial patterns, this difference has not decreased over time. As for dental expenditures, non-Hispanics spend more than Hispanics and the gap does not appear to have diminished.

POVERTY LEVEL

The percentage of people who visited the dentist has increased for both those below poverty and those at or above poverty. However, there is approximately a 20 percentage point difference in the likelihood of a visit between these two groups. This difference is consistent for 1989-1998.

There has been a substantial increase in the percentage of children that visited the dentist between 1989 and 1998 (see Table 4.4). For children two to four years old below the poverty level, the likelihood of visiting a dentist increased by 21.9 percentage points, from 26.4% to 48.3%. For children 5-17 years old below the poverty level, the likelihood of visiting a dentist increased by 15.7 percentage points, from 51.1% to 66.8%.

Among children two to four years old, living above the poverty level, the percentage of those who visited the dentist increased by 9.2 percentage points, from 34.7% to 43.9%. For children 5-17 years old, living above the poverty level, the increase among those who visited the dentist was 6.8 percentage points, from 74.9% to 81.7%. The differ-

ence in the percentages visiting a dentist between children who are above and below poverty levels narrowed to one-half of the earlier percentage difference. Both pre-school and school-age children demonstrated this improvement. By 1998, pre-school children living below the poverty level exhibited as high a likelihood of visiting a dentist as those above poverty. This finding comes as a surprise and has not been seen before. Confirmation from other sources is necessary before it can be assumed that the poverty gap in utilization of dental services in this age group has vanished.

Among adults, the increase in the likelihood of a visit was smaller than that for children (see Table 4.4). Across all age groups, persons living below the national poverty level were less likely to see a dentist than those above the poverty level. However, both groups exhibited substantial improvement in the likelihood of a visit between 1989 and 1998.

TABLE 4.4

Percentage Distribution of Persons Two Years of Age and Older who Visited the Dentist within the Past Year, by Poverty and Age Group⁷

Age Group	Below Poverty		At or Above Poverty	
	1989	1998	1989	1998
2-4	26.4	48.3 ⁸	34.7	43.9 ⁸
5-17	51.1	66.8	74.9	81.7
18-34	48.0	52.3	60.1	63.1
35-54	33.6	41.7	65.2	71.2
55-64	27.2	32.0	58.4	66.4
65 and over	22.6	32.7	47.4	58.4

Source: National Center for Health Statistics, *National Health Interview Survey* (1989 and 1998).

Unlike the experience of children, however, among adults the differences observed between poverty and non-poverty groups did not appear to narrow over this time period.

As might be expected, dental expenditures increased with the level of income (i.e., percent of poverty level) between 1987 and 1996. However, differences between individuals at the highest and lowest income levels narrowed by almost 60%, from \$236 (\$607-\$371) to \$96 (\$516-\$420) in 1996.

⁷ Data derived by ADA staff using public use data files available from NCHS.

⁸ The difference in these two means - the 48.3% utilization rate for 2-4-year-olds below poverty and the 43.9% utilization rate for 2-4-year-olds above poverty - is not statistically significant.

For children living below the poverty level, real dental expenditures increased. Among children 2-4 years old, the increase was from \$82 to \$187. Among children 5-17 years old, the increase was from \$235 to \$431. Real dental expenditures decreased among 5-17-year-old children from families living at the 100-200% of the poverty level. See Table 4.5.

TABLE 4.5

Real (Base=1998) 1987 NMES and 1996 MEPS Expenditure Data for Children 2 to 17 Years Old, by Age Group and Poverty Level⁹

	1987 Charges	1996 Charges	P-Value
2-4 Years			
Below Poverty	\$ 81.99	\$186.57	.003
100%-200%	131.51	100.22	.351
201%-400%	138.64	171.19	.249
>400%	123.40	137.89	.660
5-17 Years			
Below Poverty	235.03	431.46	.033
100%-200%	419.90	294.57	.081
201%-400%	654.68	549.09	.141
>400%	831.72	677.75	.102

Source: Agency for Healthcare Policy and Research, 1987 National Medical Expenditure Survey (NMES) and 1996 Medical Expenditure Panel Survey (MEPS).

Within each survey (NMES and MEPS), the largest expenditure differences between income levels are found in children 5-17 years old. Nevertheless, as shown in Table 4.5, this gap between the lowest and highest income groups in this age group decreased from \$597 in 1987 (\$832 - \$235) to \$247 in 1996 (\$678 - \$431). Much of these expenditure differences in this age group are related to orthodontic services primarily among teenagers.

The expenditure patterns for children's care, that of large expenditure increases per patient among the poorest children and decreases in expenditures among children from families with higher incomes, are somewhat surprising. A potential explanation may lie in the improvement of all children in

untreated caries. The data on untreated caries presented earlier clearly indicates that middle class children have low levels of caries and almost no untreated caries. Untreated caries in this age group is largely concentrated in lower income children. Thus, one explanation of these data may be that middle class children did not need as much restorative dentistry as lower income children. Without an increase in need for care, expenditures for middle class children were largely for preventive services and did not increase between 1987 and 1996. In contrast, lower income children may have had a larger need for restorative care, and somehow found the funds to receive it.

BARRIERS TO ACCESS

Everyone faces some barriers to access to dental services. Some see cost as a primary barrier to care. However, in a market delivery system, prices (dental fees) play an important role. They permit trade-offs to be made between competing goods and services that individuals desire. No nation, not even one as wealthy as the United States, has inexhaustible resources or productive capacity. Choices must be made regarding what is produced and who will receive it.

For most goods and services in the United States, those choices are made through markets.

Healthcare is a sector of the economy where market forces are supplemented by other sources of finance and other mechanisms of allocation. Within healthcare, the dental sector still relies on markets to a greater extent than the medical care sector. As the preceding sections have indicated, most people can and do access the dental care delivery system and receive the care they need and desire. Overall, for the United States, dentistry is health care that works rather well under its current financing structure. As new problems arise, dental markets in their broadest sense (i.e., markets for services, prepayment, education, etc.) can be expected to generate new financing arrangements that deal with those problems.

⁹ Data presented in this table were derived by ADA staff using NMES and MEPS data available from the Agency for Healthcare Policy and Research.

In the 1989 NHIS (Bloom et al, 1992), by far the most common reason given for not having a dental visit in the prior year was "no dental problem," regardless of age, sex, race and ethnicity, place of residence, income, prepayment, or activity limitations. Overall, "no dental problem" was cited by 46.8% of individuals as the reason that they did not have a visit in the prior year. This was the most common reason cited by virtually every subgroup, except for the oldest adults, where "no teeth" was the major factor. After "no problem" and "no teeth," the next most common reason given was "cost," which overall was cited by 13.7% of people as the reason for no dental visit in the prior year. Cost as a reason reached its highest levels in people with low incomes, no prepayment, and activity limitations.

While "no dental problem" "no teeth," and "cost" account for the vast majority of the reasons for not visiting a dentist, the category of "access problem" was rarely cited. This category includes the statements "don't know [a] dentist," "dentist too far," and "can't get there." Overall only 1.7% of non-users cited access as the primary reason for not having a dental visit.

Some subpopulations face unique barriers because they have special problems (e.g., persons with disabilities and complex medical conditions). Their conditions make it additionally difficult to access services. Although the economically disadvantaged may face similar barriers to care as the general population, these barriers force much starker tradeoffs and are much harder for disadvantaged persons to overcome without help.

Barriers for the Disadvantaged **COST BARRIERS**

For economically disadvantaged people, the cost of care is a significant barrier. They do not have the financial resources to meet the needs of everyday living and still afford dental care as easily as the rest of the United States population. Long-term solutions to improving their access to care are the same that will improve their economic status—such as better education, better job skills, safer neighborhoods, and more stable personal lives. But for immediate impact, increased direct financial aid is needed. This aid, which has been inadequate, has been usually provided through philanthropic endeavors or public-funded programs. More is needed in the way of public support for dental care for disadvantaged adults. To date, Medicaid and Head Start have provided limited care for disadvantaged children (Barnett and Brown, 2000).

MEDICAID PROGRAM LIMITATIONS

The Barnett and Brown study concluded that inadequate reimbursements and Medicaid administrative burdens limit the effectiveness of the Medicaid program (Barnett and Brown, 2000). Observers identify the cause of inadequate reimbursement as lack of political will.

Medicaid serves only a small fraction of the children that it is supposed to provide with dental care. Unfortunately, there is considerable uncertainty regarding the percentage of children eligible for Medicaid who actually receive dental care and more accurate data are needed.

At present, most analyses rely on data concerning services paid for by Medicaid. These data do not account for other services children receive outside of Medicaid - such as free care donated by the dentist. The amount of dental care that dentists provide free of charge could be of approximately the same magnitude as Medicaid services. Thus, the extent to which the Medicaid population is underserved is unclear, though it is obvious that Medicaid itself does not provide the level of services that it is intended to provide. Head Start, however, has increased the rate of dental care usage for its children substantially above the rate for higher income pre-school children. Barnett and Brown also identify a number of other barriers as important, though clearly of secondary importance compared to inadequate reimbursement.

LIMITED PROVIDER MEDICAID PARTICIPATION

Survey data indicate that the lack of dentists who are willing to accept new Medicaid patients is a significant problem. Dentists do not participate in Medicaid, primarily, because of low program reimbursement rates. In addition, the administrative burden and the high "no-show" rate of Medicaid clients discourage dentists' participation. For the vast majority of dentists, the opportunity cost of serving a Medicaid client is far higher than the Medicaid reimbursement rate (Barnett and Brown, 2000).

MICHIGAN'S HEALTHY KIDS DENTAL PROGRAM - A PROMISING EXAMPLE OF MEDICAID REFORM

The data suggest that for low-income persons, the major barriers to care appear to be perception of need and cost. There is promising early evidence that removal of the cost barrier can be a major

impetus to increasing utilization among Medicaid-eligible children.

The state of Michigan, in an attempt to secure access to dental care for its underserved children, made the bold step of removing the financial and administrative barriers from its program. The Healthy Kids Dental Program is administered by private dental benefits companies with rules, regulations and reimbursement schedules similar to those offered in the private sector. In a 22-county experiment in Michigan, conversion of the Medicaid program for children to private administration paying UCR fees, resulted in more than a 50% increase in the number of children receiving treatment in just the first 4 months of operation, and a 40% increase in the number of dentists providing care, compared to the same 4 months in the previous year (Michigan Department of Community Health, 2000).

The Healthy Kids Dental Program has been extremely successful. Children enrolled in the program now have access to dental care which is approaching that of children in the private sector. Other states looking to secure marketplace access for patients enrolled in their programs should look carefully at this example. Longer-term results from this program should be followed closely.

Other Potential Barriers

AVAILABILITY

According to the United States General Accounting Office (GAO), "while several factors contribute to the low use of dental services among low-income persons who have coverage for dental services, the major one is finding dentists to treat them." According to this report, "some low-income people live in areas where dental providers are generally in

short supply, but many others live in areas where dental care for the rest of the population is readily available." (United States General Accounting Office, 2000.)

PERSONAL FACTORS

Some observers have identified individual factors that create barriers to care. For example, many immigrants do not speak English; this can lead to communication problems with the providers of care and may result in more difficult access. Knowledge of appropriate dental care—and when to seek it—may be less developed among subpopulations. Finally, apprehension about going to the dentist may discourage use. While these factors may influence utilization and expenditures, evidence of their quantitative impact on access is not conclusive.

GEOGRAPHIC BARRIERS

People who live in areas where there are few, if any, dentists nearby must overcome circumstances to receive regular dental care, but there are no comprehensive data to quantify the effect of this barrier.

SPECIAL NEEDS POPULATIONS

Individuals with physical, sensory and developmental disabilities that limit mobility or are accompanied by exceptional treatment needs, face special challenges in receiving regular dental care, as they do with many aspects of everyday life. The skills and experience required to treat some of these individuals is sometimes beyond the capabilities of the average dentist. The costs involved also may be beyond the means of the affected families.

II. FINANCING OF AND ACCESS TO DENTAL CARE IN THE FUTURE

A primary determinant of access to dental care is having the financial resources to purchase services. The availability of resources is highly dependent on the overall growth of the economy. Dentistry has clearly benefited from the robust economy over the past two decades. Greater wealth has resulted in large increases in dental services utilization and total national expenditures.

These gains in purchasing power have affected all segments of the population, but as expected, the poor and near-poor have less purchasing power

than the wealthier segments of society. Although oral health and access to care have improved significantly among the disadvantaged during the past 30 years, these individuals do not utilize dental services to the extent of the general population. For some Americans with special problems, such as individuals with disabilities, those with congenital conditions, non-ambulatory individuals, and people in nursing homes, obtaining dental care remains difficult.

The most effective way to give the poor greater purchasing power is to subsidize their access to care

using public funds. While surveys suggest that most Americans support providing all citizens financial access to basic health care services, to date, federal and state legislatures have not allocated funds to provide the poor the same level of access to dental care as the non-poor. Without adequate public funding, the efforts by the dental profession and others to provide the poor adequate access to dental care will continue to fall short.

FUTURE FINANCING OF DENTAL CARE

It is expected that total dental expenditures will increase at an overall growth of 5-7%; but the real growth rate (i.e., after adjusting for inflation) will be 1-2%, slightly less than the rate of growth of the real Gross Domestic Product (GDP).

In the short run (5 to 10 years), private dental prepayment is likely to decline modestly. Annual maximums, which have not changed appreciably in the last 15 to 20 years, should increase with a moderate increase in premiums of 5% or less. If medical costs continue to increase as they have during the past two years (e.g., 8-15% annually), then employers are likely to either (1) shift costs to employees so that fewer employees opt for dental prepayment or, (2) cut back on the dental prepayment coverage they offer in order to help fund medical insurance. In the longer run, events and trends in the financing and organization of medical care may have substantial impact on dental care financing. The unpredictability of medical costs and the response by employers and government to this situation makes long-term predictions for dental coverage very uncertain.

The proportion of dental expenditures funded directly by patients, private prepayment and public programs will remain essentially the same for the next five years. Major increases in public funding of dental care for the poor or medically disabled are not expected, with the exception of modest increases in programs targeting children (e.g., SCHIP).

Within the structure of dental prepayment, the percent of the privately insured population with PPO plans will increase. In turn, there will be a decline in indemnity and Dental HMO enrollment. Also, there will be some increase in direct reimbursement and there will be more interest in Medical Saving Accounts as a market-based system to control medical care costs.

Although many dentists will treat patients with PPO plans, the overall impact of managed care on

dentists' management of patients and aggregate dental expenditures will be limited.

The concept of a "prepayment/insurance free" practice may grow as a result of the dentists' perceptions of the difficulties encountered in dealing with carriers. Dentists are more likely to refuse assignment of benefits and, therefore, more of the burden of dealing with the insurance company will be placed on the patient. In turn, this could put increasing pressure on insurance companies to simplify their administrative procedures and/or become more "provider friendly."

ACCESS TO DENTAL CARE IN THE FUTURE

In the short run, the demand for care is expected to continue to increase at about the same rate as it has for the past five years. Some of the major factors which are likely to influence demand are: 1) more affluent, educated and growing population, 2) new diagnostic and treatment technologies, and 3) some underserved populations will gain financial access to care and use services (e.g., SCHIP).

Unless the percent of the population seeking dental care continues to grow, overall demand may moderate, due to improving oral health among those who seek services. These trends may become more pronounced as younger cohorts with less caries experience replace the so-called baby boom generation. Nevertheless, a growing economy and new technologies must be factored into the situation before any final conclusions can be reached.

In the near term, increasing utilization and expenditure by elderly persons are likely to continue. This is because the next generation of elderly (the current 55-65 year-olds) is large in number and these individuals are already high users of dental care. They will, therefore, be the most affluent elderly generation thus far and their current dentitions will require high levels of maintenance. As the elderly population increases in number and influence, pressure may build to provide them with more dental coverage either through tax deferred Medical Savings Accounts or a combination of public subsidies and employer contributions. In the longer term, as the generation following the baby boomers begins to retire, demand among the elderly may decline because these future generations will be fewer in number and healthier.

While affluent people who live in rural areas have the means to seek care, low-income families in rural

communities may have a more difficult challenge in securing needed dental care. There is no reason to expect that within the next 5 to 10 years large numbers of dentists will establish practices in rural or economically depressed areas. Government programs to encourage dentists to locate in underserved areas are valuable in specific locations when they succeed, but so far, the number of dentists placed on a long-term basis is relatively small. This is unlikely to improve in the next decade and

may even become worse.

Physical and mental disability, whether associated with advanced age, illness, congenital condition, or injury, is a significant barrier to access. In addition to low-income and other health problems that are associated with disabilities, the fact is that most dental practices are organized with fully ambulatory patients as the primary, if not exclusive, focus. Disability and special needs will continue to be a significant barrier to access.

III. PATHWAYS AND STRATEGIES FOR FINANCING OF AND ACCESS TO DENTAL SERVICES IN THE FUTURE

The dental profession's vision for access to dental care is that all Americans will be able to receive the dental care that they both need and want. That is, all Americans, regardless of their financial, geographic, physical or other special circumstances, will have the ability to receive the highest quality dental care.

For most Americans the current dental services delivery system works very well. More than three out of four people from non-poor families report at least one dental visit in the previous year. For these people access is excellent and will continue to be in the future. Even among the disadvantaged, access to care and oral health has improved significantly in the last 30 years. Nevertheless, many financially disadvantaged people and people who live in geographically isolated areas continue to have inadequate access to care. The following strategies focus on achieving dentistry's vision for access.

IMPROVING FINANCIAL ACCESS

Low-income individuals and families are a diverse group. While many low-income people are unemployed, others are employed but make relatively little money. In 1996, 38 million people were low-income, defined as income below the poverty line, and long-term unemployed, representing 14% of the United States population. Low-income employed people are often referred to as "the working poor." The income of the working poor is generally defined to be 100 to 200% of the federal poverty level. In 1996, 53 million people, 20% of the population, were "working poor."

For the long-term unemployed, expansion of public financing that compensates dental care providers at or above market rates is indicated. It is essential

that professional fees for services provided to the disadvantaged not be allowed to fall below prevailing market rates. Therefore, in the long term, fees should be indexed accordingly.

These changes should be phased in over a 5-to-10-year period to allow the dental care system to accommodate to the resultant increased demand. In addition, priority should be given to covering children first. Private carriers, who would be responsible for managing programs for the disadvantaged, should use the same procedures and systems as employer-based dental prepayment plans. There is strong indication that this will increase utilization by the poor and participation by the dentist.

Some segments of the population may need additional support to obtain dental care. Examples of the kinds of support include education, transportation, and convenient access to care for institutionalized or semi-institutionalized populations.

The working poor are generally employed in economic sectors in which private dental prepayment is not prevalent. The issue with this group is lack of affordable private prepayment. Therefore, a two-pronged strategy to encourage financing of private prepayment might be necessary.

Under this strategy, the government would provide individuals with a stipend to subsidize the purchase of either a traditional prepayment plan or a dental savings account. The federal or state governments would facilitate the necessary approaches to risk-spreading by creating risk pools. The administration of the program would be contracted to the private sector. This will empower the disadvantaged to make choices regarding dental care in a manner similar to the rest of the population. By bypassing the employer and going directly to the individual, the dif-

facilities of providing employer-based prepayment for this segment of the market is avoided. However, individual employee contributions could be withheld from wages much like Social Security and Medicare.

By going directly to the employee, savings in administrative costs of employer-based programs in the small business market can be used to purchase dental services. This would also reduce the cost of the plan, making it more affordable to low-wage workers.

Individual employees could be responsible for some level of cost sharing. Although this is envisioned as a voluntary program, by making the individual's contribution amount small the program could encourage enrollment. There are existing methods for controlling adverse selection and other issues that result from a voluntary program. These changes should be structured so that they would not be competitive with existing employer-based prepayment coverage.

IMPROVING GEOGRAPHIC AVAILABILITY

Adequate availability of dental care is a problem for the poor in inner cities and rural areas. Over time, adequate financing should create the financial incentives needed to encourage the development of dental services for these groups.

Nevertheless, it is very difficult to attract and retain private dentists to disadvantaged rural areas. Dentists must have a strong financial incentive to practice in these areas, and this means reimbursement rates that are substantially above current market rates. In addition, loan forgiveness and other incentive programs such as tax credits may also be necessary to induce initial location in these areas.

Expansion of a National Health Service Corps or a similar program might be helpful for creating an effective plan for the rural areas. Eligibility for participation should not be limited to new dental graduates. Older dentists and those in semi-retirement may provide an important pool of personnel to address this issue. Again, long term funding at adequate levels is essential.

IMPROVING ACCESS FOR SPECIAL NEEDS POPULATIONS

Access for special needs populations and for individuals with disabilities may be the most difficult issue to address. It will be more expensive to provide dental services for these persons because of

their special needs and complex management. Many of these patients are either homebound or institutionalized. Furthermore, the health providers who care for these people require special skills and educational background. For these reasons, adequate financing for this group of people will require reimbursement at rates substantially above market rates.

Properly caring for populations with disabilities will require long-term funding well in excess of what is now available. Dentists will need to be reimbursed at appropriate rates to give them financial incentives to gain the additional clinical training and to devote their time to this segment of the population. Educational programs to train providers with the specialized necessary skills will be important. Additional attention within the dental profession to reach out to "physically challenged individuals" could have a positive impact on access for this group.

Clearly, utilization and access among the elderly have increased. Moreover, older people enjoy better dental health today than ever before. Nevertheless, the elderly as a group have considerably less dental prepayment coverage. There is evidence that employers are reducing retirement-based prepayment coverage for their former employees.

Establishing tax-deferred Dental Medical Savings Accounts in which the balances in those accounts accrue over time and can be used by the elderly offers a market-oriented strategy to address this lack of coverage. Not all elderly can or will participate. Nevertheless, this is a step in the direction of greater coverage. These initiatives combined with the growing economic resources of the elderly and their improving oral health should underpin the maintenance of their dental health in the future.

CULTURAL COMPETENCE

The dental profession should have the competence and skills needed to provide services to a growing and diverse patient population. In this respect, the prospects for success are greatly enhanced by the position taken elsewhere in this report.

ROLE OF DENTAL SCHOOLS

Dental schools have the potential to serve as a major safety net for the underserved without infringing on the private market sector. This will require schools to have senior students, postgradu-

ate students, and faculty providing care in community clinics and practices located in disadvantaged areas. Schools must also recruit and retain more minority students, auxiliary staff, and faculty. Dental education must include cultural competence and spe-

cial knowledge and skills to deal with these special populations. Over time, new and creative use of allied dental personnel is the preferred method for dealing with changes in needs. Schools will need to be adequately compensated to develop such programs.

APPENDIX A. OTHER TRENDS IN DENTAL PREPAYMENT

Some employees participate in voluntary and referral plans where employers do not contribute to the premium. In the former type plan, employers assist in plan administration, but employees pay the full cost of premiums. In the latter, employers direct employees to a network of dentists who provide services at a discount and employees pay for the full cost of services.

Five other trends in dental prepayment plans deserve mention. First is the rise in employee contributions to premiums. In the average family dental plan, employees now pay 41% of the premiums (Managed Dental Care, 1999; and Meskin and Brown, 1988). As dental prepayment costs increase, employers are passing some of these costs on to employees in the form of larger contributions to premiums.

Second is limited changes in member cost sharing (e.g., deductibles, co-insurance, maxima) or the services covered under the dental plan. A few insurers are now offering to cover selected cosmetic services, implants or other expensive treatments for a larger premium (Mr. Thomas Meyer, Personal Communication, September 27, 2000; and Meskin and Brown, 1988).

Third, some large employers (i.e., 1,000 employees or more) offer employees a range of options that allow them greater choice in paying for dental care. This includes the option of enrolling in an indemnity plan or preferred provider organization. With

rising dental care premiums, more employers are only offering the managed care plan (Mr. Thomas Meyer, Personal Communication, September 27, 2000; and Meskin and Brown, 1988).

Fourth, cafeteria plans, spending accounts, and medical saving accounts are benefit options provided to employees working for large companies—see Appendix B for a description of these benefits. The number of employees participating in these arrangements and their impact on dental expenditures are not known. From a theoretical perspective, they provide employees a financial incentive to opt out of conventional dental prepayment plans, thereby increasing plan costs for employees who do enroll and, in turn, reducing prepayment plan enrollment and total prepayment-based spending for dental care.

Fifth, personal financing plans: with the current strong economy, more insured and non-insured patients obtain personal credit to finance their dental expenses. Practitioners report an increase in the number of institutions offering to finance patient dental expenses. Often, dentists must discount their services by paying the lending entity 2 to 19% of charges. In other plans of this type, dentists pay an annual fee to have patients eligible for the loans (Dr. Myron Bromberg, Personal Communication, October 12, 2000; and Meskin and Brown, 1988).

APPENDIX B. GLOSSARY OF PREPAYMENT TERMS

Cafeteria Plan (Flexible Benefit Plan):

These are employee benefit plans in which an employer establishes a menu of benefits that are available to employees. Employees select their medical insurance coverage and other nontaxable fringe benefits from the list of options provided by the employer. Participants may receive additional, taxable cash compensation if they select less expensive benefits. Each employee chooses the benefits in which he or she

wants to participate. Employees pay for the benefits they select before taxes are calculated on their wages.

Defined Contribution Plan:

These are employee benefit plans in which the employer provides an agreed upon amount of funds to each employee. The contribution is to be used by employees to purchase any health insurance plan they want. The employee may add to the employer

contribution to purchase more extensive insurance coverage. The employees are the owners of the policies they purchase. To be workable, the employer contribution would not be taxed as employee income. Several defined contribution models, ranging from individual plans to managed competition have been described.

Direct Reimbursement:

Direct reimbursement is a funded program in which the individual is reimbursed based on a percentage of dollars spent for dental care provided, and which allows beneficiaries to seek treatment from the dentist of their choice.

Flexible Spending Account:

Flexible Spending Accounts allow employers and employees to use pretax dollars to pay for certain personal health care expenses that are not covered by medical or dental insurance. Funds are reimbursed to the employee for health care (medical and/or dental), dependent care, and/or legal expenses, and are considered a nontaxable benefit. This includes insurance cost-sharing expenses associated with deductibles and co-insurance. Employee reimbursement accounts are primarily funded with employee-designated salary reductions.

Indemnity Plan:

An indemnity plan is a dental plan where a third party payer provides payment of an amount for specific services, regardless of the actual charges made by the provider. Payment may be made either to enrollees or, by assignment, directly to dentists. Schedule of allowances, table of allowances, or reasonable and customary plans are examples of indemnity plans.

Managed Care:

Refers to a cost containment system that directs the utilization of health benefits by:

- a. Restricting the type, level and frequency of treatment;
- b. Limiting the access to care; and
- c. Controlling the level of reimbursement for services.

There are two general forms of managed care. Preferred Provider Organizations and Dental Health

Maintenance Organizations. Some plans are hybrids of the two forms.

Preferred Provider Organization (PPO):

A PPO is a formal agreement between a purchaser of a dental benefit program and a defined group of dentists for the delivery of dental services to a specific patient population, as an adjunct to a traditional plan, using discounted fees for cost savings. The panel or network of providers is limited in size and usually has some type of utilization review system associated with it. The discounts from usual and customary fees vary greatly usually ranging from 15% to 30%. In this paper discount programs of 5% common to some Delta Dental and Blue Cross "participating" provider plans are not considered preferred provider organizations.

Dental Health Maintenance Organization (Capitation):

A capitation program is one in which a dentist or dentists contract with the program's sponsor or administrator to provide all or most of the dental services covered under the program to subscribers in return for payment on a per-capita basis. These plans place providers at risk for some medical (dental) expenses. In dentistry, the risk is usually for basic services (e.g., diagnostic and simple restorations). More expensive elective services are usually provided under a discounted fee-for-service arrangement with substantial patient cost sharing.

Medical Savings Accounts (MSA):

The MSA is a tax-exempt account, similar to an Individual Retirement Account (IRA) that is used to pay for routine eligible medical expenses. Moneys not spent in the account can be rolled over to the next year's account or put into an IRA. It is a form of defined contribution in which contribution may come from employers, employees or public funds. In addition to the MSA, a catastrophic health insurance policy is required as a safety net to protect against very high costs.

Out-of-Pocket:

This refers to the payment for dental services by patients with their own funds. For individuals with-

out dental prepayment, the entire billing for dental services is paid by the patient or some designated person, usually a relative. For individuals with dental prepayment, this refers to the portion the billing for dental services not covered by the plan and is paid by the patient, or some designated person. These payments may be for noncovered services or as copayments for covered services. Types of copayments include: deductibles, copayments, and expenses above the maximum allowed by the plan.

Coinsurance:

A provision of a dental benefit program by which the beneficiary shares in the cost of covered services, generally on a percentage basis. The percentage of a covered dental expense that a beneficiary must pay (after the deductible is paid). A typical coinsurance arrangement is one in which the third party pays 80% of the allowed benefit of the covered dental service and the beneficiary pays the remainder of the charged fee. Percentages vary and may apply to table of allowance plans; usual, customary, and reasonable plans; and direct reimbursement programs.

Deductible:

The amount of dental expense for which the beneficiary is responsible before a third party will assume any liability for payment of benefits. Deductible may be an annual or one-time charge, and may vary in amount from program to program.

Maximum Benefit:

The maximum dollar amount a program will pay toward the cost of dental care incurred by an individual or family in a specified period, usually a calendar year.

Premium:

The amount charged by a dental benefit organization for coverage of a level of benefits for a specified time.

Referral Plan:

This is a type of plan that refers employees or members of a group, such as a professional association, to a group of participating dentists who will provide dental services at a discount from their

usual fees to individuals enrolled in the plan. The referral service may be provided free to employees or group members, or a membership fee may be charged. No insurance or third parties are involved. Financial arrangements are directly between the participating dentist and the member of the plan.

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