

**The Wisconsin Dental Association's (WDA) Summary of the
Wisconsin Dental Workforce Report That Was Presented by
University of Connecticut Health Center Researchers
to the WDA on January 12, 2001**



**ANALYSIS OF DENTAL WORKFORCE,
POPULATION NEEDS, AND POLICY OPTIONS
IN WISCONSIN
FOR THE NEXT 10 YEARS**

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Preface

To

Wisconsin Dental Association's (WDA) Summary of the Wisconsin

Dental Workforce Report Presented by University of Connecticut Health Center

Researchers to the WDA on January 12, 2001

The Wisconsin Dental Association (WDA) is committed to advancing the public interest by promoting quality oral health care for all people of Wisconsin, both presently and in the years to come.

Anecdotal evidence has provided indicators in recent years that the State is already experiencing a significant shortage in the number of practicing dentists as compared to dental service needs and that the shortage of dentists (and possibly of dental auxiliary personnel) is likely to become even more severe in the future. This perspective was reached through observation of the following indicators:

- The difference in the number of dentists entering dental practice in Wisconsin as compared to the number leaving the profession.
- The earlier age at which professionals, including dentists, now tend to retire.
- The increase in the average age of dentists now in practice, suggesting that dentists will continue to leave practice more rapidly than they can be replaced.
- The evidence of shortages already visible in most rural portions of the State.
- The production of dental practices, influenced by the number of hours worked by dentists and the availability of qualified dental auxiliary personnel.
- Population growth, increasing the overall demand for dental care.
- The aging of the population, creating additional service demands as the elderly experience increased dental care needs.
- Reports that recipients of the state's Medicaid and BadgerCare already have a difficult time finding access to dental care.

Although these indicators appear as reasonable and accurate predictors, they were only assumptions and were not supported through any analysis of hard data. In an effort to obtain a better understanding of both the future need for dental services in Wisconsin and the projected availability of dentists to meet those needs, the WDA commissioned researchers at the University of Connecticut Health Center to collect, analyze, and interpret data in order to estimate changes in these areas over the next ten years.

The results of the study are summarized here in three parts: 1) using current levels of dental service as an assumed baseline, projecting the extent to which dental care needs are expected to increase over the next 10 years; 2) an estimate of the number of dentists expected to be available to practice in Wisconsin in the year 2010 and of the number of additional dentists that will be

needed to meet projected increases in care needs, assuming (notwithstanding the anecdotal evidence to the contrary) that continuation of current levels of access to care would be acceptable; and 3) possible approaches to increasing the supply of dental services, whether by increasing the number of dentists or by other means.

It should be pointed out that the analytic models used by the researchers to generate information on imbalances, over time and across county lines, are based on a market-oriented approach (i.e. an economic model, focusing on where economic factors suggest dentists would choose to locate practices in certain counties in Wisconsin, rather than on a professional assessment of actual oral health needs in any particular county). Additionally, the researchers' models and projections assume, as a starting point that the current level of availability of dental services is acceptable both socially and from a political perspective.

We believe the current study would be significantly enhanced if it were supplemented (i) by a professional assessment of current oral health needs within the Wisconsin population, and (ii) by additional information regarding the current adequacy of access to, and availability of, dental services. Even without this additional information, however, the study demonstrates compellingly that Wisconsin can expect to face a shortage in the number of practicing dentists, which is likely to result in severe and increasing shortages in the availability of dental services in years to come. At this point the study needs to be refined to incorporate both a professional assessment of the oral health needs of State residents and a better baseline picture as to the current adequacy of access and service availability.

While further refinements to the Report will give a better picture of specific problem areas, we cannot afford to wait for the results. Rather, the WDA has begun to evaluate options available to increase the number dentists and the availability of dental services and looks forward to working with other interested groups to determine and implement the appropriate and necessary actions.

Acknowledgements:

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Executive Summary

The purpose of this study was to project the need for dental services in Wisconsin in the year 2010 and to look for possible imbalances in the number of dentists between counties using an economic model that predicts the ability of dental practices to be financially viable in particular counties of the State. Using economic data from dental organizations and government, the current availability of dental services in Wisconsin appears similar to that in other areas of the East North Central (including Wisconsin plus our neighboring states of Illinois, Indiana, Michigan and Ohio) Region, as it has been identified by the American Dental Association (ADA) for survey purposes and the United States. No attempt was made to assess whether the current availability of dental service is adequate or the extent to which it meets desired access and service levels for Wisconsin residents.¹

Using an economic model of the factors that influence dentists' decisions on practice location, the researchers identified all 72 counties as currently having more, less, or the expected number of practicing dentists based on the economic factors in each county. It should be noted that the market model is specifically limited to economic factors like population, average county income, office rental and other practice costs, and similar economic indicia to determine whether particular counties have more or less practicing dentists than their respective economic conditions would naturally predict. There is nothing in this relatively straightforward economic model which attempts to measure the specific oral health care needs of the citizens of specific counties or to determine whether the number of practicing dentists in any given county is sufficient to meet those needs.

With this baseline of economic information, the project estimated both the increase in dental service needs through 2010, and the number of practicing Wisconsin dentists expected to be available at that time. The results suggest that the absolute number of dentists will decline by about 10 percent (297 dentists) because of a disparity

¹ While there was no evaluation as to either the current adequacy of access or availability of service, both anecdotal evidence and observation strongly suggest that there is already a shortage of dentists in Wisconsin and that additional dentists are needed at this time to meet even the existing dental needs of State residents.

in the number of dentists leaving and entering practice. The researchers estimated that the State's population is expected to grow an estimated .42 percent per year and that per capita utilization of dental services is expected to increase .98 percent per year. While some of the increased economic demand for dental services will be met by greater dentist productivity (estimated at 1.9% per year), there will still be a need for 194 more dentists than are expected to enter practice between now and 2010 merely to maintain the status quo in terms of currently available levels of service. This estimate assumes that existing availability of access to dental services is already adequate and that the basic structure of the dental delivery system will not change. If there is a current shortage in the availability of dental services (and there is strong anecdotal evidence suggesting shortages exist), a failure to add the necessary number of additional dentists will further exacerbate the problem by the year 2010.

The study examined several options for making concerted, policy-driven, alterations to the natural economics of the dental marketplace in an attempt to address the projected shortfall in the number of dentists between now and 2010. The major policy options that the researchers suggested included increasing the number of Marquette University Dental School graduates who practice in Wisconsin, expanding the size of the Marquette class, offering dentists some form of incentive to delay retirement, increasing the use of auxiliary personnel, developing community-based education programs in which senior students and residents treat underserved patients, expanding general practice residency programs, and using foreign trained dentists. No single option is likely to be sufficient, on its own, to offset the expected shortfall in the number of dentists and the economic feasibility of the available alternatives should be carefully examined before making any firm policy recommendations.

The primary limitations of the study were the availability of data on which to make precise predictions and the inability to factor in potential changes to the larger economic and social environment. We believe the current study would be significantly enhanced if it were supplemented (i) by a professional assessment of current oral health needs within the Wisconsin population, and (ii) by additional information regarding the current adequacy of access to, and availability of, dental services. Even without this

additional information, however, the study demonstrates compellingly that Wisconsin can expect to face severe and increasing shortages in the number of dentists and the availability of dental access and care in the years to come. The current study should be periodically reassessed to assure that the results reflect any dental practice and/or economic changes specific to Wisconsin.

Statement of Problem

The Wisconsin Dental Association (WDA) is committed to advancing the public interest by promoting quality oral health care for all the people of Wisconsin, both presently and in the years to come. A major concern is that current indicators of an existing shortage of practicing dentists, coupled with the likelihood of increased shortages in the years to come, will reduce the availability of dental services for State residents to well below acceptable levels. In an effort to obtain a better understanding of future needs for dental services compared to the number of practicing dentists expected to be available in Wisconsin, the WDA commissioned researchers at the University of Connecticut Health Center to collect, analyze, and interpret data on the economic forces that drive current dental personnel statistics in Wisconsin and to use that data to predict statewide developments over the next ten years. Results of the study are presented in three parts: 1) using current levels of dental service as an assumed baseline, projecting the increase over the next 10 years in dental service needs arising from changes in the economic environment of the State; 2) an estimate of the number of dentists expected to be available to practice in Wisconsin in the year 2010 and of the number of additional dentists that will be needed to meet projected increases in dental service needs, assuming (notwithstanding substantial anecdotal evidence to the contrary) that continuation of current levels of access to care would be acceptable; and 3) possible approaches to increasing the supply of dental services, whether by increasing the number of dentists or by other means.

Project Objectives

The project focuses on the State of Wisconsin and its 72 counties. The specific

objectives were:

1. To develop baseline data using an economic model designed to measure the factors likely to influence dentists' decisions on where to locate their practices, in order to determine whether particular counties have more or less practicing dentists than their specific economic characteristics would suggest. It is important to note that the baseline data were developed as a starting point to be used in projecting changes in the number of dentists in a county and increases in the need for dental services. There was no assessment as to whether current levels of access and service availability are adequate overall or in any particular county and, as noted previously, there is considerable anecdotal evidence to suggest that Wisconsin already lacks the number of dentists needed to meet current population needs.²
2. To project the future economic need for dentists in a county, taking into account expected changes in the population and other relevant economic factors.
3. To estimate the future number of dentists that would be expected to enter practice in Wisconsin, by evaluating and making estimates with respect to the future economic factors expected to drive the establishment of dental practices.
4. To evaluate the impact that changes in the present relation between dental service needs and the availability of dentists in a county are likely to have an impact on dental professionals and the public.
5. To assess the potential impact of possible methods of counteracting economic forces in an attempt to increase the number of dentists practicing in the State over the next ten years.

In consultation with the WDA and after the project started, the research team added this last objective in an effort to further assist the WDA in responding to the shortage of dental care providers which the initial phases of the research had begun to suggest were likely.

² The current study could be significantly improved by attempting the monumental task of providing a professional assessment of how near the currently available level of dental services comes to meeting the actual dental care needs of Wisconsin residents on a county-by-county basis.

Methods

The major source of data used in the study came from the Dental Workforce Group of the WDA. The Workforce Group provided a broad array of data on Wisconsin's dentists, dental auxiliaries, dental graduates, public insurance plans, the population of the State and related information. In addition, publicly available data were obtained from the American Dental Association, the Bureau of the Census, The Bureau of Economic Analysis, the National Center for Health Statistics, the Health Care Financing Administration, the Health Resources and Services Administration, and other published sources. The researchers also had access to national data on dentist productivity as a result of an ongoing study with the American Dental Association.

These data were used in the State and county-level analyses, including information on the dental workforce, county and population characteristics, the age distribution of professionally active dentists, and county-level projections of 10-year changes in a number of other key economic variables.

These data also provided the number, age, gender, and specialty distribution of dentists by county, the number of dentists retiring and starting practices, the schools that provide the largest numbers of Wisconsin dentists, and the number of dental auxiliaries employed in Wisconsin practices. Using both national and Wisconsin sources of information, estimates were made regarding the size and staffing of practices, hours worked by week and year, and trends in dental practice productivity. The number of people, age, gender, family income, and oral health status were estimated for each county and for the State.

Based on a multivariate model of the dental care system, expected changes in the number of dentists within the State were estimated over the next 10 years. Likewise, the expected change in the need for dental services was estimated for the same time period. From these analyses, imbalances were identified between the changes in the need for services and the number of dentists expected to be in practice in Wisconsin in the year 2010. The difference was estimated as the number of additional dentists needed to correct the growing imbalance. Details of the economic indicators used to project future dental workforce requirements were provided and the resulting estimates were produced.

To provide information about factors that influence the current distribution of

Wisconsin dentists across the State's 72 counties, a multivariate regression model was used to estimate the relationship between the number of dentists (general practitioners and specialists) in a county and its economic and supply-side characteristics. The model incorporates data on population size, area, local rents, per capita income, percent of the population that is Medicaid eligible, average Decayed, Missing or Filled Surfaces (DMSF) data (the DMSF information in this study was based on estimates of the national average of DMFS experienced in specific age groups; a specific county's DMFS status was then extrapolated based on its age distribution), percent of population with fluoride-deficient water, and characteristics of local providers (mean age, percent female). The estimated model was also used to generate information about the current distribution of dentists by county, relative to the projected distribution based solely on economic factors. The methods used to estimate current county-level imbalances were also the methods used to predict future imbalances by county. [While useful, it must be noted that the analytic models used to generate information on imbalances, over time and across counties, are based on a market-oriented approach and neither attempt nor incorporate any professional assessment of the specific oral health care needs of the population of any individual county. Further, contrary to the considerable body of anecdotal and observational evidence, the models assume, solely for the purpose of establishing a baseline for measurement of future changes, that the availability of services is currently adequate and socially acceptable. Thus, the projected increase in the need for dental care in the year 2010 and the projected shortfall in dental care providers are evaluated only against existing levels of access to care. If current access levels are inadequate, as anecdotal evidence suggests, the additional shortages projected by this project will further exacerbate those problems.]

Because the data suggest a decline in the number of dentists, several options were considered for increasing the number of dentists likely to practice in Wisconsin over a ten-year framework. These options included increasing the number of dental graduates entering practice, providing older dentists an incentive to continue in practice beyond the current average retirement age for dental professionals, giving practicing dentists an incentive to work more hours per week, increasing the use of dental auxiliaries, and expanding community-based dental education programs at Marquette University Dental

School.

The research team did not present specific recommendations on what should be done to increase the number of dentists in Wisconsin. Those decisions must be thoroughly examined (which this Report did not do) for economic feasibility, with the final decisions being made by the dental community, the WDA and, at a policy level, by State government. Further, this report does not consider the possible impact that changes in the general economy or other macroeconomic factors may have on the need for dental care. While the demand for dental services is, to some extent, sensitive to changes in the general economy (when disposable income is at a higher average, so is the demand for dental care), it was beyond the scope of this research project to attempt predictions on those larger economic issues.

Results

Baseline

Three sources of data were available on the number of dentists in the State. While estimates as to the overall number of professionally active dentists varied only about 10 percent by source, the percentage variations in the number of dentists by county was substantial (in part because of the relatively small numbers of dentists providing care in certain counties). Where differences occurred, we felt it was important to select the best data available, recognizing that no survey is perfect. The decision was made by the researchers to use the data in the 2000 American Dental Directory of the ADA, since it is widely recognized as the most detailed annual survey of dentists in the country.

Using that data, the total number of dentists in the State, and selected characteristics (age, gender, specialty, and school of graduation), the dentist-to-population ratio for Wisconsin was generated. These characteristics, where available, were compared with regional and national data. The mean age and age distribution of Wisconsin dentists is about the same as in other states within the ADA's defined East North Central Region (consisting of Illinois, Indiana, Michigan, Ohio and Wisconsin) and the rest of the United States. However, Wisconsin does have proportionately fewer female dentists and specialists. The finding regarding Wisconsin's low percentage of

specialists is generally expected in a state with a large rural population. Some 71.4 percent of State dentists graduated from Marquette, with another 20 percent coming from schools in surrounding states. The dentist-to-population ratio in Wisconsin is about the same as national dentist-to-population ratio.³ With a few exceptions, the dental workforce in Wisconsin is similar to that seen in this region and the nation. This is an important finding, since it suggests that the imbalances seen in Wisconsin may also be found in other states

The researchers grouped counties with similar data, based on county population, into five groups. The counties with the smallest populations tend to be more rural. A striking fact arising from the study was that economic factors have led to almost half of all Wisconsin dentists and specialists being located in Wisconsin's four largest counties. The mean age of dentists does not vary much by county population, but more female dentists are located in the larger counties. The number of dentists per 10,000 persons tends to be nearly twice as high in the largest versus the smallest county groups. Variations among individual counties are, of course, much greater.

Considering selected practice characteristics of independent dentists in the United States, it was found that, on a national average, they (i) work an average of 1,781 hours per year (about 37 hours/week), (ii) have 4.1 operatories (an operatory, in dentistry, being defined as the office room/space necessary to treat an individual patient, including the "dental chair" and the necessary chair-side instrumentation, technology, plumbing and safety provisions), (iii) use 1,668 square feet of space, and (iv) employ 4.2 staff persons. These data were not individually available for either Wisconsin or the East North Central Region and, for purposes of the study, it was assumed that Wisconsin dentists' practice characteristics are similar to the national averages. Dental staff employees include both full-time and part-time employees, 1.0 hygienists,⁴ 1.6 dental assistants and 1.1 secretary/receptionists/billing staff. Based on national data, the trend is towards fewer hours of work per year and larger practices with more operatories and employees.

After organizing Wisconsin counties into five groups based on the population size,

³ Data on dental hygienists are not presented, since the recently completed statewide survey of the hygiene workforce was not completed in time for the researchers to include it in their Report.

⁴ Post Report note: Recent information released by the national and Wisconsin dental hygiene workforce indicates that the number of dental hygienists per dentist in Wisconsin and nationally are approximately the same.

we examined those counties' respective population characteristics, including per capita income, percent of population that is Medicaid eligible, the rent index (a general measure of non-labor practice input costs), and the estimated number (based on the reported age distribution in the county) of decayed, missing, and filled surfaces (DMFS) per person were examined. The results indicate that smaller rural counties have lower per capita incomes, a much larger percentage of people who are Medicaid eligible, a much lower cost of living, and have relatively poor oral health as compared to residents of Wisconsin's larger counties. Clearly, people with lower incomes and poorer oral health tend to be concentrated in the rural areas of Wisconsin.

The multivariate regression model used to assess factors associated with dentists' practice locations were also used to predict the number of general dentists and specialists that each county would be expected to have, given its particular population characteristics, as noted above. A "relative shortage" was the term used if the predicted number of dentists (based solely on economic factors arising from economic and population characteristics) in a county exceeded the actual number of dentists practicing in that county. A "relative surplus" was used to describe situations where the actual number of dentists exceeded the number predicted, again based solely on economically driven population characteristics of the particular county. In neither case do the terms shortage or surplus reflect the adequacy of access or service availability within the respective counties. In fact, a professional assessment of oral health needs may well demonstrate that even counties characterized as having a "surplus", based on economic modeling, are actually underserved when analyzed on the basis of availability of and access to dental care. Results of this analysis of current county imbalances in the number of general dentists are available on a map, if desired.⁵

⁵ The map of Wisconsin shows the counties with a relative shortage of general dentists (red), a relative surplus of general dentists (green), and no imbalance (white). We have found similar results for specialists. The key finding of this analysis is that the standard dentist-to-population ratio is a relatively poor indicator in terms of assessing the distribution of dental practices when compared to an economic model (i.e. dentists tend to locate their practices in the areas that offer them the best chances of providing them and their employees with long-term financial stability, even if those areas are not the most underserved). It may become necessary, as the shortage of dentists becomes more acute in upcoming years, to consider structuring some form of economic practice incentives to assure the establishment of an adequate number of dental practices in those rural counties where the economic model suggests dentists may not otherwise locate.

Ten-Year Trends

This section presents estimates of the need for dental services and the number of dentists expected to be in practice in Wisconsin for the years 2000-2010. In order to arrive at projections regarding the number of dentists and the availability of service, the analysis projects changes in the number of dentists leaving and entering practice, dentist age and gender, the number of dental auxiliaries employed by dentists, dental practice productivity, hours worked per year, and office space. With respect to changes in dental service needs, the analysis projects changes in population, age, income, average Decayed, Missing or Filled Surfaces (the estimate of which was based on the age distribution of the county), and Medicaid insurance coverage.

Looking at the estimates of the number of Wisconsin dentists expected to retire from practice, the number of new dentists expected to enter practice, and the differences for the years 2001 to 2010, it is expected that the number of retirees per year will increase, primarily as a factor of the aging demographics of dental professionals, from 69 (2001) to 111 (2010). In contrast, the number of dentists entering practice per year is expected to increase more slowly, from 54 (2001) to 58 (2010). Thus, the discrepancy between the number of dentists retiring and entering practice is expected to range from 15 in 2001 to 53 in 2010. The overall effect is that by the year 2010, it is estimated that Wisconsin will have experienced a net loss of 297 dentists, or approximately 10 percent of the current workforce of 2,979 dentists (this number includes specialists), leaving a total of 2,682 practicing dentists (again, including specialists). If the current dentist-to-population ratio of 1/1,775 (general dentists) were used, the number of general dentists required by 2010 in order to maintain current levels of access and service availability would be 3,106, creating a deficit of 424 dentists. It is anticipated that this shortage will be somewhat offset by increases in dentist productivity and possibly by advances in both technology and dental treatments, which may reduce the predicted per capita utilization of services.

Although the number of dentists will decline about 10 percent, dentist productivity is expected to increase 1.9 percent per year. This will be driven primarily by increased use of auxiliaries, new and improved clinical technologies, and greater demand for care (i.e., which is expected to have the effect of increasing the "level of busyness" in

individual practices). On the demand side, the population of Wisconsin is expected to grow .42 percent per year, with the demand for dental care per person increasing an estimated .98 percent per year (primarily because of an older and more affluent population). As a result of the decline in dentists and growth in population, the dentist to population ratio is expected to decline from the current 1/1775 general dentists to 1/2055 general dentists, a 14 percent reduction in the dentist-to-population ratio. The competing forces of fewer but more productive dentists and a larger and more affluent population that demands more care are expected to offset each other to the extent that the overall shortfall in 2010 would be about 194 additional equivalent dentists needing to be added to Wisconsin's dental marketplace if the goal were to do nothing more than maintain current levels of access and service availability. That is, to continue to meet the expected level of Wisconsin's dental care needs in 2010 with no improvement in present access to or availability of services, the State will need to have 194 more dentists than are currently projected to be in practice at that time.

The impact of this decline in dental personnel will almost certainly not be uniform across the State. The economic model strongly suggests that the decline of 297 dentists will disproportionately affect rural counties and inner city areas, since new dentists entering the State will tend to locate in the more suburban and affluent areas where relative income and the overall demand for care will be substantially higher than they are today.⁶

Based on these analyses and assuming minimal changes in the current delivery system, it is extremely unlikely that the dentist workforce as projected in 2010 will be able to maintain even present levels of access and service within the State, with expected shortages becoming even more pronounced in the rural and less affluent areas of the State.

Options to Increase Capacity to Provide Dental Services

This section examines the potential impact of several options for increasing the capacity of the dental care system to provide dental services in Wisconsin. These

⁶ An attempt was made to predict the number of dentists in the year 2010 on a county by county basis, however, the results were too variable to be useful in planning.

options are not mutually exclusive, nor are they necessarily the only options available. The WDA will review the options and hopes to work with other interested groups to research them in greater detail in order to determine what combination of actions may be economically feasible and/or appropriate to address future dental workforce needs in Wisconsin.

In assessing various options, it is important to note that the expected decrease in the number of dentists relative to expected increases in the need for dental services will require considerable effort to correct – even assuming that current levels of access and availability of care are acceptable from a policy standpoint and to Wisconsin residents. If it is necessary to increase access beyond current levels, either for the State generally or for specific counties, the options will need to be employed more aggressively.

Number of Dentists Based on current trends about 56 dentists will enter practice, with between 69 and 111 leaving practice, in each year in Wisconsin for the next 10 years. To keep the supply of dentists the same in the year 2010 as it is now will require at least an additional 194 dentists. One option is to find a way to increase the number of Marquette University graduates who remain to establish practices in the State. Previously, only 31 of the 75 senior students from Marquette eventually entered practice in Wisconsin. This data was gathered by the researchers and might not reflect the actual number of new dentists coming into Wisconsin over the last 5 to 10 years. While there has been discussion about raising State funding subsidies in order to increase the proportion of Wisconsin residents in Marquette University School of Dentistry classes, no such funding had been approved as of the date of this Report. An increase in the number of Wisconsin residents per class would be expected to result in more Marquette graduates practicing in the State, with an increase of 10 Wisconsin students per class resulting in, perhaps, 50 more practicing Wisconsin dentists by 2010.

A related option might be to increase Marquette's overall class-size by up to 20 percent. This assumes that qualified applicants are available from Wisconsin or neighboring states. This will have limited impact on the supply of dentists in 2010, since it will be five to six years before these additional graduates enter practice. Of course, longer term, this would appear to be a sound approach to increasing the supply of dentists

available to the State.

An effort could be made to attract graduates from other states to practice in Wisconsin. This may have only a limited effect, however, since other states facing the same shortfall in the number of practicing dentists might be expected to match any incentives offered by Wisconsin.

Age of Retirement .On a national average, dentists retire between the ages of 60 to 65, with a mean age of retirement currently estimated at 62 years of age. If the age of retirement were delayed one year for 50 percent of all projected retirees, over ten years this could add about 42 dentists to the workforce. This option could prove particularly attractive, especially if it could be focused on those specific counties experiencing the most acute shortages of dentists.

The incentives needed to keep dentists practicing a few more years may include tax credits or providing opportunities to allow them to establish relationships with the Marquette University Dental School faculty and its students. Tax credits for staying in practice would apply only to State taxes, so the overall financial incentive is likely to be relatively modest, especially in comparison to the annual income of dentists. Creating teaching relationships with Marquette and allowing older dentists to teach Marquette students, either in their own practices or at the dental school, may also provide an incentive to continue in practice. An additional reason to look further into the possible implementation of this type of approach is that it could be implemented with no change in State laws or regulations.

Use of Auxiliaries .The addition of more dental hygienists and assistants can increase substantially the productivity of dentists, leading to more patients receiving care. For example, a ten percent increase in the number of auxiliaries employed is the equivalent of adding 160 dentists to the workforce. While this strategy has considerable promise, it assumes that (i) Wisconsin dentists are underutilizing auxiliaries now, (ii) trained hygienists and assistants are available to employ, (iii) significant numbers of dentists

would be willing to employ more auxiliaries⁷, and (iv) more auxiliaries can be employed without sacrificing the level of dentist oversight necessary to assure quality of care.

An important factor potentially limiting this option is the ability to educate more dental hygienists. Since more than 70 percent of Wisconsin hygienists have a two-year associates degree, it should be possible to increase the number of hygiene graduates (assuming that there are qualified applicants and that funds are available for additional space, equipment, and staff). This option also requires dentists to employ more auxiliaries, possibly even beyond the current demand for hygienists. An educational effort by the WDA, along with governmentally subsidized management training for dentists in the use of auxiliaries, may result in dentists increasing their use of auxiliaries, assuming additional trained auxiliaries were to become available for employment.

Expansion of Community Education Programs. Senior dental students and dental residents are demonstrably more productive in delivering care in community clinics and practices when directly supervised by local dentists. In states such as Colorado, preceptor dentists also continue to treat patients while supervising one or two dental students. If senior students at Marquette were to spend a larger portion of their senior year in community clinics and practices, treating underserved patients under the direct supervision of local dentists, it could make a significant contribution to the supply of dentists while at the same time increasing the availability of care to underserved portions of the community. This same strategy may apply to students in general practice residency programs. Likewise, Marquette faculty could play an important role in increasing access to the underserved if they were to treat patients in connection with their supervision of senior dental students.

A related effort could be to expand the general practice residency program by recruiting dentists from other countries. These residents could spend a substantial portion of their time treating patients in underserved areas of the State. Expanding the current General Practice Residency program by ten people should not be difficult to accomplish,

⁷ The recently completed statewide survey indicates that the demand for dental hygienists is greater than the current supply. Thus, it seems clear that dentists do want to employ more hygienists.

although it may present issues concerning the adequacy of training received by residents from different countries.

Discussion

The value of this Report depends on the quality of data used in the analysis. Although the project had access to the best data sets available, a lack of information on practice characteristics specific to Wisconsin dentists and limited data availability at the county level were significant constraints.

Another limitation of predictive studies of this type is that they cannot factor in unexpected economic or environmental events that are beyond the control of the WDA or even State government. In a ten-year period, economic recession and expansion, growth of insurance coverage, and other such factors are likely to have an important, but unknown, impact on these results.

The primary finding of the study is a predicted absolute decline in the number of practicing dentists in Wisconsin through 2010. Primarily, this results from the number of retirees exceeding the number of dentists expected to enter practice, leading to a net loss of 297 dentists over ten years. Of equal importance, the study predicts that the per capita demand for dental services and the population of the State will each increase. While dental practice productivity is also expected to increase over the next ten years, those increases will not be sufficient to offset the increased need for dental services. Consequently, there will be a relative decline in access to care, equivalent to a net loss of approximately 194 dentists. This means that to do nothing more than keep access at the current level,⁸ an additional 194 dentists will be needed in 2010. The economic model used in this research projects that the decline in access will be most severely realized in the State's rural and lower income counties.

The study offered several options for addressing predicted access problems. No one option was clearly superior and several need to be researched in their entirety, taking into consideration local factors (e.g., political feasibility) that are familiar to the leadership of the WDA but not to the research team.

⁸ As noted previously, there is substantial anecdotal and observational evidence to suggest that current access and service availability of dental care in Wisconsin are already below desired levels.

It is also important to stress that while limits on the number of Wisconsin students in Marquette University Dental School classes and the State's reliance on Marquette as the only consistent source of practicing dentists may make Wisconsin particularly susceptible to future shortages, other states are likely to face similar problems with access to care (especially in rural and inner city areas). This suggests that a number of states will be competing for new dental graduates and that no one state is likely to be able to solve its own access issues by recruiting new or established dentists from other states. At best, any one state will only have a short-term advantage before competing states offer dentists equal or better incentives to practice in their states.

Finally, good planning requires continuous testing of the basic assumptions underlying this project. The current study needs to be periodically updated, or at least reassessed, to make sure that its conclusions remain relevant to the changing dental and economic environment. A study should also be done on the current dental needs of the State's population and the adequacy of current levels of access and service availability. Absent that information, there can be no clear picture on either (i) the overall dental care needs of the citizens of Wisconsin, or (ii) the changes needed to ensure development of a dental workforce sufficient to meet those dental care needs in the future.