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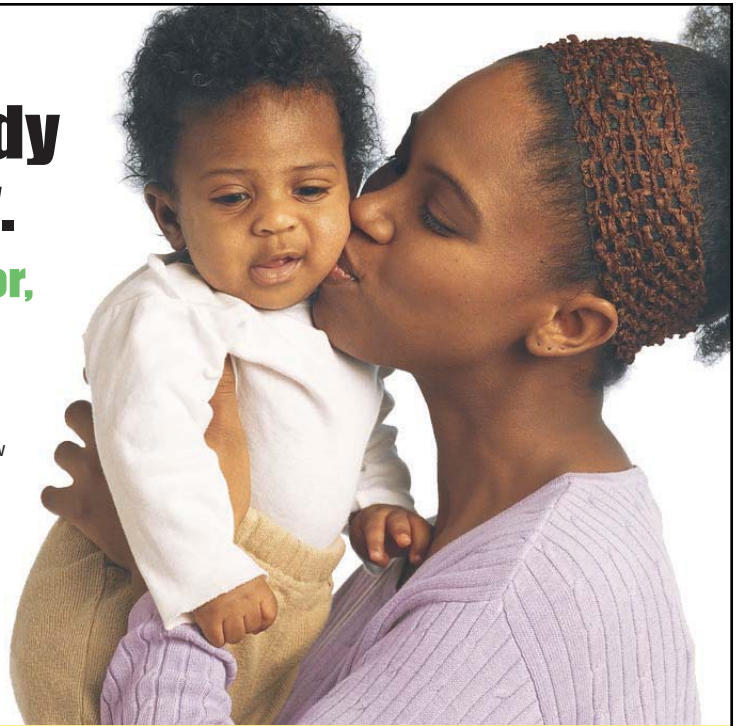
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Attainment of Goals from National Guidelines among Persons with Type 2 Diabetes: A Cohort Study in an Academic Family Medicine Setting

Julienne K. Kirk, PharmD, Kenneth R. Huber, MS, and C. Randall Clinch, DO, MS

Abstract

Background: Cardiovascular disease is the leading cause of mortality in patients with diabetes, but goals for reduction of modifiable cardiovascular risk factors are difficult to achieve in primary care. We evaluated the change in risk factor control for a cohort of patients with diabetes and hyperlipidemia over a four-year period, as well as the change in proportion of patients meeting clinical practice guideline goals.

Methods: Medical records were reviewed from a cohort of 86 randomly selected persons with type 2 diabetes in an academic family medicine setting. Data were abstracted to assess the attainment of and change in five treatment goals related to glycemic, blood pressure, and lipid control from 1999-2003. Descriptive statistics were applied to demographic variables. Mean differences in outcomes were assessed with the paired t-test. The McNemar test was used to assess non-parametric variables, and the Wilcoxon signed ranks test was applied to differences achieved in mean goal scores for outcome variables.

Results: The mean numbers of treatment goals attained were 2.76 (SD = 0.92) in 1999 and 2.48 (SD = 1.1) in 2003. Significant improvements were noted in the mean values of HbA1c (0.4% decrease, $p = 0.03$), diastolic blood pressure (4.3mmHg decrease, $p < 0.001$), low-density lipoprotein cholesterol (LDL-C; 10.6 mg/dL decrease, $p < 0.01$), and high-density lipoprotein cholesterol (HDL-C; 8.3 mg/dL increase, $p < 0.001$) over the four-year study interval. No significant differences were noted in the percent at goal during the study for HDL-C or for HbA1c. A significant decrease was found in the percent at goal from 1999-2003 for LDL-C (from 79% to 40%, respectively). The decrease in the percent LDL-C at goal was explained by the more stringent practice guideline goals introduced in 2001 for diabetes (i.e., LDL-C < 100 mg/dL).

Conclusion: Despite significant improvement in mean values of modifiable risk factors, the percent of patients meeting 2003 guideline goals for HbA1c, systolic blood pressure, and LDL cholesterol did not improve. These findings suggest that patient-level improvements may not be adequate indicators of a practice's achievement of guideline recommendations. Percent attainment of guideline goals may be a useful performance measure of practice-level quality improvement initiatives.

Key words: Type 2 diabetes, blood pressure, HbA1c, hyperlipidemia, dyslipidemia, National Cholesterol Education Program (NCEP) Adult Treatment Panel guidelines, LDL cholesterol, body mass index, American Diabetes Association (ADA) Standards of Care, Primary Care

Introduction

Diabetes has been diagnosed in approximately 13 million people in the United States, with an additional estimated 5.2 million cases remaining undiagnosed.¹ Cardiovascular disease (CVD) is responsible for approximately 65% of diabetes-related deaths, with a two- to four-fold higher CVD death rate noted among adults with diabetes versus those without diabetes.¹ As

such, the prevention of CVD is a primary goal in the management of patients with diabetes.

The American Diabetes Association (ADA) has put forth guidelines annually for several of the modifiable risk factors of CVD, including control of glycemia, blood pressure, and blood lipid concentrations.² The National Heart, Lung, and Blood Institute (NHLBI) has established widely used clinical guidelines for the screening and treatment of blood lipids [National

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Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults].^{3,4} Consensus recommendations for blood pressure control have been established by the Joint National Committee (JNC) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.^{5,6}

Many individuals with diabetes receive treatment in a primary care setting, and published literature indicates goals targeting CVD risk reduction among persons with type 2 diabetes are not being optimized.⁷⁻⁹ The intent of the current study builds upon a previously published cross-sectional analysis,⁷ which described the frequency with which ADA (hemoglobin A1c or HbA1c), NCEP (cholesterol), and JNC (blood pressure) goals were met in a family practice setting for persons with type 2 diabetes. Kirk et al,⁷ revealed that overall blood pressure, low density lipoprotein cholesterol (LDL-C), and HbA1c values did not reach the goals for the guidelines in effect in 1999.^{3,5,10} Evidence further demonstrating the benefits of achieving and maintaining blood pressure, LDL-C, and glycemic control has accrued since this initial publication.¹¹⁻¹⁵ Changes in the guidelines related to the control of blood lipids and blood pressure since our first study have led to recommendations for tighter control of these parameters (see Table 1).^{2,4,6} The purpose of the current study was to conduct a follow-up analysis on the cohort of persons with diabetes from our previous study, focusing on the attainment of CVD-related guideline parameters (i.e., HbA1c, LDL-C, HDL-C, and blood pressure).

physician assistants, two registered nutritionists, and one pharmacist diabetes educator. Resident physicians, physician assistants, and faculty physicians care for patients seen in this practice.

The methods of this prior study are reported elsewhere.⁷ Briefly, medical records were randomly selected using ICD-9 codes for type 2 diabetes and hyperlipidemia. Demographic variables (i.e., patient age, gender, and race) as well as height, weight, personal and family coronary heart disease history, tobacco use, total cholesterol, LDL-C, HDL-C, triglycerides, HbA1c, and systolic and diastolic blood pressure values were abstracted from a structured review of the medical record. The study protocol was approved by the Institutional Review Board. For the current study, follow-up data were available on 86 patients. Seven of the original 124 patients were excluded because they were involved in a clinical trial where management of blood pressure, lipids, or HbA1c was dictated by a study protocol, and 31 of the original patients were lost to follow-up (i.e., patient changed healthcare provider or died).

Descriptive statistics were performed to compute means, standard deviations, frequencies, and percentages for the demographic variables and for the lipid, blood pressure, body mass index, and HbA1c variables. Simple means were calculated for the lipid, blood pressure, and HbA1c variables. Chart data were eligible for abstraction if an office visit was associated with the collection of laboratory data. No patient had more than four eligible office visits for either year studied; missing values were

excluded from the analysis. The mean values for the lipid, blood pressure, and HbA1c values were then combined with the appropriate demographic variables to determine if a patient was meeting the goals recommended by the ADA or the NHLBI. The paired samples t-test was used to assess for a difference at the level of the patient in the means of the LDL-C, HDL-C, body mass index, HbA1c, and systolic and diastolic blood pressure values between the two study periods of 1999 and 2003 (two-sided alpha = 0.05). The non-parametric McNemar test was used to assess for a significant difference in the number of patients at

the identified goal for LDL-C, HDL-C, HbA1c, and systolic and diastolic blood pressure values between 1999 and 2003 (alpha = 0.05). A "goal score" was computed for each year, 1999 and 2003, with a value of "5" representing a person who attained the recommended goal for each of the five variables under study (i.e., for LDL-C, HDL-C, HbA1c, and systolic and diastolic blood pressure) for that year; a value of "0" represented a patient who met none of the goals for the five variables under study for that year. A histogram was created to depict the distribution of the goal scores for the years 1999 and 2003. The Wilcoxon signed ranks test was used to test for a difference between the mean "goal scores" as well as between the five individual variables from 1999

Table 1.
Guidelines for Persons with Diabetes

Parameter	Year	
	1999	2003
HbA1c*	< 7%	< 7%
Systolic blood pressure†	< 130	< 130
Diastolic blood pressure†	< 85	< 80
LDL-C‡	< 160/< 130/< 100 mg/dL [§]	< 100 mg/dL
HDL-C‡	>/= 35 mg/dL	>/= 40 mg/dL

* Based on American Diabetes Association guidelines

† Based on Joint National Committee for the Detection and Prevention of Hypertension Report, HDL-C = high density lipoprotein, LDL-C = low density lipoprotein

‡ Based on the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol

§ LDL-C goals based on risk stratification per NCEP Adult Treatment Panel (ATP) II³

Methods

A cross-sectional analysis evaluating CVD risk factors and pharmacotherapy in a randomly selected sample of 124 persons with type 2 diabetes and hyperlipidemia was previously performed.⁷ Data were obtained from an academic family medicine clinic in the southeast. Approximately 56,000 patient visits to this clinic are conducted annually, and the mix of insurance coverage includes Medicare (22%), Medicaid (12%), managed care (61%), and self-pay (5%). There are 30 medical residents in training along with three fellows, 15 faculty physicians, three

and 2003 (two-sided alpha = 0.05). All statistical analyses were carried out using SPSS (Version 12.0).

Results

The mean age of our sample was 59.6 years (SD 12.6 years); 53.7% were women. Approximately 54% were African American, and 47% were white. Analyses of those patients from the baseline study lost to follow-up revealed no significant differences from those included in the current study, with the exception of higher mean total cholesterol and triglyceride measures (225 mg/dL versus 207 mg/dL, $p = 0.03$; 357 mg/dL versus 217 mg/dL, $p = 0.03$, respectively).

There was an overall low percentage of missing data in the current study. The systolic and diastolic blood pressure variables had no missing data; the HbA1c and HDL-C variables had 1.2% missing data; and the LDL-C variables had 5.8% missing data. Missing data were excluded from analyses.

At the patient level, significant differences were noted at the 2003 follow-up for HbA1c (a 0.4% decrease; $p = 0.03$), diastolic blood pressure (a 4.3 mmHg decrease; $p < 0.001$), LDL-C (a 10.6 mg/dL decrease; $p < 0.01$), and HDL-C (an 8.3 mg/dL increase; $p < 0.001$). There was a trend toward a significant decrease in systolic blood pressure (a 3.5 mmHg decrease; $p = 0.09$) (see Table 2). No difference was detected in the body mass index ($p = 0.89$).

The number and percent of persons with diabetes “at goal” for HbA1c, systolic blood pressure, diastolic blood pressure, LDL-C, and HDL-C are listed in Table 3. While mean LDL-C improved by 10.6mg/dL between 1999 and 2003, the percentage of patients at goal for LDL-C significantly worsened (from 79.1% at goal in 1999 to 39.5% at goal in 2003; $p < 0.001$). No significant differences were found among the other four variables, though there was a trend toward a significant improvement in the percent at goal for HDL-C ($p = 0.09$).

Overall, mean goal scores were lower in 2003 than 1999 ($p = 0.035$). The mean number of goals met in 1999 was 2.8 with a standard deviation (SD) of 0.92; only two patients met all five goals, while nine patients met only one goal (see Figure 1). In 2003, the mean number of goals met was 2.48 (SD 1.1).

Similarly, only two patients met all five goals; however, three patients did not meet any of the goals that year. When considering the five individual quality indicator variables of HbA1c, systolic blood pressure, diastolic blood pressure, LDL-C, and HDL-C, the only significant difference noted in goal scores was a decrease in the LDL-C score ($p < 0.001$) from 1999-2003.

The 1999 NCEP ATP II LDL-C goals were then applied to our 2003 data. When applying these earlier criteria, no significant difference in the percentage of patients at goal for LDL-C was noted in the 2003 data: 83% (71/86) were at goal in 2003 vs. 79% (68/86) in 1999 (Chi-square 2-sided $p = 0.19$).

Table 2.
Change in Quality Indicators 1999-2003

Indicator	Mean (SD)	Mean (SD)	Difference	95% CI of the Difference
	1999	2003		(Lower, Upper)
HbA1c	8.6 (2.0)	8.2 (1.8)	-0.4	(-0.76, -0.05)
Systolic BP	137.6 (18.6)	134.1 (14.3)	-3.5	(-7.49, 0.55)
Diastolic BP	76.2 (9.3)	71.9 (9.2)	-4.3	(-6.38, -2.22)
LDL-C	125.5 (39.8)	114.9 (40.9)	-10.6	(-18.10, -3.09)
HDL-C	38.9 (11.2)	47.2 (12.1)	8.3	(8.55, 10.25)

SD (standard deviation), CI (Confidence Interval), BP (blood pressure), LDL-C (low-density lipoprotein cholesterol), HDL-C (high-density lipoprotein cholesterol)

Table 3.
Frequency “at Goal” for Quality Indicators 1999 vs. 2003

Indicator	1999	2003 using 1999 standards	2003 using 2003 standards	Difference in number “at Goal” P value [†]
	N (%)	N (%)	N (%)	
	At Goal	At Goal	At Goal	
HbA1c	12 (14.1)	*	16 (18.8)	0.33
Systolic BP	32 (37.2)	*	34 (39.5)	0.86
Diastolic BP	72 (83.7)	79 (91.9)	68 (79.1)	< 0.001 [‡] 0.48 [§]
LDL-C	68 (79.1)	71 (82.6)	34 (39.5)	0.68 [‡] < 0.001 [§]
HDL-C	53 (61.6)	74 (86)	61 (71.8)	< 0.001 [‡] 0.09 [§]

* No change in the 2003 standards occurred for this quality indicator, therefore the data are the same as those in the “2003 using 2003 standards” column,

[†] McNemar test

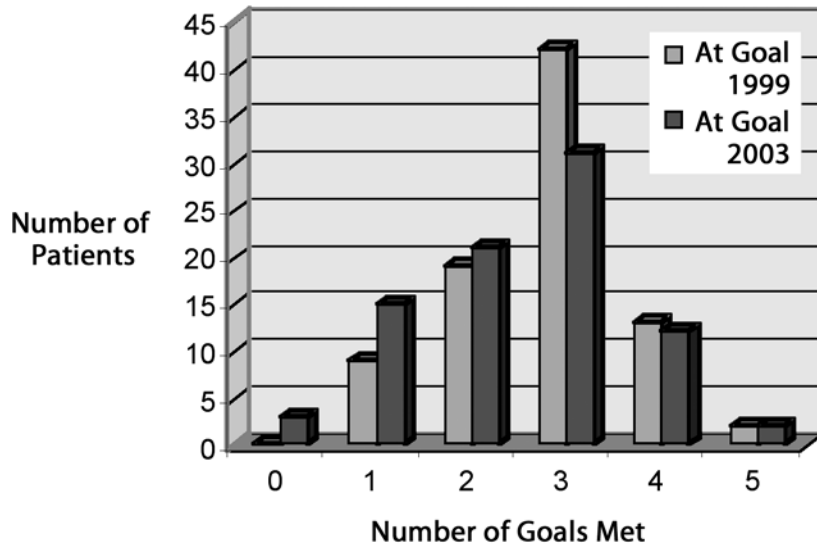
[‡] P value reflects the difference in number at goal for this quality indicator in “1999” vs. “2003 using 1999 standards”

[§] P value reflects the difference in number at goal for this quality indicator in “1999” vs. “2003 using 2003 standards”; BP (blood pressure), LDL-C (low-density lipoprotein cholesterol), HDL-C (high-density lipoprotein cholesterol)

Discussion

While improvement with respect to decreased mean HbA1c, diastolic blood pressure, and LDL-C, and increases in the mean HDL-C were achieved over the four-year study interval, the overall number of patients at goal for LDL-C decreased by approximately 40% (see Tables 2 and 3). This paradoxical improvement in patients’ mean LDL-C levels despite a decrease

Figure 1.
Number of Cardiovascular Disease-Related Guideline Goals Met (1999 vs. 2003)



in the number of patients at goal for LDL-C in 2003, are explained by the change in the NCEP ATP III guideline with the introduction in 2001 of type 2 diabetes as a coronary artery disease equivalent and the new LDL-C goal of less than 100 mg/dL.

Attainment of goals targeting metabolic endpoints related to cardiovascular disease risk reduction among persons with type 2 diabetes has been studied among primary care providers.⁷⁻⁹ Some primary care practices have used computer-assisted interventions to improve diabetes care with limited improvement in metabolic outcomes.¹⁶ Compliance with blood pressure or lipid guidelines in cross-sectional data are based primarily on surrogate markers, such as reports of awareness of guideline recommendations,¹⁷ physicians' perceived implementation of guidelines,¹⁸ or performance of recommended screening tests.¹⁹ However, even high rates of risk factor testing (HbA1c, blood pressure, LDL-C) have been shown not to correlate with optimal metabolic control among persons with diabetes.²⁰ Grant et al., found that high annual testing rates corresponded to only 34% of patients at goal for HbA1c (< 7%), 33% at blood pressure goal (< 130/80), and 46.1% at goal for LDL-C (< 100 mg/dl).²⁰ Primary care providers are not alone in their difficulty achieving practice guideline goals. Aliyu et al., reported that 38% of cardiologists' patients with established coronary heart disease and no contraindications to statin therapy had sub-optimal management of their dyslipidemia when compared against the NCEP ATP III guidelines.²¹

A previous cross-sectional study assessing ADA-specific lipid treatment goals among adults with type 2 diabetes in a university primary care setting revealed 42% were at goal for HDL-C, and 47% were at goal for LDL-C.⁸ In a comparison of national samples of white, African-American, and Mexican-American persons with type 2 diabetes, Harris reported the percent of those with LDL-C values less than 100 mg/dL were

15.4%, 19.6%, and 21.1%, respectively.²² The percent at goal for HbA1c (i.e., < 7%) for all subjects was 44.6%.²³ In the current study, we found that 71.8% (61/85) of patients were at goal for HDL-C in 2003, while only 39.5% (34/86) were at goal for LDL-C. Only 18.8% (16/85) were at goal for HbA1c (see Table 3). Most patients were at goal for only two of the five variables under study in both 1999 and 2003 (see Figure 1).

A limitation of the current study is its small sample size. The fact that the study patients were from an academic family medicine practice also limits the external validity of the study. While the patients seen in this practice are representative of a mixed population, greater than half of the patients have a managed care

plan. Additionally, this follow-up study included only persons with type 2 diabetes and a coexisting diagnosis of hyperlipidemia. It is possible that the percentage of those at goal for HbA1c may differ among persons with type 2 diabetes without hyperlipidemia. Another consideration is the potential confounding effect of the aging of our cohort; treatment goals may be more difficult to achieve with advancing age.

Summary

This longitudinal study, conducted among a sample of persons with type 2 diabetes in an academic family medicine setting, describes the attainment of goals related to metabolic control and CVD risk reduction. The current study highlights the impact that changes in guideline recommendations can have on a practice's achievement of metabolic goals despite improvements at the patient level. We found that patients achieved on average approximately half of the guideline-specific goals related to CVD risk reduction. These results echo those of other investigators in that practice guideline goals are difficult to attain in the primary care setting. Further research is needed to elucidate the barriers related to attaining guideline-specific goals for patients with diabetes in primary care, such as short, infrequent visits; lack of information technology support; and competing demands.²⁴ Our findings suggest that patient-level improvements may not be adequate indicators of a practice's achievement of guideline recommendations. Percent attainment of guideline goals may be a useful performance measure of practice-level quality improvement initiatives.

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Trends in Up-to-Date Status in Colorectal Cancer Screening, North Carolina, 1998-2002

Jane A. Kim, MD, MPH, Deborah Porterfield, MD, MPH, and Ziya Gizlice, PhD

Abstract

Background: Rates of colorectal cancer (CRC) screening are rising nationwide. Our purpose was to determine the proportion of North Carolina adults who were up-to-date with CRC screening in 1998-2002 and analyze trends by socio-demographic subgroups.

Methods: We examined data from the North Carolina Behavioral Risk Factor Surveillance System. For 1998, 1999, 2001, and 2002, we determined the proportion of respondents 50 years old and older who were up-to-date, defined as a home fecal occult blood test (FOBT) in the past 12 months and/or a sigmoidoscopy or colonoscopy in the past five years. We examined trends in up-to-date status in all respondents and in selected socio-demographic subgroups. We also examined the characteristics of respondents who were up-to-date in 2001-2002.

Results: From 1998-2002, the percentage of respondents 50 years old or older who were up-to-date with CRC screening increased from 46.1% to 54.0% (test for trend, $p < 0.0001$). The proportion who were up-to-date increased among those 50-74 years old, those with a high school or college education, and those with incomes less than \$25,000. Proportions that were up-to-date did not significantly increase among African Americans and respondents with less than a high school education. In 2001-2002, we found low percentages that were up-to-date among adults 50-54 years old, Hispanics, and the uninsured.

Conclusions: The proportion of North Carolina adults who are up-to-date with CRC screening is increasing, but not across all socio-demographic groups. These results indicate that there are subgroups that need to be reached with screening programs. Efforts to educate the public and providers about CRC screening should continue.

Introduction

Colorectal cancer (CRC) is a leading cause of cancer in the United States and ranks only behind lung cancer as a cause of cancer death.¹ The American Cancer Society (ACS) estimates that 4,100 new cases and 1,590 deaths from colorectal cancer will occur in North Carolina in 2005.¹ Colorectal cancer screening reduces mortality²⁻⁶ and is cost-effective.^{7,8} The United States Preventive Services Task Force, the American Gastroenterological Association, the ACS, and others recommend screening for adults 50 years old or older.⁹⁻¹¹ Multiple modalities can be used for screening: a yearly fecal occult blood test (FOBT), flexible sigmoidoscopy or barium enema every five years, a combination of FOBT and sigmoidoscopy, or

colonoscopy every ten years (see Table 1). Despite expert group recommendations and multiple screening modalities, national rates of CRC screening^{12,13} remain far below rates for mammography, prostate-specific antigen screening, and Pap smear testing.¹⁴⁻¹⁶

Although CRC screening rates were low throughout the 1990s, recent data from the national Behavioral Risk Factor Surveillance System (BRFSS) show modest increases in screening rates. From 1999-2001, the percentage of adults 50 years old or older who reported FOBT screening within the past 12 months increased from approximately 19% to 24%, and the percentage reporting a sigmoidoscopy or colonoscopy within the past five years improved from 34% to 39%.^{12,13} In 2001, approximately 53% of adults 50 years and older were up-to-date with screening, defined as an FOBT in the past 12 months or

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Table 1.
Colorectal Cancer Screening Guidelines for Average Risk[§] Individuals
50 Years Old or Older^{* 9-11}

Any one of the following:

1. Yearly fecal occult blood testing (FOBT)
2. Flexible sigmoidoscopy (FS) every five years
3. Combined yearly FOBT and FS every five years**
4. Colonoscopy every ten years
5. Double-contrast barium enema every five years

[§] Average risk: individuals without a family or personal history of colorectal cancer, personal history of adenomatous polyps, and the absence of an illness, such as inflammatory bowel disease that predisposes individuals to CRC

^{*} Recommendations of the American Gastroenterological Association Consortium Panel, United States Preventive Services Task Force, and American Cancer Society (ACS)

^{**} ACS recommends the combination of flexible sigmoidoscopy and FOBT over either test alone

a lower endoscopy (colonoscopy or sigmoidoscopy) in the last ten years.¹³

Recent trends in up-to-date status in North Carolina are of interest to the Cancer Prevention and Control Branch of the North Carolina Division of Public Health, which is responsible for surveillance and has implemented CRC screening programs for underserved populations in the past. These trends are also of interest to the Advisory Committee for Cancer Coordination and Control, which makes recommendations on cancer screening and control for North Carolina and is currently writing an updated state plan for cancer control. We were also interested in assessing recent trends in CRC screening to determine if various factors, such as insurance policy changes, state-based legislation, and public awareness campaigns might have resulted in an increased proportion of North Carolinians who were up-to-date with CRC screening. We examined the data from the North Carolina BRFSS for trends in CRC screening rates, including trends across selected socio-demographic subgroups from 1998-2002. We also evaluated the characteristics of those who were up-to-date in 2001-2002 in order to identify populations that might be in need of interventions to improve the performance of CRC screening.

Methods

The BRFSS is a multistage, random-digit-dialed, state-based telephone survey of noninstitutionalized adult United States residents ages 18 and older.¹⁷ The BRFSS consists of a core set of questions with additional optional modules for topics, such as colorectal cancer screening. States have the option to add these additional modules based on the data needs of their state. Colorectal cancer screening questions were mandatory core items in the 1999, 2001, and 2002 BRFSS. The North Carolina Cancer Prevention and Control Branch paid to add questions to the 1998 BRFSS for enhanced surveillance of colorectal cancer screening behavior and needs assessment for public health programs.

During the study period, the North Carolina BRFSS conducted 17,764 interviews. Colorectal cancer screening questions

were asked of the 7,642 respondents who were ages 50 years old or older at the time of the interview. Response rates of all eligible individuals with telephones in North Carolina ranged from 56% (2001) to 64% (1998) and were calculated via the CASRO method.¹⁸ The CASRO method calculates the response rate by taking the percentage of complete and partial interviews out of an estimate of all eligible households.

Interviewers asked four questions about whether respondents had ever been screened with sigmoidoscopy/colonoscopy or a home FOBT and, if so, when they received screening (see Box 1). To reflect updated evidence regarding colonoscopy and proctoscopy, endoscopy questions changed in

1999 to ask about screening with "sigmoidoscopy/colonoscopy" instead of "sigmoidoscopy/proctoscopy." For this analysis we refer to both sets of terms as "endoscopy." In 2001, BRFSS changed endoscopy response choices to include endoscopy within the past ten years, the time frame recommended for colonoscopy screening. We defined up-to-date status for the analysis of trends from 1998-2002 as a home FOBT in the past 12 months and/or a sigmoidoscopy or colonoscopy in the past five years. We chose this definition in order to compare trends across years because the ten-year answer choice was not available before 2001.

For each year with data on CRC screening from 1998-2002, we determined the proportion of respondents who were up-to-date with screening for the total number of respondents as well as for the socio-demographic subgroups of gender, age, race, education, and household income. Those who responded "do not know/not sure" or "refused" were excluded. We used a test for trend to determine if there were significant trends in the proportions who were up-to-date with CRC screening. Trends were not calculated for subgroups with less than 100 respondents in a given year.

For 2001 and 2002, we also calculated the percentages who were up-to-date using an alternate definition: FOBT within the past 12 months and/or a sigmoidoscopy/colonoscopy within the past ten years. Given that the national BRFSS now uses the ten-year time interval to determine the percentage of individuals who were screened with lower endoscopy during recommended time intervals,¹² we used this updated definition of up-to-date in order to be consistent with the national definition. This definition of up-to-date includes respondents who were appropriately screened with colonoscopy within the past ten years, but also those who had a sigmoidoscopy five to ten years earlier and were no longer up-to-date with guidelines. To evaluate whether screening according to guidelines increased significantly between 2001 and 2002, we compared the difference in the proportions of respondents who were up-to-date using a t-test.

We combined data from 2001 and 2002, the most recent years for which we had data, and examined the characteristics of respondents who were up-to-date with screening. Combining data from 2001 and 2002 allowed us to determine the proportions

Box 1

Questions on colorectal cancer screening, 2002 BRFSS (Behavioral Risk Factor Surveillance System)

A blood stool test is a test that may use a special kit at home to determine whether the stool contains blood. Have you ever had this test using a home kit?

- A Yes
- B No
- C Don't know/not sure
- D Refused

How long has it been since you had your last blood stool test using a home kit?

- A Within the past year
- B Within the past two years
- C Within the past five years
- D Five or more years ago
- E Don't know/not sure
- F Never
- G Refused

Sigmoidoscopy and colonoscopy are exams in which a tube is inserted in the rectum to view the bowel for signs of cancer or other health problems. Have you ever had either of these exams?

- A Yes
- B No
- C Don't know/not sure
- D Refused

How long has it been since you had your last sigmoidoscopy or colonoscopy?

- A Within the past year
- B Within the past two years
- C Within the past five years
- D Within the past ten years
- E Ten or more years ago
- F Don't know/not sure
- G Refused

who were up-to-date with screening in subgroups, such as the uninsured and Hispanics, groups with small numbers sampled in each individual year.

We used SUDAAN version 8 to calculate rates, averages, standard errors, and 95% confidence intervals.¹⁹ Data from the sample were weighted to adjust for unequal probabilities of selection due to the disproportionate sampling method and due to people living in households with different numbers of telephones and different numbers of adults. The final sample data were also weighted to account for unequal non-response rates among different demographic groups. Two-sided p-values < 0.05 were considered statistically significant. Analyses using BRFSS data are exempt from Institutional Review Board approval because the BRFSS does not have any personal identifiers and is a public health surveillance system. These data were analyzed as part of the surveillance work of the North Carolina Division of Public Health.

Results

Trends in Up-to-Date Status in Colorectal Cancer Screening, 1998-2002

The percentage of respondents 50 years old or older who reported a home FOBT in the past 12 months or endoscopy in the past five years increased from 46.1% [95% confidence interval (CI), 42.2, 50.1] in 1998 to 54% (95% CI, 51.2, 56.7) in 2002 (test for trend, $p < 0.0001$, see Table 2). Table 2 shows the trend in the percentage of all respondents that were up-to-date from 1998-1999 and 2001-2002, the years in which North Carolina asked questions about CRC screening, and Table 3 presents trends in up-to-date status by socio-demographic subgroups. There were statistically significant positive trends in up-to-date status among males and females, those 50-74 years old, whites, those with a high school or some college education, and those with incomes less than \$25,000 (see Table 3). There was a 24 percentage-point increase in up-to-date status among those with incomes less than \$15,000 (33% to 57%) and a 13 percentage-point increase from 31% to 44% in the 50-54-year-old age group. In contrast, there were no significant trends in the percentages who were up-to-date among respondents with less than a high school education or a college degree or greater and those with incomes greater than \$25,000. Respondents with higher levels of education and income already had high baseline percentages of individuals who were up-to-date in 1998; these groups experienced only small increases over the five-year period.

Proportions and Characteristics of Up-to-Date Respondents, 2001-2002

For 2001-2002, using the updated definition of up-to-date, which was an FOBT in the past 12 months or sigmoidoscopy/colonoscopy in the past ten years, the percentage of respondents who were up-to-date

Table 2.
Number and Percentage of North Carolina Respondents 50 Years Old or Older Who Were Up-to-Date with Colorectal Cancer Screening,* 1998-2002

	Total Number of Respondents	Percent	95% Confidence Interval
1998	931	46.1	(42.2, 50.1)
1999	1,031	45.2	(41.8, 48.7)
2001	2,473	55.4	(52.5, 58.2)
2002	2,942	54.0	(51.2, 56.7)

Test for trend, 1998-2002: t-value = 4.47, $p < 0.0001$

* FOBT within past 12 months and/or sigmoidoscopy/colonoscopy within the past five years

Table 3.
Trends in Up-to-Date Status in Colorectal Cancer Screening* by Socio-demographic Groups in North Carolina, 1998-1999, 2001-2002

Demographics	1998 Percent (Total)	1999	2001	2002	Trend Test P Value
Gender					
Male	44.8 (354)	43.3 (385)	54.6 (896)	51.9 (1,082)	0.01
Female	47.1 (577)	46.7 (646)	56.0 (1,577)	55.7 (1,860)	0.001
Age					
50-54	30.9 (162)	39.8 (216)	42.5 (536)	43.9 (624)	0.01
55-64	49.0 (301)	40.0 (306)	57.9 (803)	56.7 (955)	0.003
65-74	51.1 (279)	50.6 (299)	61.9 (643)	60.9 (782)	0.003
75+	49.7 (189)	53.0 (210)	56.8 (491)	52.4 (581)	0.47
Race					
White	45.0 (765)	45.2 (831)	56.4 (2,043)	54.8 (2,046)	0.0001
African-American	51.9 (151)	43.7 (180)	52.5 (350)	53.6 (370)	0.46
Education					
Less than high school	44.8 (269)	37.5 (268)	50.2 (526)	44.7 (655)	0.41
Some high school	44.4 (290)	43.4 (331)	54.4 (753)	57.2 (878)	0.001
Some college	42.6 (196)	49.0 (195)	57.9 (576)	54.3 (609)	0.01
College+	55.5 (169)	54.0 (235)	60.7 (609)	59.9 (788)	0.23
Household Income					
Less than \$15,000	33.0 (180)	37.5 (151)	47.3 (311)	57.2 (390)	0.001
\$15,000-\$24,999	45.3 (190)	46.4 (191)	54.6 (427)	48.1 (473)	0.001
\$25,000-\$34,999	51.9 (129)	47.3 (133)	59.5 (321)	51.3 (307)	0.62
\$35,000-\$49,999	57.8 (100)	42.0 (126)	56.9 (292)	57.1 (342)	0.55
\$50,000+	43.9 (122)	46.9 (183)	58.5 (521)	60.3 (573)	0.23

* FOBT within past 12 months and/or sigmoidoscopy/colonoscopy within past five years

with CRC screening was 57.4% in 2001 and 56.4% in 2002; this difference was not significant.

In the combined data from 2001 and 2002, approximately 58% of whites were up-to-date compared to 54% of African-Americans and 41% of other minorities, a category that included Asians, American Indians, and native Hawaiian or other Pacific Islanders (see Table 4). Fewer respondents of Hispanic origin were up-to-date with screening (49.9%) compared to those who were not Hispanic (57.0%). Only 45% of respondents 50-54 years old were up-to-date, compared to 59% of those 55-64 years old and 61% of those 65 years old or older. Forty-nine percent of respondents with less than a high school education were up-to-date versus 63% of those who had a college education or beyond. Approximately 59% of those with health insurance were up-to-date with screening, compared to only 34.8% of respondents without health insurance.

Discussion

From 1998-2002, the percentage of North Carolina adults 50 years old or older who were up-to-date with CRC screening increased, but remained low, and positive trends in up-to-date status were present in some, but not all socio-demographic subgroups. In 2001-2002, screening rates continued to improve, but more than 40% of respondents still had not been screened according to guidelines. There were notable disparities in the

percentages that were up-to-date in 2001-2002 by race, age, and insurance status.

The proportions of those who were up-to-date in North Carolina are similar to those obtained from the national BRFSS. In the 1999 national BRFSS, 44% of adults 50 years old or older were up-to-date with screening, defined as an FOBT in the past year or a sigmoidoscopy in the past five years,¹³ compared to 45.2% of North Carolina respondents. In the 2001 national BRFSS, 53.1% were up-to-date using the updated definition, an FOBT within the past 12 months or lower endoscopy within the past ten years.²⁰ In North Carolina, approximately 57% of respondents reported screening within these time intervals.

The increase in the percentages of North Carolina respondents who were up-to-date may be due to national and state efforts to promote CRC screening. The Centers for Disease Control and Prevention (CDC) launched multi-media campaigns in 1999 to educate the public and healthcare providers about CRC screening.²¹⁻²³ The American Cancer Society also implemented a colorectal cancer screening media campaign in March 1999 and 2000. Activities organized through North Carolina's Cancer Prevention and Control Branch of the North Carolina Division of Public Health included a media campaign to promote screening and regional training sessions for physicians. In addition, the North Carolina Advisory Committee on Cancer Coordination and Control funded a pilot project in 2000 to

Table 4.
Characteristics of North Carolina Respondents 50
Years Old or Older Who Reported FOBT within Past
12 months and/or Sigmoidoscopy/Colonoscopy
within the Past Ten Years, 2001-2002

Demographics	Percent (Total)	95% CI
Total	56.9 (5,418)	54.9, 58.9
Sex		
Male	55.2 (1,978)	52.0, 58.4
Female	58.2 (3,440)	55.8, 60.7
Race		
White	58.1 (4,452)	55.9, 60.2
African American	54.2 (720)	48.9, 59.3
Other minorities	41.1 (202)	30.7, 52.4
Hispanic	49.9 (83)	35.0, 64.7
Non-Hispanic	57.0 (5,325)	55.0, 59.0
Age		
50-54	45.4 (1,160)	41.1, 49.8
55-64	59.3 (1,758)	55.9, 62.6
65+	61.2 (2,500)	58.3, 64.0
Education		
Less than high school	49.1 (1,182)	44.9, 53.3
Completed high school	57.5 (1,631)	53.9, 61.0
Some college	59.3 (1,187)	55.2, 63.3
Greater than college	63.1 (1,397)	59.1, 66.9
Income		
Less than \$15,000	54.0 (701)	48.2, 59.8
\$15,000-\$24,999	54.0 (900)	49.2, 58.8
\$25,000-\$34,999	56.4 (629)	50.7, 62.0
\$35,000-\$49,999	60.2 (634)	54.5, 65.7
\$50,000+	61.8 (1,094)	57.4, 66.0
Health Insurance		
Yes	58.8 (5,014)	56.8, 60.8
No	34.8 (399)	28.3, 41.9

promote CRC screening in six local health departments.

Medicare and the North Carolina General Assembly implemented policy changes in 1998 and 2001 that may have contributed to the increasing proportion of North Carolina respondents who were up-to-date. In January 1998, Medicare began to cover screening FOBT, sigmoidoscopy, and barium enema for average-risk enrollees 50 years old and older. Medicare further broadened its coverage in 2001 to cover screening colonoscopy for average-risk enrollees 50 years old or older.²⁴ Also in 2001, the North Carolina General Assembly passed legislation mandating that state and private insurance plans cover CRC screening tests.²⁵ The 2002 North Carolina BRFSS, however, showed only a small increase in up-to-date status compared to previous years. It will be interesting to see whether rates of up-to-date status in subsequent surveys reflect these policy changes.

Although the percentage of North Carolina adults 50 years old and older reporting CRC screening within recommended time intervals is increasing, approximately 46% of adults are not up-to-date with screening. In addition, not all socio-demographic

subgroups experienced improvements in up-to-date status. There were significant improvements in whites, those with incomes less than \$25,000, and those with a high school or some college education. There was no significant increase in up-to-date status, however, among respondents with less than a high school education and those with incomes between \$25,000-\$50,000, indicating a possible need for interventions in these populations to help increase levels of screening. In addition, screening among all respondents 50-54 years old improved from 30% to 43% from 1998-2002, but the proportion who were up-to-date among this age group in 2002 was still low. It may be important to target individuals in this age group in order to help them start and continue with screening according to guidelines.

Prior research has found that increasing age, higher levels of education, having health insurance, and being of non-Hispanic background²⁶⁻³² are associated with higher rates of CRC screening. The findings from our study are consistent with results from these prior studies. In 2001-2002, North Carolina BRFSS respondents 50-54 years old had low rates of up-to-date screening compared to those of older age, and individuals with low educational attainment and low incomes had lesser rates of up-to-date screening compared to those with higher levels of education and income. Rates of up-to-date screening among the insured were almost twice as high as those among the uninsured. Fewer Hispanics were up-to-date compared to non-Hispanics. Current educational and awareness programs to promote screening may not be reaching the groups who had low percentages of individuals who were up-to-date; poor access to healthcare and lack of income to pay for tests are other possible reasons for these low rates.

African Americans have higher rates of colorectal cancer death and are diagnosed at a more advanced stage more often than whites.^{1,33} These disparities may be due in part to low rates of CRC screening in African Americans.³⁴ In our current study, we found that rates of up-to-date screening among African-Americans did not increase significantly over time, but that the actual rates of up-to-date screening in 2001-2002 were comparable to whites. It is encouraging that African Americans had similar rates of up-to-date status in recent years compared to whites, and the lack of a significant trend may be due in part to sampling error due to small sample sizes in 1998-1999. Efforts to promote CRC screening among African-Americans should continue given their higher rates of mortality and diagnosis in advanced stages of disease.

There are a number of limitations to this study. First, the change in wording from "sigmoidoscopy/proctoscopy" in 1998 to "sigmoidoscopy/colonoscopy" in 1999 may have resulted in higher screening rates in 1999, 2001, and 2002 due to a previously unmeasured use of colonoscopy. The change from proctoscopy to colonoscopy may mean that the increasing trends are due in part to the change in question wording, which could have introduced measurement error and potential bias into our results. The extent to which this change may have affected the results is unclear. Defining up-to-date screening status for the analysis of trends as a sigmoidoscopy or colonoscopy within the past five

years may underestimate the actual percentage of those who are up-to-date, since individuals who had colonoscopy between five and ten years ago are in compliance with current guidelines. The BRFSS questions on CRC screening did not distinguish between diagnostic and screening procedures, possibly resulting in overestimates of actual screening rates. Another limitation is that the percentages of up-to-date by socio-demographic characteristics in 2001-2002 are not adjusted for the other variables. Further investigation of these associations with a multivariate model might help define which characteristics are most strongly associated with up-to-date status. This was a telephone survey, so responses were limited to individuals who owned home telephones. The response rates were low, and respondents may have answered differently compared to those who chose not to participate. Another limitation is recall bias; responses were self-reported and may not accurately reflect the actual performance of screening tests. Comparisons of self-report and chart audits, however, have found fair-to-good agreement between patient self-report and medical records.³⁵⁻³⁷ And finally, the small numbers of African Americans surveyed in the 1998 and 1999 BRFSS may have affected the accuracy of these estimates.

Conclusions

The percentage of North Carolina adults who are up-to-date with CRC screening is increasing, and state rates of up-to-date status parallel trends seen on the national level. Although this is an encouraging finding, many adults 50 years old or older are still not up-to-date with current guidelines, and some socio-demographic subgroups, such as the uninsured, Hispanics, and those 50-54 years of age, have particularly low rates of individuals who are up-to-date with screening. There is a need for educational programs and screening initiatives for the public and for healthcare providers, especially targeted toward populations who had low percentages of respondents who were up-to-date, in order to improve the performance of colorectal cancer screening in North Carolina.

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Without the voluntary assistance and carefully executed reviews of a number of anonymous reviewers, no journal can offer the kind of peer-review for submitted manuscripts that can assure its readers the highest quality of published articles. We are fortunate in having the service of a number of individuals who have given generously of their time and expertise in service to the *North Carolina Medical Journal* this past year, and we are pleased to have this annual opportunity to acknowledge their efforts.

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POLICY FORUM

Access to Dental Care

Introduction

Gordon H. DeFriese, PhD, and Kristie Weisner Thompson, MA

Issue Brief: Assuring the Accessibility of Basic Dental Care Services: Issues of Workforce Supply, Insurance Coverage and Organization of Care

Kristen L. Dubay, MPP, M. Alec Parker, DMD, and Gordon H. DeFriese, PhD

COMMENTARIES

Defining the Need for Dental Care in North Carolina: Contributions of Public Health Surveillance of Dental Diseases and Conditions
R. Gary Rozier, DDS, MPH, and Rebecca S. King, DDS, MPH

“...the number of dentists in our state needs to increase rapidly, and concerted efforts should be made to attract additional dental practitioners to serve underserved areas and populations.”

The Dentist Workforce in North Carolina 2005: A Commentary

John W. Stamm, DDS

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John H. Frank

Access to Primary Dental Care: A Commentary on the Economics of Dental Practice and Thoughts on Solutions to Improve Access to Primary Dental Care

John N. Williams, DMD, MBA

Improving Oral Health in North Carolina: Exploring the Potential of a New School of Dentistry at East Carolina University

Michael J. Lewis, MD, PhD, D. Gregory Chadwick, DDS, MS, and F. Terri Workman, JD

INTRODUCTION

Policy Forum: *Access to Dental Care*

Since 2002, when the North Carolina Institute of Medicine began publishing the *North Carolina Medical Journal* as a statewide journal of health policy analysis and debate for all the healthcare professions, key policy makers/shapers, and the interested lay public, we have wanted to highlight the problems of assuring access to primary dental care services in our state. This year, we are fortunate to have a new relationship with the North Carolina Dental Society as an organizational co-sponsor of the Journal. This relationship and the 2005 North Carolina Oral Health Summit, convened by the Oral Health Section of the North Carolina Department of Health and Human Services, were catalysts for the production of this Journal issue. In this issue of the Journal, we summarize the principal themes of these discussions concerning the state of oral health in North Carolina, along with a number of policy options for addressing the shortages of dental workforce supply.

North Carolina, like a number of other states, is facing a significant shortage of practicing dentists. Moreover, problems accessing primary dental care are even more severe in certain rural areas of the state, for those with low incomes or dependence on coverage from the state's Medicaid program, and for persons with special needs, such as persons with disabilities. Few disagree that the number of dentists in our state needs to increase rapidly, and concerted efforts should be made to attract additional dental practitioners to serve underserved areas and populations.

On a positive note, North Carolina is one of the nation's leading states with regard to preventive dental care programs for children, which are primarily offered through the public schools. In addition, community water fluoridation efforts statewide have extended access to this valuable preventive oral health technology to more than 80% of our state's population. Since the 1960s, the prevalence of dental caries in the permanent teeth of 12-17 year olds has declined by more than 80% for whites and 65% for African Americans. Despite these impressive 40-year trends, reported by Drs. Gary Rozier and Rebecca King, serious problems remain. As many as 20-30% of North Carolinians report that they have been unable to access basic dental care services when needed, and one out of three school-age children have untreated dental decay.

While this issue of the *North Carolina Medical Journal* provides an overview of the challenges many people in North Carolina face when trying to access dental care, there are a number of challenges that are not discussed in any detail. For example, we have not provided a detailed discussion of the national faculty shortages for dental schools or community colleges that are preparing needed dental professionals. In addition, we do not discuss some of the highly sensitive issues regarding the expanded use of dental hygienists, which are being utilized in other states. These are issues that may warrant attention, but were beyond the scope of this publication.

Like a number of the health and healthcare policy issues previously addressed in Journal, opinions differ about how best to meet the oral health needs of our population. Short-term and longer-term options are considered, each with costs and likely benefits. We hope that the articles presented here will help explain our state's oral health challenges as policies and programs are developed to meet these important health needs.

Gordon H. DeFriese, PhD
Editor-in-Chief

Kristie Weisner Thompson, MA
Managing Editor

Assuring the Accessibility of Basic Dental Care Services: Issues of Workforce Supply, Organization of Care, and Education

Kristen L. Dubay, MPP, M. Alec Parker, DMD, and Gordon H. DeFriese, PhD

The most common form of dental disease is caries (tooth decay).^{1,2} In fact, dental caries is the most common chronic disease among children—five times more common than asthma (59% versus 11%, respectively).³ Nationally, more than half of all children have dental caries by the second grade.^{2,4} In North Carolina, during state fiscal year 2004–2005, 22% of children were found to have untreated tooth decay in kindergarten.⁵ Nationally, 30% of adults have untreated tooth decay.^{2,6}

Many people do not understand the integral role that oral health plays in a person's general health. Studies are increasingly uncovering associations between chronic oral infections and other conditions, such as diabetes, heart and lung diseases, stroke, low birth weight, and premature births.^{1,2} Untreated oral health problems cause unnecessary pain and suffering. They can also decrease the economic productivity of workers through lost work days or distraction, and have a similar negative effect on children's capacity to learn. Individuals with oral health problems may experience a loss of self-esteem, and in some extreme cases, death. Oral and pharyngeal cancers are also significant oral health problems that can lead to serious illness and disfigurement. Further, individuals that delay needed dental care often face higher treatment costs when they do receive care.^{1,2}

Most people experience caries and/or periodontal (gum) disease at some point in their lives. Fortunately, most of these problems are preventable and treatable with a combination of self-care, professional care, and community-based initiatives. Community water fluoridation, for example, has significantly reduced the prevalence and severity of dental decay in North

Carolina and the nation.⁷ Professionally-applied dental sealants, varnishes, and gels, and the use of products containing fluoride, (e.g., toothpaste, mouth rinses, dietary fluoride supplements) effectively prevent dental decay. Self-care practices that include a diet with limited sugars and carbohydrates, regular tooth brushing and flossing, along with regular professional cleanings are also critical to maintaining oral health. Regrettably, many people either cannot access needed dental care, do not know how to access the care they need, or do not realize the importance of dental care to their overall health status.

“Studies are increasingly uncovering associations between chronic oral infections and other conditions, such as diabetes, heart and lung diseases, stroke, low birth weight, and premature births.”

Dental care services are one category of healthcare for which there is both the expectation of widespread, if not universal, availability, and yet low levels of consumer demand in comparison with conventional healthcare (i.e., medical) services. Dental care is a segment of overall healthcare where preventive services are of unquestionable primary importance to both the maintenance of health status and the minimization of future costs of treatment. But oral health within communities requires attention to both individual health-promotive behaviors as well

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as collective interventions, such as the assurance of dental care access and the fluoridation of public water supplies.

Patterns of Dental Disease in North Carolina

North Carolina has benefited from more than 30 years of detailed and on-going epidemiological studies documenting the extent and the patterns of dental disease in this state. In addition, the preventive dentistry programs targeted to children in this state set it apart from most others. As a result, it is possible to describe the distribution of dental disease (in terms of need) as well as the success of various programs to address the prevalence of dental disease among North Carolina's children in a way that has made North Carolina the envy of many other states. Drs. Gary Rozier and Rebecca King provide an overview of the history of dental disease trends in North Carolina in a commentary in this issue of the *North Carolina Medical Journal*.⁸

These accomplishments have been realized through an effective and long-term collaboration between the state's Oral Health Section of the North Carolina Department of Health and Human Services (DHHS) and the University of North Carolina at Chapel Hill (UNC-Chapel Hill) School of Public Health. In the 1960s, Drs. John Fulton and John Hughes of the UNC-Chapel Hill School of Public Health worked with state epidemiologists and oral health personnel to develop the first statewide oral health survey.⁹ This landmark study demonstrated widespread patterns of untreated dental decay, endentulism, and periodontal disease and served as the stimulus for legislative action to create a major new initiative in dental public health with a particular focus on the oral health of North Carolina's children. The 1960-1963 Fulton-Hughes study was followed 13 years later (in 1976-1977) by a second statewide epidemiological survey conducted by Dr. John Hughes and Dr. Gary Rozier, which enabled the calculation of oral health rates of change in North Carolina.¹⁰ More recently, in 1986-1987 and 2003-2004, Rozier and his colleagues^{11,12} at the Oral Health Section of the North Carolina DHHS conducted clinical examinations and questionnaire surveys of 80% of North Carolina school children in kindergarten through 12th grade, which included open-mouth dental screenings by dental professionals. Few states have such a resource to track the accomplishments of dental healthcare and preventive services.

Poverty and Access to Dental Care

Oral health status, like general health status, varies according to sociodemographic factors. For example, people who are low-income, minorities, and/or are less well educated tend to have poorer dental health than others. Low-income children are more likely to experience tooth decay, have a severe experience with tooth decay, and have untreated decay.^{3,13}

Between 1999 and 2002, children ages two through 11 with family incomes below 100% of the federal poverty guideline (FPG)* were found to be nearly two times as likely to experience tooth decay as children in families with incomes at or above 200% FPG.¹⁴ Adults and children in poverty were more than twice as likely as their higher-income peers to have untreated tooth decay.¹⁴ Likewise, Latino and African-American children experienced higher rates of tooth decay (treated and untreated) than white children. Poor and minority children are also less likely to receive preventive treatments, such as dental sealants (3% versus 23%, respectively). Similarly, African-American adults are less likely to survive oral and pharyngeal cancers than whites (five-year survival rates are 34% versus 56%, respectively).¹⁵

Education also plays a key role in dental health. Less educated adults are less likely to have a regular oral cancer examination,¹⁷ more likely to experience destructive periodontal disease, and more likely to eventually lose all of their teeth. For example, more than 13% of individuals without a high school diploma have lost all of their teeth, compared to less than 4% of individuals with more than a high school diploma.¹

Special Analyses of Dental Health Issues in North Carolina

All of these socio-demographic differences in dental health have been addressed at the state-level through a series of meetings/conferences with North Carolina dental health professionals and other interested individuals. In 1989, the North Carolina DHHS was asked by the General Assembly to consider the problem of access to primary dental care by low-income persons in our state, particularly those covered by the state's Medicaid program. Subsequently, the Secretary of the Department, Dr. H. David Bruton, asked the North Carolina Institute of Medicine (IOM) to organize a statewide task force that would examine these issues and make recommendations to address the significant problems low-income individuals and those living in rural and other underserved areas have accessing dental care. The North Carolina IOM Task Force began work in 1998 and completed its report to the North Carolina DHHS and the North Carolina General Assembly in April 1999.¹⁶ The work of the Task Force was generously supported by grants from the Kate B. Reynolds Charitable Trust and The Duke Endowment. The 1999 North Carolina IOM report offered 23 specific recommendations for addressing dental care access issues facing low-income persons in the state. Subsequently, the North Carolina IOM followed-up the work of the Task Force with two meetings, in 2001 and 2003, to discuss the steps that had been taken to fulfill the recommendations from the 1999 report. In April of 2005, the Oral Health Section of the North Carolina DHHS evaluated these issues at the North Carolina Oral Health Summit. The recommendations of the 2005 Summit are highlighted herein where appropriate.

* According to the federal poverty guidelines in 2000, 100% of FPG for a family of four was an income of \$18,000.

Policy Approaches to the Problem of Dental Care Access

Since the mid-1990s, it has become clear that an insufficient number of dentists and dental hygienists have been entering practice in North Carolina. Too few dentists are willing to serve low-income populations, particularly those covered by the state's Medicaid program. A number of possible avenues have been suggested for meeting these challenges. While there is general agreement that dental healthcare is a critical aspect of overall population health and making these services available is fundamental to overall health policy in our state, many of these proposed solutions are controversial.

In North Carolina, as in many other states, there is a growing sense that professional dental care is becoming less and less available, particularly as a number of dental schools across the nation have closed, and as the total number of newly licensed dentists has decreased nationally. The Kate B. Reynolds Charitable Trust, one of the state's leading health-oriented private philanthropies, has made access to dental care for low-income populations a high priority for more than a decade. Some of their programs are described by John Frank, Director of the Trust's Health Care Division, in this issue of the *North Carolina Medical Journal*.¹⁸ Dental care in the United States is clearly among the best in the world for those who can afford it and for those who have regular access to professional care. Unfortunately this is not the case for a sizable proportion of our state's population.

Four basic strategies to improve access have been considered over the previous decade: (1) increasing the dental provider participation in the North Carolina Medicaid program, (2) increasing the supply of dentists, (3) increasing dental care availability for special needs populations, and (4) increasing public awareness of the importance of oral healthcare.

Strategy One: Low-Income Access to Dental Care

Of North Carolina's more than 8.5 million population, approximately 18% are Medicaid recipients—881,356 of whom are less than 21 years old.¹⁹ North Carolina provides dental coverage for all eligible Medicaid recipients (adults and children). Unfortunately, use of these services is low. On average, only 27% of Medicaid recipients visited the dentist in state fiscal year 2004, a percentage that varies by geographic location. In 2005, the percentage of Medicaid recipients who visited a dentist ranged from a low of 17% in Swain County to a high of 36% in Wilkes County.¹⁹ Low-income, uninsured individuals face other barriers to access because the entire financial burden for services is theirs. These individuals often look for free or reduced-cost services and safety net clinics.

Medicaid Payment Rates for Participating Dentists. One of the primary factors responsible for low dental service utilization among Medicaid beneficiaries is the limited participation of dentists in the Medicaid program. In 2004, only 25% of the private practice dentists (855 of 3,446) in North Carolina were considered "active participants" in the program, meaning they billed Medicaid for more than \$10,000 in a single year. This is

a 33% increase from 2000, but still too few to serve the needs of the Medicaid population, which grew approximately 11% over the same period. The total number of dentists that served at least one Medicaid patient in 2005 is 1,771. Therefore, the current ratio of private dentists participating in the Medicaid program per Medicaid recipient is 1:885.¹⁹ Given this relatively small number of dental professionals practicing in North Carolina, many Medicaid recipients have difficulty finding a dentist who will treat them.

In an effort to prevent dental caries and reduce the need for dental care treatment within the Medicaid population, a program called *Into the Mouths of Babies* (IMB) was developed by the Oral Health Section and introduced across the state. The IMB program provides dental preventive service packages to health departments and physicians' offices serving Medicaid-eligible children. The packages include targeted oral health education for caregivers and a dental screening and fluoride varnish application for high-risk children from birth to age three. Collaboration is also underway with the Early Head Start program to develop educational materials for use with their clientele, to help their clientele access dental preventive services within the medical community, and to help them to find a dental home. Although this program has been effective in preventing dental caries, it is unable to address the low dental care utilization rates among this population.

To address utilization, it is important to understand why dental health professionals may not serve Medicaid patients. One of the main reasons given for low dental provider participation in the North Carolina Medicaid program is low Medicaid reimbursement rates. The North Carolina Medicaid program pays dentists 73% of the UNC-Chapel Hill Dental Faculty Practice's "usual, customary and reasonable" (UCR) charges for a selected list of dental procedures commonly provided to children. These rates were increased in 2003, from 62%. The increase came as a result of a settled lawsuit. The National Health Law Program filed the lawsuit, *Antrican v. Bruton*, against the North Carolina DHHS on behalf of low-income children, challenging the adequacy of North Carolina's Medicaid dental reimbursement rates. Data indicate that, between 2003 and 2005, the percentage of Medicaid-eligible children ages birth through 21 years with a Medicaid dental visit increased from 29% to 32%, and it is believed that higher Medicaid reimbursement rates may have contributed to this increase. Dr. Mahyar Mofidi offers a review of the North Carolina experience with dentist participation in Medicaid in this issue of the *Journal*.²⁰

Despite the 2003 increase in Medicaid reimbursement rates, there is still a feeling among dentists that rates should increase further and move toward a market-based fee schedule. The UNC-Chapel Hill School of Dentistry fee schedule was initially adopted because it was one generally supported by both dental providers and the Division of Medical Assistance. However, more recently, both groups have begun to discuss the potential benefits of a market-based fee schedule. Dr. Mofidi provides a more detailed explanation of this issue on page 457 of this *Journal*.²⁰

Participants at the 2005 North Carolina Oral Health Summit recommended that moving toward a Medicaid reimbursement rate reflecting the 75th percentile of market-based fees in North Carolina would significantly reduce barriers to access for the Medicaid population. Such a target would indicate that reimbursement rates would be equal to or greater than the rates charged by 75% of dentists in the state. Recently, the North Carolina General Assembly has taken positive steps toward increasing the Medicaid dental reimbursement rates. In the 2005 session, the North Carolina General Assembly appropriated two million dollars in each year of the 2005-2007 biennium to increase Medicaid dental rates. This translates into an approximate increase of \$6.4 million/year after factoring in the federal and county shares of Medicaid costs.

Increasing Volunteer Efforts of Dental Professionals in the Care of the Underserved. Beyond the needs of just the Medicaid population, there are important and impressive voluntary efforts on the part of some dental professionals (both dentists and hygienists) to meet the most urgent needs of all those without adequate access to primary dental care. Some of these efforts are in conjunction with clinics operated by federally qualified health centers (FQHCs), while others are through programs offered by “free clinics” in various communities across the state. In this issue of the Journal, Dr. Steve Slott offers a description of some of these voluntary efforts, but with a clear message that more of this type of volunteer effort would be both welcome and likely to have a sizeable impact among our state’s population who are most in need of routine dental care.²¹

Strategy Two: Increasing the Supply of Dental Professionals

In addition to the challenges related to low dentist participation in the Medicaid program, dental care access is problematic for many because of the limited supply of dental professionals. In 2004, there were 3,628 licensed, active dentists in North Carolina.²² This represents a dentist-to-population ratio of 4.2 dentists per 10,000 population—a rate that is well below the national average of 5.7 dentists per 10,000 population. The need for dentists is particularly acute in four eastern, rural counties (Camden, Hyde, Jones and Tyrell) where there is no practicing dentist. In addition, there are three other counties in North Carolina that have only one dentist each (Gates, Graham, and Northampton).²² Only eight counties have a dentist-to-population ratio equal to or greater than the national average. Seventy-nine counties qualify as federally designated dental health professional shortage areas, meaning that they have a full-time-equivalent dentist-to-population ratio of at least 1:5,000, or between 1:4,000 and 1:5,000, with unusually high needs for dental services or insufficient capacity of existing dental providers.²³

The number of dental hygienists in North Carolina poses less of a challenge to access. In 2004, there were 4,324 active, licensed dental hygienists in North Carolina, which represents an increase of 18% from state fiscal year 2000 to 2004.²² In 2004, North Carolina had 5.1 dental hygienists per 10,000 population, a level greater than the national average of 4.4 per

10,000 population. Unfortunately, dental hygienist shortages remain a problem in certain areas of the state. For example, three North Carolina counties (Currituck, Jones, and Northampton) have only one dental hygienist, and in four counties, there is no active dental hygienist (Bertie, Gates, Hyde and Tyrrell).²²

There are several potential strategies for responding to the shortage of dental health professionals, and they can be divided into short- and long-term strategies. The short-term strategies include making it possible for more out-of-state dentists to enter practice in North Carolina and expanding the role of public health dental hygienists in the provision of educational and preventive dental care services in additional safety net organizations. The long-term strategies include increasing the class size at UNC-Chapel Hill School of Dentistry, developing a new school of dentistry at East Carolina University, and expanding the number of residency training programs and graduates in the specialty of pediatric dentistry.

Attracting Dentists and Hygienists from Out-of-State. In the short run, one strategy for increasing the number of dentists in the state is to make it possible for more out-of-state dentists to practice in North Carolina. Presently, about 40% of all dentists practicing in North Carolina are graduates of dental schools outside of North Carolina.²³ Therefore, dentists educated in other states play a significant role in serving North Carolina residents. It has always been possible for any graduate of an accredited United States dental school to apply for a license to practice in North Carolina. However, prior to 2003, applicants were required to take the North Carolina clinical examinations. These examinations were barriers to out-of-state dentists because they were complicated to schedule and involved extensive logistical and financial commitments of the examinees. As a result, in August 2002, Senate Bill 861 was signed into law (SL2002-37) allowing licensure by credentials for dentists and dental hygienists who have practiced in another state for at least five years without any disciplinary actions. Since that time, 162 dentists (with eight denials) and 182 hygienists (with four denials) have received a North Carolina license by credentials.²³

The North Carolina State Board of Dental Examiners is further pursuing participation in a Southeast Regional Examination procedure through which dental graduates (dentists and hygienists) who take the clinical examination in any participating state in the region can also apply for a license in North Carolina by reciprocity. The Board of Dental Examiners is also actively pursuing participation in a forthcoming national credentialing examination. Participants at the 2005 North Carolina Oral Health Summit supported all three of these initiatives and felt these were important efforts to improve the state’s ability to attract dentists trained in other states.

Expanding the Role of Public Health Dental Hygienists. Another short-term strategy for increasing the capacity dental health professionals in North Carolina is to expand the role of public health dental hygienists to provide educational and preventive dental care services in safety net organizations other than public health department clinics serving low-income populations. In this issue of the Journal, Dr. Rebecca King, Chief of the Oral

Health Section of the North Carolina DHHS, offers a detailed description of dental public health programs in North Carolina.²⁴ In 1999, the North Carolina General Assembly passed legislation to revise the North Carolina Dental Practice Act to permit specially trained public health dental hygienists to perform preventive clinical services outside the public school setting under the direction of a licensed public health dentist (Sec. 11.65 of HB 168).

Under the North Carolina Dental Practice Act, 32 dental hygienists working in local health departments and one working in a safety net special care clinic, had been specially trained to provide services under the direction of a public health dentist by June 2005. In addition, the North Carolina Oral Health Section was able to use the increased capacity of its qualified state public health dental hygienists (36 people) to expand the reach of its sealant program. In the 2004-2005 school year, the majority of the 6,459 sealants provided to 1,911 children by the North Carolina Oral Health Section were placed by hygienists under the direction of a public health dentist. The successes experienced within the state and local public health programs could also be extended to other safety net providers, such as federally-funded community or migrant health centers, state-funded healthcare clinics, or not-for-profit clinics. These programs serve predominantly Medicaid, low-income, or uninsured populations. Allowing hygienists to provide educational and preventative dental care under the general supervision of a dentist employed at such safety net organizations may extend the safety net organizations' capacities to provide preventive care to underserved populations. Participants at the 2005 North Carolina Oral Health Summit requested that the North Carolina State Board of Dental Examiners reconsider the feasibility of allowing these types of arrangements.

Increasing the Productivity of Dental Education Programs. In the long-run, more significant steps need to be taken to increase the number of dental care providers, particularly dentists, in North Carolina. As North Carolina's population continues to grow, the shortage of dental providers will become even more acute. Currently, the UNC-Chapel Hill School of Dentistry is the only dentistry program in North Carolina, and it accepts 80 students each year. Adding seats to each class at the UNC-Chapel Hill School of Dentistry could positively impact the number of dentists in the state. However, there are a number of challenges to increasing the school's class size. Additional laboratory facilities for the teaching of basic clinical sciences, clinical training facilities, and faculty would be necessary. Such changes would require further funding, which is not readily available.

Increasing the Class Size at UNC-Chapel Hill. In this issue of the *North Carolina Medical Journal*, two commentaries address the complex issues associated with increasing the production of dentists from the UNC-Chapel Hill School of Dentistry. Dr. John Stamm, former Dean of the School of Dentistry at UNC-Chapel Hill, summarizes the current dental workforce situation in the state and recent appropriations by the North Carolina General Assembly to support planning for increasing dental school enrollment in North Carolina. In addition, the new dean of the UNC-Chapel Hill School of

Dentistry, Dr. John Williams, describes the complexities of dental workforce issues that bear on the issue of dental class size. His commentary advocates support for an existing plan to expand enrollment at the UNC-Chapel Hill School of Dentistry by 50% (from 80 to 120 students per class).²⁵

Developing a New School of Dentistry at East Carolina University. Another option for increasing the production of dentists in the state is to develop a new, second dental school. A commentary in this issue of the *Journal*, authored by Dr. Michael Lewis, Vice Chancellor for Health Sciences at East Carolina University (ECU) in Greenville, makes the case for a new, "community-oriented" school of dentistry at ECU.²⁶ The ECU proposal is to develop a school of dentistry that will attract individuals who would like to practice professionally in North Carolina communities that need high-level dental care, and have inadequate dental care access. As exemplified by the Brody School of Medicine and the ECU School of Nursing, ECU has a history and culture of exposing health sciences graduates to strategies for serving underserved populations. Moreover, a sizeable proportion of these graduates are motivated to stay in North Carolina and choose primary care as a career path. Therefore, this strategy could be used to reduce workforce shortages in underserved communities, which would improve access to care for underserved populations. Participants at the 2005 North Carolina Oral Health Summit agreed that there is a need to produce more dentists in this state, and they supported further examination of this issue to determine which of these strategies would be most appropriate and feasible.

Increasing the Number of Fellowship-Trained Pediatric Dentists. Finally, beyond the general dentist under-supply problem, there is a need for more fellowship-trained pediatric dentists in North Carolina. Pediatric dentists are very important because, according to the American Academy of Pediatric Dentistry, they provide a disproportionately higher amount of oral healthcare for underserved children and children receiving Medicaid. A 2000 Task Force report from the American Academy of Pediatric Dentistry found that between 1990 and 1998, the number of trained pediatric dentists in the United States declined from 3,900 to 3,600. This decline was attributed to a lack of pediatric training programs rather than a lack of interest in pediatric dentistry training.²⁷ The only graduate program for this specialty in North Carolina is at the UNC-Chapel Hill School of Dentistry. In this issue of the *Journal*, Drs. Michael Roberts and William Vann, Jr., offer an extensive discussion of issues related to the pediatric dental workforce and efforts to increase the supply of pediatric dentists.²⁸

As a response to a perceived shortage of pediatric dentists, the Department of Pediatric Dentistry at UNC-Chapel Hill increased enrollment in the early 1990s from two residents per year to three using insecure funding sources. The success of this recent increase in pediatric residency programs has been very valuable, and it is important that it continues. The pediatric workforce is aging, and its future supply is projected to decrease. Additionally, pediatric dentists are still largely concentrated in urban areas and are unavailable in many communities. The 2005 Oral Health Summit participants supported strategies for

continuing to increase the supply of pediatric dentists through continual support for increasing the number of pediatric dental residents at The UNC-Chapel Hill School of Dentistry and developing at least one additional pediatric residency program in North Carolina.

Clearly, there is a significant need to increase the number of both general and specialty dentists in North Carolina. However, doing so will require significant financial support. In addition, some of these strategies are controversial, and it will be important to evaluate each option closely before undertaking any of the initiatives.

Strategy Three: Increasing Dental Care Availability for Special Needs Populations

Many special needs patients have unique and more extensive barriers to accessing dental care than other demographic groups. Special needs patients often have cognitive and/or physical disabilities that require special care. Many of these patients live in nursing homes, assisted living facilities, or group homes. Even those living independently or with families in the broader community may have trouble accessing care for reasons such as transportation challenges or finding a provider willing to serve them. Dental professionals face a unique challenge when treating special needs patients because each patient is different. Some patients can be served in a traditional private practice environment, needing no additional time or services, while others must be served at their residence, require specific facility capabilities, and/or take significantly longer to serve than traditional patients.

Barriers to accessing dental health services arise from a variety of factors within the special needs community. For some, oral health is simply overlooked due to the patient's inability to provide self-care or a caregiver's lack of knowledge or training. Most dentists are not trained to deal with the needs of this population. Others find it too onerous, since most of the special needs patients are Medicaid recipients and, thus, services are reimbursed at low rates. Even dentists who treat special needs patients may refuse to treat severely uncooperative or disruptive patients because they lack the expertise or resources needed to care for these patients.²⁹

Strategies for better serving the special needs populations were discussed at the 2005 Oral Health Summit. Recommended strategies included developing a data system for gathering information on the amount of training oral health students receive about serving special needs patients; teaching dental professionals techniques that would help practices integrate special needs patients into a more traditional patient base; establishing concentrated special needs clinics with appropriate facility and equipment needs in which dentists could be encouraged to provide part-time services; and developing additional Medicaid reimbursement codes for services to disabled/special needs populations. The commentary in this special issue of the *North Carolina Medical Journal* by Dr. William Milner³⁰ summarizes the complex issues surrounding the organization and provision of dental care to special needs populations and offers a number of concrete suggestions for how this care might be better managed.

Strategy Four: Increasing Public Awareness of the Importance of Oral Healthcare

Given the low rates of participation in the North Carolina Medicaid dental program by beneficiaries (only 27% of eligible beneficiaries in 2004 had at least one dental visit; the percentage for Medicaid beneficiaries 21 years of age or younger was 31%),²² there has been a concern that the importance of dental care and good oral health practices needs further emphasis, especially among younger populations covered by this program. This is a problem of widespread significance within the general public. Even among those with dental care insurance, rates of utilization are far less than for conventional medical care. For this reason, it is considered important to continue to emphasize school-based educational programs in health education, which include units on oral health, prevention, and self-care.

Summary: Policy Options for Dental Care Access in North Carolina

As we move into the 21st Century, it is important that North Carolina can assure access to basic (primary) dental healthcare services for all populations. A focal point of this effort is centered around having sufficient numbers of dental healthcare professionals to provide needed services, and that these professionals will be willing to serve those with only a modest ability to pay for their care, especially when these individuals and families are covered by programs like Medicaid.

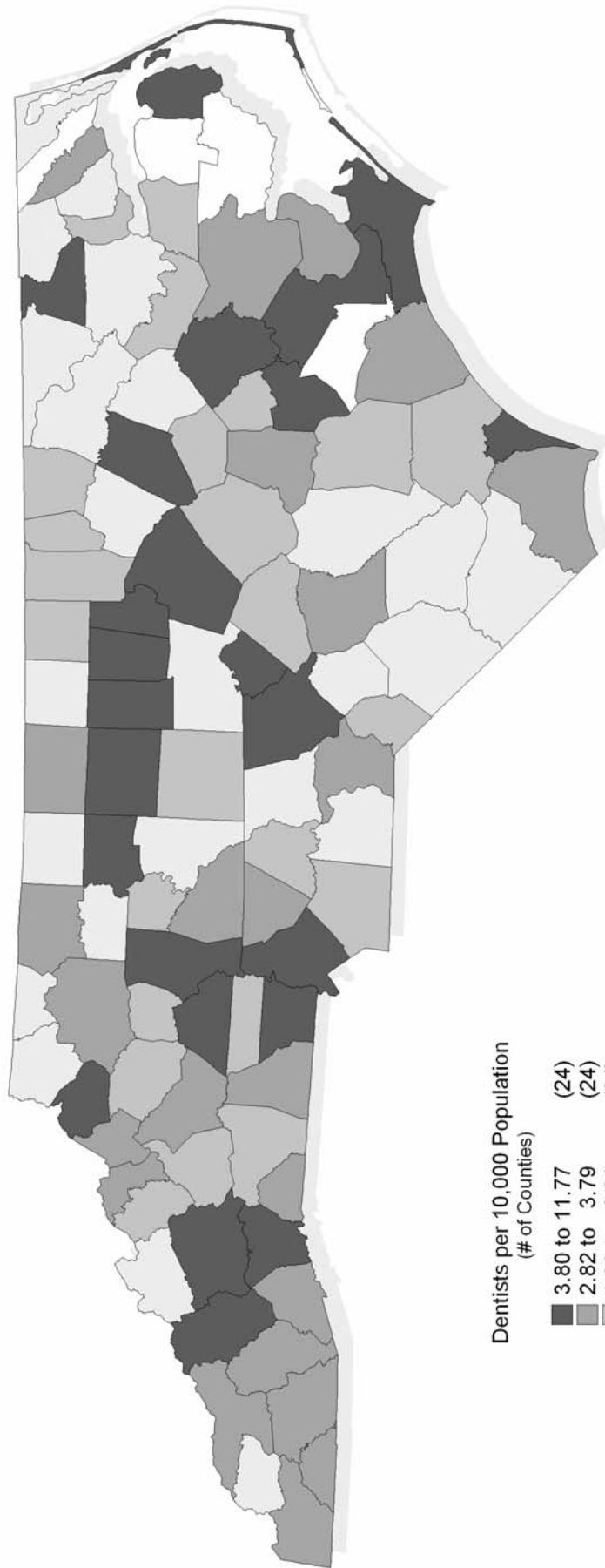
In this regard, six strategies warrant further consideration and debate as policy options for the future:

- Increasing the numbers of graduating dentists and dental hygienists entering practice in North Carolina, and especially those electing to practice in rural and underserved communities.
- Increasing the numbers of graduate-trained practitioners in general dentistry and pediatric dentistry.
- Allowing public health dental hygienists to perform dental preventive services in clinical settings outside of public health departments in order to extend the reach of these services to those most in need.
- Subsidizing the care provision taking place in remote rural areas or inner cities where those most in need are provided access to basic dental care.
- Training more dentists and hygienists and organizing care delivery programs to meet the needs of special care patients.
- Encouraging a greater level of voluntarism among dental care professionals to serve the needs of low-income populations in special clinical care programs, and through active participation in the North Carolina Medicaid program.

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Dentists per 10,000 Population North Carolina, 2004



Source: North Carolina Health Professions Data System, with data derived from the NC State Board of Dental Examiners, 2004.
 Produced by: North Carolina Health Professions Data System, and the Southeast Regional Center for Health Workforce Studies, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

*Dentists included are active or have unknown activity status.

Defining the Need for Dental Care in North Carolina: Contributions of Public Health Surveillance of Dental Diseases and Conditions

R. Gary Rozier, DDS, MPH, and Rebecca S. King, DDS, MPH

A long-standing principle held by epidemiologists who study the health status of human populations is that any disease can demonstrate important variation among people with different characteristics, across different geographic locations, and over time. Substantial fluctuations in the amount of disease can occur as the relative importance of diseases rises and falls, usually in response to scientific breakthroughs and widespread application of effective interventions, but often for unknown reasons.

The prevalence of dental diseases and their consequences are particularly prone to change because of the complex and interacting nature of their many biological, environmental, and social determinants. Dental diseases were at record highs during the first half of the 20th Century.¹ Few people went unaffected, and most could expect to lose some of their teeth by middle age. In the early 1960s, almost 3,000 students graduated from high school in North Carolina having lost all their teeth to the ravages of dental disease.² In the mid-1970s, the number of missing teeth among those in their sixth decade of life was two and one-half times greater than the number of filled or decayed teeth.³

National trends through the 1990s demonstrated several significant advances in oral health status during the last half of the 20th Century.^{1,4} Primary among these changes were substantial declines in dental caries (tooth decay) in permanent teeth beginning in childhood and extending through young adulthood, modest reductions in destructive periodontal (gum) disease, and improvements in tooth loss and oral cancer mortality. Even with these improvements, however, dental disease still is recognized as a silent epidemic, with dental caries and periodontal diseases being among the most common of all diseases. Particularly hard hit are the poor, minorities, those living in remote geographic areas and those with special healthcare needs, creating large disparities in disease and in access to

preventive and treatment services.

Important changes in public health practice, the field of dentistry, and the North Carolina population have occurred during the last few decades that should substantially affect the oral health of North Carolina residents. In this commentary, we briefly review the current status of dental diseases and trends that

“After decades of remarkable improvements in the prevalence of tooth decay, the trend line seems to be leveling off or possibly increasing for primary tooth decay.”

have direct relevance to issues involving access to dental care. Available data require us to focus primarily on children. We will use both clinically determined disease status as well as indicators self-reported in questionnaire surveys of the North Carolina population.

North Carolina Oral Health Assessment Systems

A core function of dental public health is to monitor the burden of oral diseases and the availability of preventive and treatment services. The Institute of Medicine (IOM) of the National Academy of Sciences recommends that public health “...regularly and systematically collect, assemble, analyze, and make available information on the health of the community, including studies on health status, community health needs,

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and epidemiological and other studies of health problems.⁵ The oral health surveillance system for North Carolina is one of the more comprehensive in the nation and is responsive to this IOM recommendation and historical precedents for public health practice.

The surveillance for oral health in North Carolina consists of several major elements. Periodically, a scientific sample representative of the entire state or subgroups of its population are selected to participate in dental examinations and interviews. Four of these surveys have been conducted, all with large samples and good response rates. The first two of the four surveys provided estimates for dental disease for the North Carolina population of all ages in 1960-1963⁶ and 1976-1977.³ The second two provide comparable estimates for school children in kindergarten through 12th grade in 1986-1987⁷ and 2003-2004.⁸ The North Carolina Oral Health Section also conducts annual surveillance of dental caries and its treatment in kindergarten and fifth grade. Assessments began in the 1996-1997 school year and continue with open-mouth dental screenings by trained dental professionals of about 80% of all children in these grades in almost all of North Carolina's counties.⁹

North Carolina participates in the Behavioral Risk Factor Surveillance System (BRFSS), a random telephone survey of

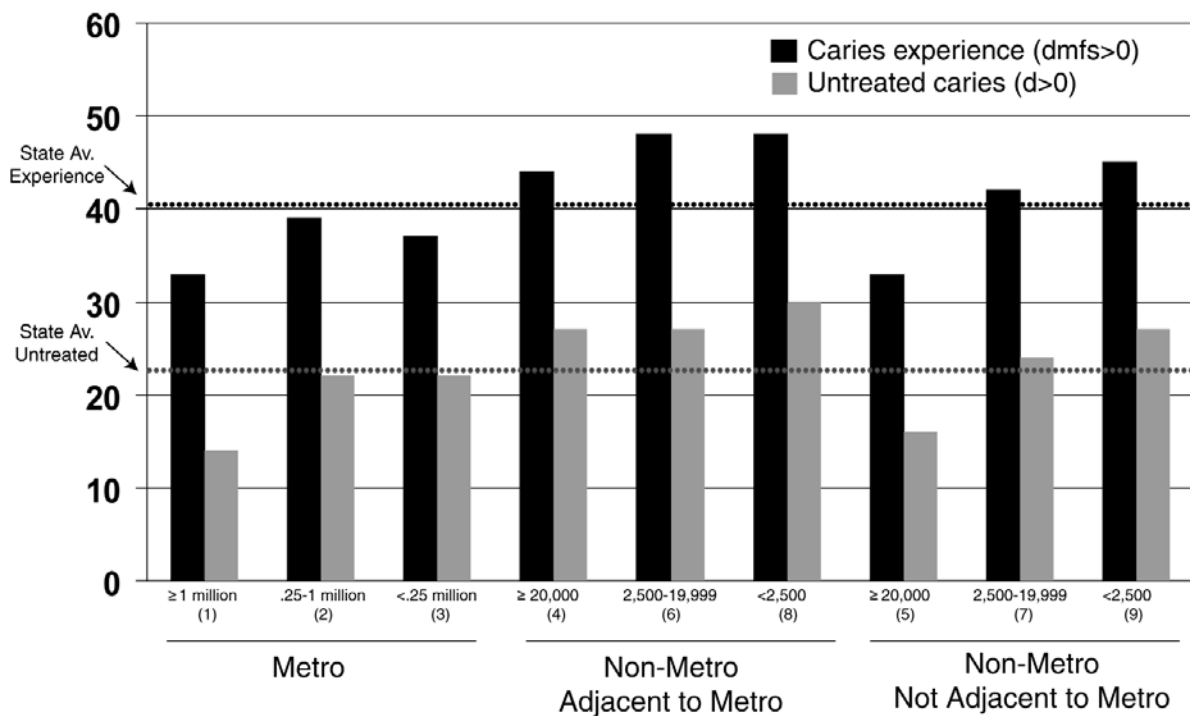
the state's residents 18 years of age and older.¹⁰ This survey, done in all states, provides information on dental use and outcomes in North Carolina that is collected in a routine, standardized manner at the state level and for a few larger counties. This system was expanded in January 2005 by the Child Health Assessment and Monitoring Program (CHAMP) survey.^{11,12} CHAMP is the first telephone survey of its kind in North Carolina to measure access to dental care, dental utilization, and outcomes of children from birth to 17 years of age, thus providing a seamless account of dental care access and outcomes for the entire state from birth into adulthood.

Other components of the oral health surveillance system for North Carolina include detailed information about water fluoridation and oral cancer incidence and mortality, but information from these elements of the system is not included in this commentary.

Oral Health Status of North Carolina's Population

Key indicators for the oral health of North Carolinians are presented in Table 1 (see page 440), most of which are taken from the 2003-2004 survey of school children. Several findings are evident from these data. First, a large percentage of children

Figure 1.
Percent with Caries Experience and Untreated Caries by North Carolina County Rural-Urban Continuum Codes, Kindergarten Students, 2003-2004



(1) Anson, Cabarrus, Gaston, Mecklenburg; (2) Alexander, Brunswick, Buncombe, Burke, Caldwell, Catawba, Chatham, Cumberland, Davie, Forsyth, Franklin, Haywood, Henderson, Hoke, Johnston, Madison, New Hanover, Orange, Pender, Person, Randolph, Rockingham, Stokes, Yadkin; (3) Alamance, Edgecombe, Greene, Nash, Pitt, Wayne, Onslow; (4) Carteret, Cleveland, Davidson, Halifax, Harnett, Iredell, Lee, Lenoir, Lincoln, Moore, Richmond, Robeson, Rowan, Rutherford, Surry, Vance, Wilson; (5) Craven, Dare; (6) Beauford, Bladen, Columbus, Duplin, Granville, Jackson, Martin, McDowell, Montgomery, Sampson, Scotland, Stanley, Transylvania, Watauga, Wilkes; (7) Hertford, Macon, Washington; (8) Avery, Caswell, Gates, Jones, Polk, Swain, Yancey, Warren; (9) Alleghany, Ashe, Bertie, Cherokee, Clay, Graham, Hyde, Mitchell, Northampton, Pamlico, Tyrrell.

are affected by tooth decay, and the severity, as measured by the mean number of decayed, missing, and filled surfaces per child (dfs or DMFS), among those affected is high. Second, a large percentage of parents report that they believe that their children need

dental treatment, such as fillings, teeth pulled, or cleanings. This self-reported need is supported by actual clinically determined need through the oral health survey in 2003-2004. About 31% of North Carolina children have untreated decay in primary

Table 1.
Oral Health Status Indicators for North Carolina, 2003-2005

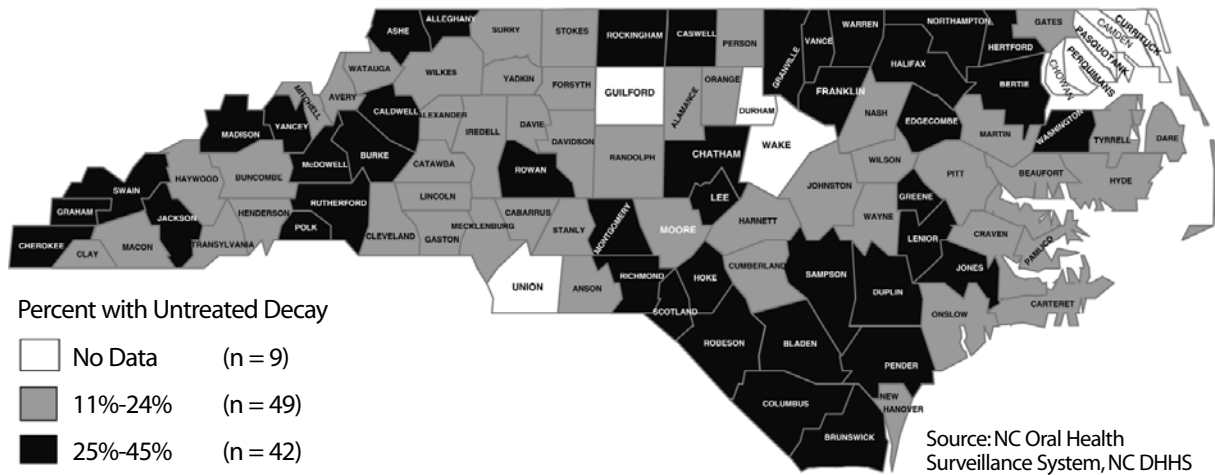
Condition	Overall [†]	Non-Hispanic White	Non-Hispanic African American	Hispanic
Disease Experience				
% any caries in primary teeth (5-9 year olds)	53.7	49.8	55.1	65.0
Mean dfs per child with any caries (5-9 year olds)	8.8	8.5	8.1	11.0
% any caries in permanent teeth (6-17 year olds)	37.5	35.7	41.6	35.7
Mean DMFS per child with any caries (6-17 year olds)	4.4	4.1	5.1	3.9
% any caries in either tooth type (5-17 year olds)	55.8	53.2	58.2	61.3
% clinical evidence of incisor trauma (6-17 year olds)	11.8	10.6	14.1	8.6
% parent reporting serious trauma (5-17 year olds)	10.7	11.5	9.3	8.6
Untreated Disease				
% with 90% of untreated primary tooth decay (5-9 year olds)	19.7	16.9	22.1	28.8
% with any untreated primary tooth decay (5-9 year olds)	30.8	25.7	37.0	41.4
Mean decayed primary tooth surfaces per child among those with any decay (5-9 year olds)	5.1	4.6	5.3	5.8
% with 90% of untreated permanent tooth decay (6-17 year olds)	10.0	9.1	11.4	10.7
% with any untreated permanent tooth decay (6-17 year olds)	13.4	10.6	18.2	16.5
Mean decayed permanent surfaces per child among those with any decay (6-17 year olds)	2.6	2.2	2.9	2.8
Demand				
% parents reporting child needs treatment (5-17 year olds)	51.5	42.4	67.5	60.3
% parent reporting wanted care, but did not get it (5-17 year olds)	60.1	65.8	49.6	72.2
% children ever experienced dental pain in lifetime (kindergarten-third grade)	23.5	19.1	28.2	32.2
% children experienced dental pain at least once in last 3 mos. (grades 4-12)	31.0	28.8	36.4	26.5
Outcomes				
% children's health rated fair or poor by parent	6.6	‡	‡	‡
1-4 year olds				
5-17 year olds	16.4	10.9	22.5	36.3
% adults with tooth loss (18 years and older)				
Some tooth loss because of tooth decay or gum disease, but not all	44.7	41.6	58.0	25.2
Complete tooth loss because of tooth decay or gum disease	9.3	9.5	11.0	3.9

[†] Denominator includes all race and ethnic groups.

[‡] Preliminary estimates from CHAMP, 2005. Sample sizes do not permit estimates by race or ethnicity.

Notes: All estimates are from the 2003-2004 oral health survey of schoolchildren except parents' perceptions of oral health of children one to four years of age and tooth loss, which are from the CHAMP¹¹ and BRFS, ¹⁰ respectively.

Figure 2.
Percent of Kindergarten Students with Untreated Dental Caries by County, 2003-2004



(baby) teeth; 13% in permanent teeth. A third interpretation from data presented in Table 1 is that untreated tooth decay is highly concentrated in a small percentage of children. With regard to outcomes, a large percentage of adults overall lose teeth because of dental disease, and this is highly age-dependent, probably reflecting inadequate access to dental care and values held years ago. Finally, disparities by race and ethnicity exist for most of the indicators, with Hispanics being much worse than whites on many important indicators. African Americans have indicators that usually fell between those of the other two groups.

Surveillance data on caries experience and untreated dental caries in kindergarten students are presented in Figure 1 according to a scheme used by the federal government to classify United States counties according to their rurality.¹³ Each county in North Carolina has been classified according to the population size of its metropolitan (metro) area if it has one, and nonmetropolitan (nonmetro) area according to its degree of urbanization and adjacency to a metro area. A nonmetro county is defined as adjacent to a metro county if it physically adjoins one of the state's metro areas and has a least 2% of its employed labor force commuting to central metro counties. Both dental caries experience and untreated tooth decay differ by population size of the county and its adjacency to a metro area. Children in nonmetro counties that are adjacent to a metro county have more caries experience and untreated decay than children in other types of counties, regardless of population size. Between 40% and 50% of children in these nonmetro counties of all three size categories show obvious signs of tooth decay, and close to 30% have some untreated decay. Within each of the three metro and nonmetro classifications, caries experience and untreated decay generally increase as the population size decreases,

particularly in those counties not adjacent to metro areas.

A county-specific geographic distribution of untreated decay in kindergarten students is displayed in Figure 2. As many as one out of every four kindergarten students in 42 counties begin school with untreated decay. This number is as high as one out of every three students in a dozen of these counties. Most of the counties with students who experience large amounts of caries and receive a small amount of treatment are located in northeastern, southeastern, or western counties.

Trends in Dental Diseases in North Carolina

Remarkable improvements in dental caries have occurred in the permanent dentition of school-aged children in North Carolina over the last 40 years. Trends in 12-17-year-old children are presented as an example of these improvements (see Figure 3). Lifetime caries experience is presented as the mean of the person-level count of decayed, missing, and filled teeth (i.e., the DMFT index, a standard epidemiologic tool designed for these

Figure 3.
Trends in Dental Caries (DMFT) in 12-17-Year-Old Children, North Carolina

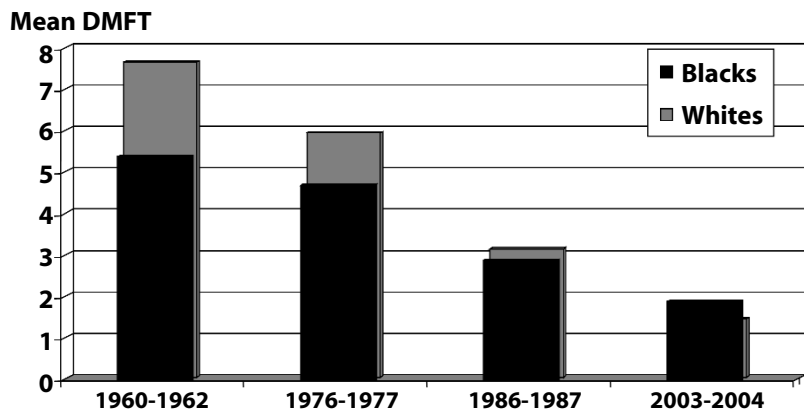
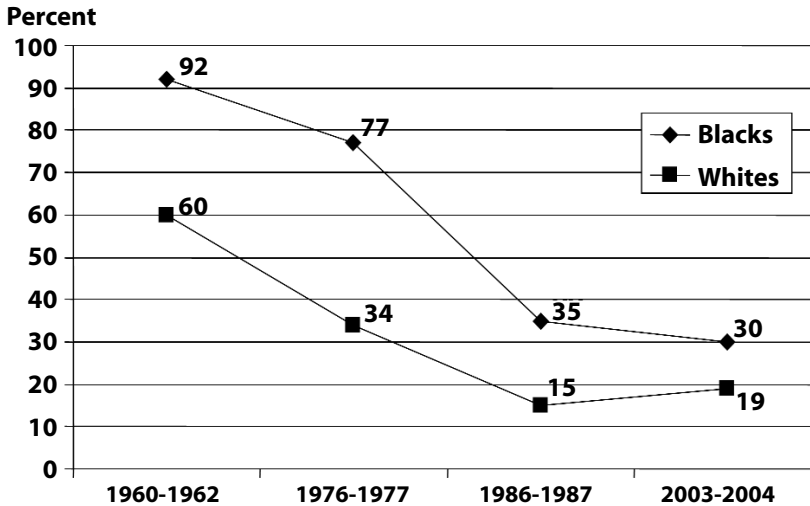


Figure 4.
Trends in Untreated Decay (%DT/DMFT), in 5-17-Year-Old Children, North Carolina



purposes). The mean DMFT score per person declined by 82% in white adolescents between 1960-1962 and 2003-2004 from 7.6 per person to a low of 1.4. A reduction of 65% occurred in black adolescents. The decrease in mean DMFT per person from 5.4 to 1.9 is likewise impressive. Along with the decline in the occurrence of tooth decay, the proportion that is untreated also has declined, and by a substantial amount (see Figure 4). Most of this change occurred, however, between 1960-1962 and 1986-1987. The amount of untreated decay did not change much between 1986-1987 and 2003-2004 (see Figure 4).

Trends in primary tooth decay are not as favorable as for permanent teeth. After years of decline, trendlines in the prevalence of caries in primary teeth have leveled off or appear to have even increased in some groups of children between 1986-1987 and 2003-2004 (see Figure 5). The increase is particularly striking for children whose caregivers have less than a high school education. Surveillance data suggest that most of this increase prob-

ably occurred in children born in the mid- to late-1990s and, thus, entered kindergarten in the early 2000s and thereafter.

Discussion of Key Findings from Oral Health Surveillance

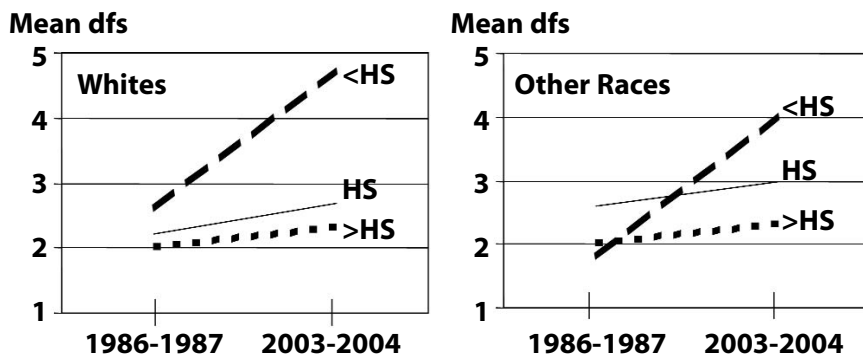
The key indicators reviewed in this commentary suggest that substantial improvements in the prevalence and severity of tooth decay, the major dental disease affecting children and young adults in North Carolina, have occurred over the last 40 years. Multiple factors are likely to have contributed to these changes in disease status. A comparison of a few of the possible dental experiences of adolescents born in the 1950s with those born in the 1990s, roughly the cohorts being

compared in 1960-1963 and 2003-2004 as 12-17 year olds in Figure 3, reveals major differences.

Of significance is the increase in preventive programs. In the 1950s, only 15% of the North Carolina population was drinking fluoridated water, while other public health preventive programs, such as school water fluoridation and fluoride mouthrinse programs in schools were nonexistent. Fluorides were rarely a part of preventive services provided in private dental offices, and less than 20% of children used fluoridated toothpaste. By the 1990s, more than 80% of the population served by municipal drinking water systems was drinking fluoridated water. A significant portion of the remaining child population was exposed to systemic fluorides through the school water fluoridation program, to topical fluorides in public health mouthrinse programs, or applications in dental office settings. A major contribution to the downward trend in tooth decay has been the increase in use of fluoridated toothpaste. By the 1990s, almost everyone who brushed their teeth was using fluoridated toothpaste. Although not presented, our survey results also show that in 2003-2004, close to 60% of adolescents had one or more dental sealants, surpassing the national goal of 50% set for 2010.

The availability of dental services also increased during this 40-year period. In the 1950s, only one dentist for every 4,000 people practiced in the state.¹⁴ They employed fewer than 100 dental hygienists. By the 1990s, the ratio had improved to one dentist for every 2,500 people.¹⁵ Public health workforce supply also increased rather dramatically during this period. In the 1950s, only about

Figure 5.
Trends in Caries (dfs) in 5-9-Year-Old Children, by Parent Education Level, North Carolina



Note: HS = high school

30 public health dentists worked for the state in school-based programs, and the state employed no public health dental hygienists. Only a few local health departments had dental clinics. By the 1990s, a network of more than 100 public health dentists and dental hygienists was providing services in almost every county.

Demand for dental services also likely grew rather dramatically after the 1950s because of changing norms about dental health. The significant increase in dental insurance coverage, which was not available to the earlier cohort of adolescents, but had grown to be more than 50% when the later cohort was growing up, also was likely to be a contributing factor to the increase in demand for care.¹⁶

These changes in tooth decay mirror trends in dental disease nationwide. Between 1988-1994 and 1999-2002, the two most recent national surveys, a reduction in the prevalence of caries in permanent teeth of up to 10% was observed among persons six to 19 years of age and up to 6% among dentate adults 20 years of age and older.⁴ While we do not have recent information about dental caries or periodontal diseases for the adult population of North Carolina, national information suggests that destructive periodontal disease should have improved as well.¹⁷ The North Carolina BRFSS indicates improved tooth retention in adults, an important outcome measure of oral health status. The growing number of people with more teeth can increase the need for dental care, although this need can be counterbalanced by a shift in types of dental procedures from treatment to diagnostic and preventive. While not addressed in this commentary, publications from the North Carolina State Center for Health Statistics suggest declines in oral cancer incidence during the 1990s in most population groups.¹⁸

This review of surveillance information available for North Carolina also suggests that in the face of these improvements, a large percentage of the population continues to have unmet need and suffer its consequences on oral health-related quality of life. The public's demand for dental services is much more difficult to measure than unmet clinical need or even self-reported need for care. However, responses to the one question asked of parents in the most recent school survey most directly related to demand for dental care suggests that excess demand does exist, ranging from about 21% to 36% depending on race and ethnicity. The extent to which these children and adolescents are able to get dental care in North Carolina depends on a number of factors, many of which present significant barriers to realizing their desire for dental care.

Large disparities in oral health status and access to dental services continue to exist in the state. We chose to present disparities by race and ethnicity, rurality and geographic location, but clear disparities also are apparent by other characteristics of individuals, such as their age and poverty status. The analysis of untreated dental caries found that statewide roughly one out of five children have untreated decay in primary teeth when they start school, but many counties have as many as one of four young children in this condition, 24 counties with one out of three. These counties clearly cluster in sections of the state known to have other health and social disadvantages.

Untreated disease also clusters in a small number of people. The ubiquitous distribution of tooth decay among children has shifted so that most are not affected in their permanent teeth at any time during their childhood, and only 10% to 20% of those who are affected have almost all of the untreated disease.

Statistics for dental caries presented in this commentary are for obvious carious lesions. We did not include non-cavitated lesions, nor were radiographs used for any determinations of caries status. The true amount of tooth decay in the North Carolina population is underestimated, probably by about 35% to 40% based on the exclusion of noncavitated lesions alone. Noncavitated lesions are responsive to fluoride therapy and other preventive interventions, which implies the need to continue programs that emphasize preventive strategies that will prevent noncavitated lesions from progressing to the stage that they need restorative intervention.

Implications for Public Health Action

Several conclusions with important implications for public health can be drawn from this review. After decades of remarkable improvements in the prevalence of tooth decay, the trend line seems to be leveling off or possibly increasing for primary tooth decay. Smaller reductions in decay prevalence are evident in the permanent teeth of today's young children than in those in the past. So far, this effect seems to be most pronounced in children born during or after the mid-1990s. These trends are consistent with national trends through 2001, providing some support for the conclusion that these observations in North Carolina reflect actual trends.⁴ These emerging trends need to be monitored closely so that we can determine if they represent statistical fluctuations around what are historic low levels of decay, or if we are observing the early signs of a trend toward more disease.

Nevertheless, investigations need to be undertaken into the possible reasons for what appear to be unfavorable trends in dental disease. We may be seeing the early indications of increased disease—the consequence of a reduced availability of preventive dental services, particularly school-based services. The rapid growth of the North Carolina population overall and, more specifically, the number of people at elevated risk for disease, may be straining the capacity of the dental care system to respond to public needs and demands. Key factors related to the demand for dental services, such as the importance the public places on oral health, may also be a contributing factor. A better understanding about why these trends are occurring would help guide public policy.

Progress has been made since the early 1960s in reducing disparities in dental disease and access to care between whites and African Americans living in North Carolina. The growing Hispanic population, who have more disease than its non-Hispanic counterparts, may be eroding the gains made in reducing these disparities. Programs that can help eliminate disparities in dental disease and access to dental care are needed. Approaches will require implementation of innovative strategies, such as: the current *Into the Mouths of Babies* program that encourages physicians to provide preventive dental services for

very young, low-income children; expanding existing community-based programs; or restoring discontinued community-based programs that helped us achieve the observed major reductions in dental disease during the 1960s, 1980s, and parts of the 1990s.

Wide concern has been expressed about the lack of access to dental care in North Carolina and nationally, particularly for children from low-income families and for preschool-aged children overall. This concern is bolstered by information abstracted from surveillance systems in North Carolina. Many young, school-aged children have untreated decay, but the overall amount of untreated decay is highly concentrated in a small segment of the population. Untreated decay in older, school-aged children, although less prevalent, is even more concentrated in a small number of children. Addressing the dental needs of these very high-risk children will require intense and concentrated efforts involving multiple strategies.

Finally, the ability to examine trends in dental disease in some detail for North Carolina demonstrates the value of the oral health surveillance system in North Carolina. The surveillance

system has matured over the years, but still has limited ability to monitor adult oral health status in general and the oral health status of some minorities, such as American Indians or Asians, who are a small proportion of the state's population, at the level of detail possible with other population groups. The oral health status of adults needs to be brought under surveillance so that the oral health conditions of children being born today can be monitored as they grow into adulthood.

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The Dentist Workforce in North Carolina 2005: A Commentary

John W. Stamm, DDS

This commentary, delivered at the North Carolina Oral Health Summit 2005, presents a basic assessment of the currently active dentist workforce situation in North Carolina. The assessment suggests that North Carolina's dentist workforce supply, while qualitatively excellent, is quantitatively insufficient, ranking North Carolina 47th out of 50 states. In addition, like many states, North Carolina is experiencing significant maldistribution in its supply of dentists. Moreover, the massive projected population growth, changing demographics, disease trends, alterations in demand for care, and potentially significant changes in dental practice styles all further reinforce the view that North Carolina urgently needs to develop substantially increased capacity for enrolling and graduating high quality dentists.

Within acknowledged limitations, the present analysis offers a number of conclusions: *One*, there is an urgent need for dentist workforce expansion in North Carolina based upon the existing dentist shortage, the current maldistribution of dentists, and the very strong North Carolina population growth projected out to 2030 by the United States Census Bureau. *Two*, North Carolina's goal should be to position its dentist-to-population ratio to rank somewhere near the national median of 6.0 dentists per 10,000 population. *Three*, to achieve its need for more dentists, North Carolina should rapidly pursue significant dental student enrollment expansion. *Four*, dental student enrollment growth should be linked with North Carolina Area Health Education Center programs to encourage training in appropriate rural and underserved community settings. *Five*, expansion in dental and dental hygiene enrollment should provide admission priority to academically qualified candidates from rural North Carolina. *Six*, expansion should be considered for General Dental Practice Residency programs and Pediatric Dentistry Specialty programs.

Introduction

The opportunity to examine the status of North Carolina's dental workforce comes at a critical time. On one hand, caries rates among school children and adolescents continue to decline, relatively fewer extractions are being performed, fewer

“[A] severe shortage of dentists... has emerged in North Carolina. ...North Carolina currently ranks 47th of the 50 states in terms of the dentist-to-population ratio.”

adults are becoming edentulous, and a majority of North Carolina citizens are receiving excellent oral healthcare services. Nevertheless, as one looks forward, the state faces increasingly serious dental, oral, and craniofacial healthcare challenges. For North Carolina's oral healthcare system, whether in the private or public sectors, the current and growing challenge is to provide the population with adequate access to professional dental care in all counties of the state, but especially for rural and economically disadvantaged populations, regardless of where they live. The dental care access problem in North Carolina is acute and getting worse.

Contrast this with the situation nearly 30 years ago, when data from the 1976 North Carolina Dental Disease Prevalence Survey, and the National Health and Nutrition Examination Survey (NHANES), permitted Schonfeld and Warren-Hicks to write, “The dental care system in North Carolina is considerably underutilized in each of the six Health Service Areas due to the low level of demand for dental care. It is expected that this underutilization will result in a drop in productivity in future years due to the four percent annual net increase in dental manpower. The

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North Carolina population has been increasing at an annual rate of one percent.”¹ Surveying the North Carolina dental manpower growth between 1972 and 1979, Konrad and DeFries wrote, “These data show a steady growth in the number of licensed dentists over the period 1972 to 1979. Since the year 1972, the average annual net growth in the supply of dentists in the state has varied between 3.1 and 4.9% per year, with an average net growth rate of about four percent.”² In contrast, and from the perspective of 2005, it is very clear that North Carolina has changed dramatically since the mid-1970s, and for many persons in the state, gaining access to needed and adequate dental, oral, and craniofacial healthcare has become a more difficult and/or unaffordable proposition.

While acknowledging some over-simplification, the current and likely future access to dental care challenge faced in North Carolina appears to arise from a confluence of four distinct elements or trends:

- *Deterioration of Dental Medicaid.* North Carolina’s Medicaid dental reimbursement rates deteriorated during the 1980s and 1990s. Not only that, significant coverage restrictions were also imposed in the early 2000s.
- *Shortage of Dentists.* A severe shortage of dentists has emerged in North Carolina. In the United States, North Carolina currently ranks 47th of the 50 states in terms of the dentist-to-population ratio.
- *Mal-distribution of Dentists.* In North Carolina, as in most other states, and as is true for many other service professions, the distribution of dentists has continued to evolve to the disadvantage of the state’s rural populations.
- *Massive Population Growth.* The United States Census Bureau projects that among the states, North Carolina will jump from being the tenth to the seventh largest in population in 25 years. The Census Bureau estimates the 2000-2030 relative population growth will be 29.2% for the United States, but 51.9% for North Carolina.

In consideration of these factors, in 1998, the North Carolina General Assembly charged the North Carolina Department of Health and Human Services (DHHS) with exploring the dental care access issue and recommending strategies for improving the situation. Specifically, the legislature asked the North Carolina DHHS to develop strategies for:

- Assisting dentists in increasing the number of Medicaid patients they treat;
- Increasing Medicaid patients’ access to quality dental services;
- Teaching dental professionals how to better integrate Medicaid and other low-income patients into their practices; and
- Expanding the capacity of local health departments and community health centers to provide properly diagnosed and supervised preventive services, such as sealants, fluoride, and basic dental hygiene treatments to low-income patients.

The legislature’s charge to the North Carolina DHHS deserves closer attention. Three of the four concerns to be studied,

and strategies to be developed, focused on North Carolina Medicaid issues as they related to dentistry. The fourth area of focus was on local health departments and community health centers and their capacity to offer preventive dental services. In the legislature’s charge itself, no direct reference was made to the supply of the privately practicing dental workforce in North Carolina. Yet, privately practicing dentists constitute over 95% of the dentist workforce in the state.

On receiving its charge, the North Carolina DHHS contracted out the task of evaluating the four issues identified and recommending appropriate corrective strategies to the North Carolina Institute of Medicine (IOM). The North Carolina IOM formed a high-level, blue-ribbon Task Force on Dental Care Access that undertook the study and released its report in May 1999.³ The report included 23 recommendations.

Since that time, a good deal has been accomplished in implementing most of these recommendations, or parts thereof. Implementation efforts have included: (1) significant new legislation, (2) changes to dentist licensing procedures by the North Carolina State Board of Dental Examiners, (3) generous funding from the Kate B. Reynolds Charitable Trust for new and expanded community dental clinics, (4) changes in legally permitted duties for dental hygienists in public health clinics, (5) refinement in contract terms for dentists qualifying for support through the state’s Office of Research, Demonstrations and Rural Health Program Development, and (6) some additional funds for children’s dental care through North Carolina Medicaid. The North Carolina IOM has provided a particularly useful service by issuing follow-up reports in 2001, 2003, and 2005, which tracks the progress made on the original 1999 recommendations.^{4,5}

The North Carolina IOM Recommendations on Dental Workforce

In spite of the fact that no direct reference to North Carolina’s dental workforce supply appeared in the legislature’s original charge to North Carolina DHHS, the North Carolina IOM study recognized that dental workforce supply concerns existed and needed attention. In its 1999 Report, the North Carolina IOM Task Force on Dental Care Access offered nine recommendations for “increasing the supply of dentists and dental hygienists in the state with particular focus on recruiting dental professionals to practice in underserved areas and to treat underserved populations.”³ These appeared as recommendations 4-12 in the report and will not be reproduced here.

Importantly, however, the nine dental workforce recommendations emphasized issues related to, or for the most part restricted themselves to, the Medicaid and the local/community health centers’ components of the legislature’s original charge to the North Carolina DHHS. Two important exceptions were the recommendation that the North Carolina State Board of Dental Examiners (SBDE) establish a licensure-by-credentials pathway, and that the SBDE also consider whether existing regional (i.e., multi-state) dental examining boards could form yet another

pathway to dental licensure in North Carolina. The first of those two pathways has been implemented.⁶ The second of these two pathways appears on track for future implementation. But, the North Carolina IOM was not charged to undertake a comprehensive dental workforce study, and it did not do so. As a result, several large-scale dental workforce issues, with important public policy implications for North Carolina, were not addressed in the North Carolina IOM Report.

The North Carolina Legislature Begins to Address Concerns over Dental Workforce Supply

The legislature's major response to the 1999 North Carolina IOM Report was the 2001 introduction and passage of Senate Bill 861, which, among other achievements, set into motion a study to evaluate the feasibility of increasing North Carolina's capacity to train dentists.⁶ Specifically, the legislature charged the University of North Carolina Board of Governors to evaluate alternative approaches for enrolling, training, and graduating more dental students in North Carolina. The Board recruited a team of external consultants to conduct the study and generate a report with recommendations for the Board.⁷ The Board of Governors received, whetted, and formally approved the report and delivered it to the legislature in July 2002.

The consultants' recommendations contained in the Board of Governors report called for a significant and rapid enrollment increase, from 80 to 105 dental students, at the University of North Carolina at Chapel Hill (UNC-Chapel Hill). There has been concrete follow-up on this recommendation, and UNC-Chapel Hill has submitted an enrollment expansion plan, through the Board of Trustees and the Board of Governors, to the North Carolina legislature. The legislature has, in turn, authorized planning funds for this initiative, which has now been expanded to increase enrollment by 50 students per class, specifically by going from 80 to 130 admitted dental students per year.

The Board of Governors' study for the legislature also recommended that the General Dentistry Residency Program at East Carolina University (ECU) be significantly expanded, and that ECU consider the establishment of a pediatric dental residency program. The Board's report further recommended that ECU evaluate the feasibility of establishing a dental hygiene program. Subsequently, ECU submitted a request for planning funds to expand their General Dental Practice Residency Program, but the legislature did not appropriate funds for their request. To date, it appears that ECU has not acted to implement the other recommendations related to training programs in pediatric dentistry and dental hygiene.

Dental Workforce in North Carolina 2005: A Brief Overview

On January 1, 2004, North Carolina had 3,483 active in-state dentists and 4,052 in-state licensed dental hygienists.¹⁰ In that same year, North Carolina's dentists practiced in 96 of the state's 100 counties. Still referencing the start of 2004, North Carolina's dentist-to-population ratio stood at 4.1 dentists per 10,000 people, compared to the national figure of 6.0 dentists per 10,000 people. An examination of dentist-to-population ratios in all 50 states in 2004 revealed that North Carolina's dentist-to-population ratio ranked 47th out of 50 states.¹¹ Table 1 provides some basic information for placing the state's dental workforce concerns into a relevant context.

Table 1.
Dental Workforce Context, North Carolina, 2004

North Carolina population in 2003—8.4 million
Population Growth 1990-2000: North Carolina—21.4% United States—13.1%
Annual North Carolina dental expenditures \$1.65 billion
3,483 active in-state dentists (81% generalists)
Distribution (96 counties have one or more dentists)
North Carolina has 4.1 dentists per 10,000 population (National figure is 6.0 per 10,000)
North Carolina's dentist-to-population ratio ranks 47th among 50 states
4,052 in-state licensed dental hygienists

Table 2 provides more detailed information about the rate of growth in the dentist workforce in both North Carolina and the United States between 1976 and 2003. These data indicate North Carolina's dentist-to-population ratio has been virtually flat since 1987. Moreover, the national dentist-to-population ratio has been consistently 40-50% higher than North Carolina's.

Turning to the stock of dental hygienists in North Carolina, Table 3 shows that the number of active dental hygienists has grown from 1,368 dental hygienists in 1979 to 4,052 in January

Table 2.
Dentist Workforce, United States and North Carolina, 1976-2003

Year	United States			North Carolina		
	Population (millions)	Active Dentists	Dentist-to-Population Ratio (per 10,000 population)	Population (millions)	Active Dentists	Dentist-to-Population Ratio (per 10,000 population)
1976	217.6	110,300	5.1	5.6	1,900	3.4
1987	242.3	137,800	5.7	6.4	2,600	4.1
1992	254.9	152,900	6.0	6.6	2,700	4.1
1995	264.6	158,600	6.0	7.2	2,900	4.0
2000	281.5	166,000	5.9	7.8	3,100	4.0
2003	290.3	173,600	6.0	8.5	3,500	4.1

Table 3.
Active Dental Hygienists per 10,000 Persons in North Carolina, 1979-2003

Year	Licensed Dentists per 10,000 Population	Active Dental Hygienists per 10,000 Population	Active Hygienists	Dental Hygienists-Dentist Ratio
1979	3.8	2.4	1,368	0.62
1989	4.1	3.3	2,190	0.82
1998	4.0	4.5	3,395	1.12
2003	4.1	4.8	4,052	1.18
Change Percentage (1979-2003)	7.9%	100%	199.3%	

2004, a 199.3% increase. In terms of the ratio of dental hygienists per 10,000 population, this too has grown from 2.4 in 1979 to 4.8 in 2004, a 100% increase in the ratio. In contrast, the dentist-to-population ratio grew by only 7.9% over the same period. These two disparate growth rates account for the improvement in the ratio of dental hygienists-to-dentists. In 1979, there were 0.62 dental hygienists for every licensed in-state dentist. By January 2004, the ratio had changed, indicating 1.17 dental hygienists for every North Carolina active, in-state dentist.

The Distribution of Dentists in North Carolina

Beyond concerns about the adequacy in the overall supply of dentists in North Carolina, the dental care access problem is significantly compounded by the uneven distribution (hence, the availability) of dentists across the state's 100 counties. Figure 1 indicates the number of dentists per 10,000 people in each of the state's counties, as reported for 2003.¹² Most revealing is that only eight North Carolina counties have a dentist-to-population ratio that approaches or exceeds the United States average of 6.0 dentists per 10,000 people. This explains, in large measure, why 79 North Carolina counties are federally designated dental shortage areas.¹³ In North Carolina, 28 counties are served by two dentists or fewer per 10,000 population. These workforce distribution concerns need to be evaluated against the continuing high population growth in North Carolina, and the expected impact of that population growth in terms of the future availability of professional dental services in both urban and rural counties.

Productivity and Quality Increases by Dentists and the Dental Team

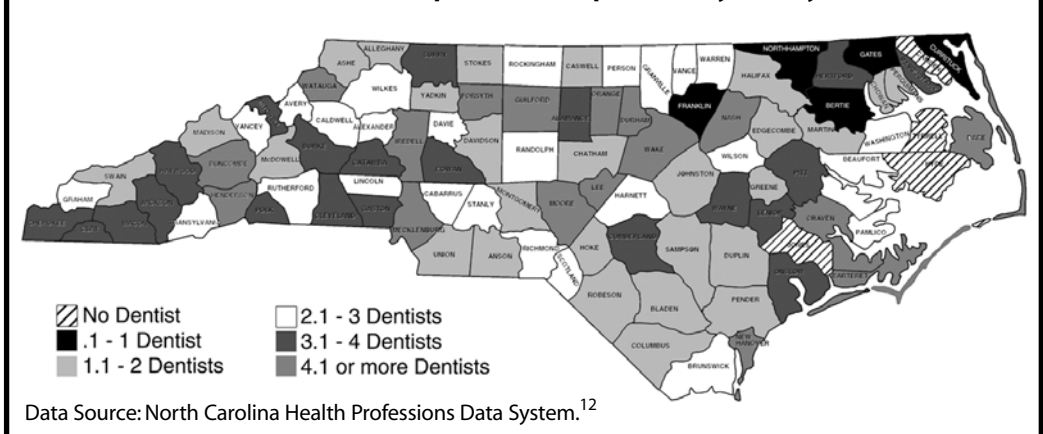
Almost all good economic analyses of dental workforce supply recognize that it is the supply of dental services, not simply the supply of dentists, dental hygienists, dental assistants, and dental technicians, that is critical to the population. This is a valid and important

distinction. In recent decades, the dental team has demonstrated continuing increases in service productivity (and quality) per unit of time. In acknowledging the significance of productivity and quality increases, these have their weakest impact where the stock of dentists is low and/or where the available dentists are aging and may be past their most productive years. While it is only speculation, it does appear that older dentists close to retirement constitute a substantial proportion of the supply of dentists in rural North Carolina counties.

Access to Dental Care in the Face of North Carolina's Population Growth

Beyond the dentist workforce shortage and dental care access concerns in 2005, the projected population growth in the state will greatly magnify the problems that currently exist. The challenge of providing future dental care services for North Carolina's population will, therefore, become more formidable with each passing year. North Carolina is currently the tenth largest state, on top of which it is also one of the fastest growing states.⁸ Already during the 1990-2000 decade, United States Census Bureau data show that North Carolina's population grew by 21.4%, compared to the United States population that grew by only 13.1% for the same period.⁹

Figure 1.
Number of North Carolina Dentists per 10,000 Population, by County, 2003



Looking ahead, the continuing population changes for North Carolina are even more dramatic. Figure 2, adapted from recent United States Census Bureau estimates, illustrates that in terms of absolute population growth during 2000-2030, North Carolina will experience the 5th largest population increase among the 50 states.¹⁵ Based on these estimates, North Carolina's population is projected to be 4.2 million larger in 2030 than in 2000. It is remarkable that, for the period 2000-2030, the total United States population is expected to grow by 29.2%, while over the same period North Carolina's population is projected to grow by 51.9%.¹⁵

Assuming that the United States Census Bureau provides the most reliable population projections available, the preliminary implications for the dental workforce needed by North Carolinians in 2030 are staggering. Two scenarios may be considered. Under the first scenario, North Carolina will continue to rank 47th out of 50 states and maintain its dentist-to-population ratio of 4.1 per 10,000 population. Just 25 years from now, to maintain the current ratio, North Carolina will require approximately 5,500 active dentists, in contrast to the 3,606 active as of January 1, 2005.¹⁶ Under the second scenario, in which the national dentist-to-population ratio norm is adopted for North Carolina, the state will need 6,320 active dentists in 2030.

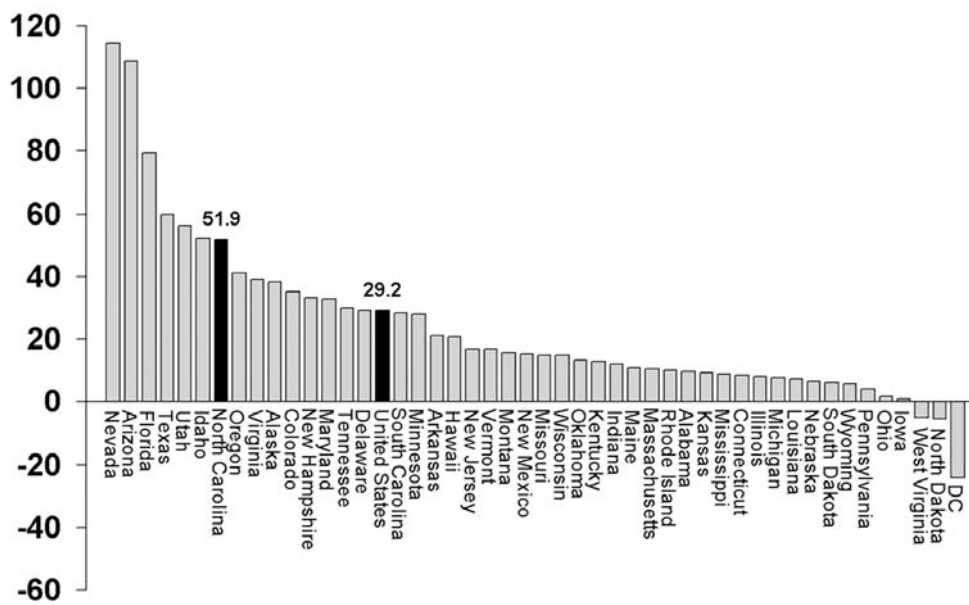
The impact of dentists retiring from active practice deserves more explicit consideration when considering future dentist workforce needs. Assuming a typical 35-year career span for dentists and a rectangular age distribution, it becomes apparent that approximately 3.0% of active dentists retire or otherwise leave dental practice each year. In North Carolina, this suggests that approximately 95-105 dentists each year leave active practice, with that number going up as the workforce slowly expands. To place the impact of dentists retiring from active practice into perspective, the UNC-Chapel Hill School of Dentistry currently graduates 75-80 dentists per year, not enough to replace those leaving practice. This situation has existed for some time. These and other issues cited above deserve careful and intensive attention as North Carolina considers its need for more dental education capacity.

Discussion

In calling for an increase of the dentist workforce in North Carolina, together with incentive measures to promote enhanced access to dental services for rural and underserved populations, the rise of contrary perspectives can be expected. In part, this may arise because workforce and population projections are imperfect, by definition. In a similar vein, some may suggest that dentists' productivity increases have not been sufficiently considered. That is true; though the current access-to-care concerns have arisen even while dentists' productivity, nationally, grew 1.12% per year during the 1990-2002 period.¹⁷ (One assumes North Carolina dentists exhibited similar productivity growth during that period.) Moreover, as was indicated previously, productivity increases have less impact where there is a significant dentist shortage involved. Others may point out that career/practice styles may be changing, in part by the continuing influx of women in the dental profession. Some may question why in-migration of dentists has not been separately considered in the current overview. Also not accounted for are the state's large African American, Hispanic and retired elderly populations, all of whom appear likely to be underserved and may be assumed to exhibit above-average dental needs. In short, while a formally constructed dental workforce analysis would be more illuminating, the following points appear to be a fair and robust reflection of the current dentist workforce concerns facing North Carolina.

- North Carolina ranks 47th out of 50 states in terms of the dentist-to-population ratio.
- The United States has 6.0 dentists per 10,000 persons; North Carolina has 4.1 dentists per 10,000 people. The

Figure 2.
Absolute Population Growth (in thousands) by State: 2000-2030



Adapted from US Census Bureau, Population Division Interim State Population Projections, 2005. Internet Release Date: April 21, 2005.

- national ratio is close to 46% better than North Carolina's.
- North Carolina has only eight counties whose dentist-to-population ratio approaches or exceeds the national average of 6.0 per 10,000.
 - 79 North Carolina counties are 'federally designated dental shortage areas'.
 - The North Carolina dental hygiene workforce has expanded progressively during the past 25 years, considerably exceeding the growth rate of the North Carolina dentist supply.
 - The United States Census Bureau projects North Carolina as the nation's fifth fastest growing state, becoming the seventh most populous state by 2030, implying significant future growth in dental service needs.

It is apparent that the North Carolina General Assembly continues to be sensitive to the public policy dimensions of the dentist workforce shortage in North Carolina. Specifically, the legislature has gone beyond its initiatives in 1998 and 2001 (encompassed in Senate Bill 861), and has appropriated \$2.0 million in fiscal year 2005-2006 planning funds with the goal of rapidly and cost-effectively expanding dental school enrollment in North Carolina.

The legislature also continues to rely on the North Carolina Area Health Education Centers system to help ensure that dental student practitioners gain rural and community-based dental care experiences. These student rotations are typically focused on North Carolina rural health clinics, but also on state mental health centers, on Indian Health Service facilities, military and coast guard installations, as well as Veterans Affairs (VA) hospitals.

Aside from the powerful and appropriate influence of market forces, the size of the future dental workforce needed in North Carolina will be largely defined by two additional considerations. The first of these is that North Carolina's current position as 47th out of 50 states with respect to dentist-to-population ratios must be rectified. A preferred ranking would see North Carolina positioned around the middle of the range, say 25th out of the 50 states. The second consideration, as already shown, is the state's projected population growth, which significantly exceeds the national growth rate, and thus may push North Carolina into becoming the seventh most populous state in just 25 years. With a 2030 estimated population of 12.2 million, this alone will account for 4.2 million more people than in North Carolina's 2000 census. Essentially, the current dental workforce shortage, overlaid with a North Carolina population estimated to be 51.9% higher than in 2000, dramatizes the need for a substantially larger and responsive oral healthcare workforce.

North Carolina has considerable dental education capacity. In 2005, the state operated 12 dental hygiene programs, 11 of which are based in the Community College System. In addition, there are 15 dental assistant education programs, 14 of which

are community college-based, and there is one community college-based dental technology program. The state's dental school is based at UNC-Chapel Hill, where the maximum current annual enrollment is 80 dental students. Interestingly, it would appear that all of these programs function at a sub-optimal size. A recent economics study by the American Dental Association determined that the economies of scale in university-based dental education were such that the lowest per-student costs were approached as a dental school's total enrollments entered the 800-1,300 DDSE* range.¹⁴ The DDSE estimated for the UNC-Chapel Hill School of Dentistry at the time this paper is published is approximately 526.

This commentary on North Carolina's dentist workforce status has focused largely on the availability and distribution of general dentists, because that is where the dental care access problem is the most acute. It is recognized, however, that dental assistants, dental hygienists and dental technicians are also key members of the dental team, and all contribute to the quality and productivity of dental care services delivered. For that reason this commentary has offered a relatively brief glimpse at the growth of North Carolina's dental hygiene work force, relative to that of dentists.

In the same vein, and with respect to advanced dental education, North Carolina currently has four general dental practice residency programs, located in Charlotte, Winston-Salem, Greenville, and Chapel Hill. A fifth general dental practice residency program is being considered for the Asheville area. The University of North Carolina also trains specialists for all dental specialties recognized by the American Dental Association. At the current time, there appears to be a need in the state for more pediatric dentists, as well as for dentists trained to serve the special needs of the ever growing elderly population, a significant proportion of whom are medically compromised and/or dependent on extensive pharmaceutical regimens. Access to dental care for institutionalized seniors is marginal at best. The supply and distribution of dental specialists in North Carolina may well deserve a future workforce study.

Conclusions

This commentary has presented a basic analysis of the current dentist workforce situation in North Carolina. The assessment offered does not represent a formal, fully specified and nuanced workforce study. Taking into account this limitation, the analysis suggests that North Carolina's dentist workforce supply, while qualitatively excellent, is quantitatively insufficient, ranking North Carolina nearly last out of 50 states. Such a position is generally perceived as undesirable with respect to healthcare policy norms.

Moreover, the massive projected population growth, changing demographics, disease trends, alterations in demand for care, and potentially significant changes in dental practice styles all

* DDSE is the DDS Undergraduate Equivalent. It is obtained by weighting each category of students by a teaching intensity factor, and summing the resultant weighted components. E.g., DDSE = (1.0 x undergraduate DDS enrollment) + (1.7 x dental specialty enrollment) + (1.7 x non-clinical graduate student enrollment) + (0.6 x allied dental enrollment) + (1.2 x non-specialty advanced dental education enrollment).

further reinforce the view that North Carolina urgently needs to develop substantially increased capacity for enrolling and graduating high-quality dentists. Committing to an enrollment increase program, together with increased community-based training experiences, would directly improve dental care access for people in North Carolina, would also contribute to greater economic development in the state, and would lead to positive distributional benefits.

Within acknowledged limitations, the current assessment of the dentist workforce status in North Carolina permits the following conclusions:

- Significant dental workforce expansion in North Carolina is justified by the existing dentist shortage, the current maldistribution of dentists, and the very strong population growth projected out to 2030 for North Carolina by the United States Census Bureau.
- In terms of dentist supply, North Carolina's goal should be to climb from its current 47th position to rank near 25th out of the 50 states with respect to the dentist-to-population ratio.
- Significant dental student enrollment expansion in North

Carolina is necessary and should seek to capitalize on the acknowledged economies of scale achievable by encouraging institutions to enroll students up into the 800-1,300 DDSE range.

- Dental and dental hygiene student enrollment expansion must include additional linkages with North Carolina AHEC to help facilitate increased training capacity and to encourage dental training in appropriate rural and community settings.
- Dental and dental hygiene student enrollment expansion should make it possible to provide admission priority to academically qualified candidates from rural North Carolina.
- Expansion of general dental practice residency programs and pediatric dentistry specialty programs should be strongly encouraged.

Acknowledgement: I would like to acknowledge the excellent graphics work by Mr. W. McCollum, Acting Director of the Center for Educational Development and Informatics at the UNC-Chapel Hill School of Dentistry. NCMedJ

Editorial Note: Dr. Stamm uses figures from the North Carolina State Board of Dental Examiners, which report the numbers of dentists active as of January each year. The Issue Brief in this issue of the Journal uses figures from the NC Health Professions Data System provided by the Cecil G. Sheps Center for Health Services Research, which reports active dentists through October of each year. Because the numbers are collected and reported ten months apart, the numbers of dentists and dental hygienists reported in this commentary may differ from those in other papers in this issue of the *North Carolina Medical Journal*. These differences are not considered to have significant implications for the policy analyses or conclusions drawn from their use in any case.

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Access to Dental Care for Young Children in North Carolina: History and Current Status of Workforce Issues

Michael W. Roberts, DDS, MScD, and William F. Vann, Jr., DMD, MS, PhD

Dental caries is considered the most prevalent childhood illness with a prevalence of over 44%, surpassing asthma (11%). Among preschool children, dental caries is considered a major health problem, and this issue has recently come under scrutiny by policy makers, physicians, investigators, and public health officials. This played a central role in the fact that the year 2000 Surgeon General's Workshop and Conference was dedicated to children's oral health issues.

The access to dental care for children in North Carolina mirrors the national picture or is worse. The circumstances in North Carolina are complicated by workforce issues as well as the fact that a substantial number of children are eligible for Medicaid or are uninsured. The purpose of this commentary is to review factors impacting access to dental care for children with a special emphasis on young, preschool children. We also review recent efforts to address the issues and point out several challenges on the horizon.

The Third National Health and Nutrition Examination Survey (1988-1991) found that nearly 80% of two-to-five-year-old children below the poverty level have experienced caries.^{1,2} The United States Surgeon General's Conference in 2000 underscored the scope of the nationwide problem of access to dental care for children, especially low-income and minority families, and those with special healthcare needs. Reasons cited include the lack of dental professionals trained to see special populations and/or accepting Medicaid clients. Children lose an estimated 52 million hours a year from school due to dental pain and related care.³

In response to a perceived developing national workforce concern, the American Academy of Pediatric Dentistry (AAPD) formed a "Task Force on Work Force Issues" in 1998 that published a white paper summarizing its deliberations.⁴ The Task Force noted that since the late 1980s, there has been a growing shortage of pediatric dentists in many geographic locations of the United States. These concerns were substantiated

with data; by 1998, the number of trained pediatric dentists in private practice, public institutions, and dental education had declined to 3,600 from approximately 3,900 in 1990. The Task Force concluded that the root cause of the shortage was because the number of pediatric dentistry training positions and graduates was not adequate to offset deaths and retirements.

The dearth of training positions in the specialty was the subject of an American Dental Education Association's (ADEA) request to Congress and is described in their "Primary Care in General and Pediatric Dentistry Programs FY 2000 Appropriations Request" to increase the funds to support additional Title VII grants. This request noted that "the United States is not training enough pediatric dental healthcare providers to meet the increasing need for pediatric oral health services."⁵

While accurate projections of workforce issues in a dynamic society are difficult, Waldman⁶ projected a need for an additional 3,000 pediatric dentists to meet the dental care needs of the children in the United States by the year 2020. A National Symposium of Pediatric Dental Educators and AAPD leaders examined the specialty workforce issues in 1998 and set a goal to increase training positions by ten per year from 2000-2010. To accomplish this goal, the AAPD urged existing residency programs to look for creative ways to increase their training numbers. The AAPD also focused its advocacy efforts toward increasing Title VII funding for program expansion and new program start-ups and encouraging hospitals and dental schools to apply for these grants. These efforts have been successful: the number of first-year trainee positions grew from 181 in 1997 to 278 in 2005.⁷ This increase of over 30% was achieved through the establishment of seven new residency programs and wide-spread program expansion across the United States.

While national workforce data have made a dramatic swing since 1998, some concerns remain. The AAPD estimates that approximately one-third of dental care to children is provided by pediatric dentists, noting that specialists deliver a disproportion-

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ately higher amount of oral healthcare for Medicaid and medically compromised children. Currently the number of children in the United States is increasing, and the ratio of dentists-to-population is decreasing, a circumstance that has potential to further overload the demand on pediatric specialists.

Access Issues for Children in North Carolina

Improved access to dental care for children in North Carolina was the top priority of the North Carolina Academy of Pediatric Dentistry throughout the decade of the 1990s. Their efforts were focused on improving dentists' participation in Medicaid by attempting to increase procedure reimbursement rates. In 1999 the North Carolina Institute of Medicine (IOM) Task Force on Dental Care Access issued a report to the North Carolina General Assembly and to the Secretary of the North Carolina Department of Health and Human Services identifying inadequate access to dental care as being commonplace among children of families living in poverty.⁸ This problem is especially notable among children birth through five years of age. Approximately 25% of all children entering kindergarten each year in North Carolina have untreated dental decay.^{7,8} And, among parents who feel that their children have unmet healthcare needs, 57% report the unmet need is for dental care, a percentage almost two-times greater than that reported for medical care.⁸

Many would argue that North Carolina has a statewide dental workforce shortage, magnified by a workforce misdistribution. The fact is North Carolina ranks 47th nationally in the supply of dentists.⁹ Four of its 100 counties have no dentists in practice, and 79 counties qualify as federally recognized dental professional shortage areas.¹⁰

The dental access problem for young children in North Carolina is compounded by two factors; (1) low dentist participation in the Medicaid program and (2) the paucity of practicing dentists. In 1998, there were only 47 actively practicing pediatric dentists in North Carolina.

North Carolina IOM's Recommendation Aimed at the Specialist Workforce

Recommendation #13 in the North Carolina IOM Report addressed the issue of training more specialists. It recommended that the number of training positions in the pediatric dentistry residency program at the University of North Carolina at Chapel Hill (UNC-Chapel Hill) School of Dentistry be increased and also recommended that consideration be given to the establishment of additional pediatric dentistry residency programs at other sites.⁸

What about the Addition of New Residency Training Programs?

Following the publication of its report, the North Carolina IOM hosted a meeting of dental directors from East Carolina University, Wake Forest University School of Medicine and the Carolinas Healthcare System [Carolinas Medical Center (CMC)]. Wake Forest University considered initiating a program, but did not go forward. Recently CMC has expressed an intention to develop a program.

The Residency Training Program at UNC-Chapel Hill

The UNC-Chapel Hill School of Dentistry Department of Pediatric Dentistry has been the only residency program in pediatric dentistry in North Carolina since 1955. From 1955-1985, the program was 24 months in length. During this time frame, up to three students/year (a program total of six trainees) were accepted annually, depending on department resources. By 1986, the program had 66 alumni, two-thirds of whom were practicing in North Carolina.

The program length was extended to 36 months in 1986, but the class size was reduced to two residents per year (a program total of six trainees) because resources could not be

stretched to support more than a total of six residents. In 1992, the program was awarded a five-year grant from the federal Maternal and Child Health Bureau and recognized as one of three Centers for Excellence in Pediatric Dentistry in the United States. Prior to this time the program

never had stable funding, but was supported by a hodge-podge of creative financing mechanisms with reliance on the UNC-Chapel Hill School of Dentistry, the UNC Hospitals, and private resources, which could only sustain very low resident stipends.

The Maternal and Child Health Bureau support has served as a recruitment magnet for exceptional residents. Since 1992, many of these individuals have had the background and sophistication to support their training using a variety of governmental grants. This permitted program expansion of one additional resident per year in most years since 1992 and under this scenario, an extra 11 residents have been trained. Since the advent of the 36-month program, the retention of graduates in North Carolina has been 75%, and this does not include several who left the state for academic appointments.

In 2003, the UNC-Chapel Hill School of Dentistry Department of Pediatric Dentistry was awarded a competitive three-year non-renewable Title VII grant from the federal Health Resources and Services Administration (HRSA), Bureau of Health Professions to increase the number of pediatric dentistry

“Currently the number of children in the United States is increasing, and the ratio of dentists-to-population is decreasing...”

residency positions by one per year for 2003-2006. As noted previously, these grants are intended to be seed money to initiate new residency programs or increase the number or positions in existing programs.

To summarize, at present there are nine residents (three per year) in training at the UNC-Chapel Hill School of Dentistry, but this number will dwindle to six (two per year) in 2008 unless additional funding is identified and secured to sustain the increase.

Another strategy put in place at the UNC-Chapel Hill School of Dentistry has been to strongly encourage and assist their dental students to complete pediatric residency training outside North Carolina and urge them to return to the state to practice. This strategy has also seen success in the past decade.

As a result of recent cumulative efforts to increase the number of pediatric specialists practicing in the state, the number of private practitioners increased from 47 in 1998 to 92 in 2004, a 96% increase. Notably, five of the pediatric dentists are engaged in community dental clinics within health departments or in Medicaid clinics.¹¹ While the number of pediatric dentists practicing in North Carolina and the number being trained may be sufficient at present, there is continued concern about the aging of the pediatric workforce and the future increase in the number of children in the state. These trends could have a negative impact on access to dental care.

The North Carolina Dental Medicaid Challenge

Many factors influence the low use of dental services among North Carolina Medicaid recipients. Low dentist participation in the Medicaid program remains an issue. North Carolina has one of the lowest rates of actively participating dentists in the country. Recommendations #1, 2 and 3 of the North Carolina IOM Report addressed issues that would encourage increased dentist participation.⁸

In 2000, a class action law suit (*Antrican vs. Burton*) was

brought by a group of parents against the North Carolina Medicaid Program alleging inadequate access to dental care for their Medicaid-covered children. Settled in 2003, this litigation resulted in reimbursement rate increases for 27 selected dental procedures. This action led to additional dentists agreeing to become Medicaid participants (see Table 1).

Unfortunately, however, the settlement did not include an inflation adjustment clause. Most experts agree that reimbursement levels should reflect the 75th percentile of market-based fees (fees equal to or greater than those of 75% of dentists in the state) to encourage dentist participation.

Although the absolute number of dentists participating in Medicaid increased 4% from 2001 to 2004, the percentage of practicing private dentists who participate in Medicaid remained constant or declined slightly over the same period (49% to 47%).¹¹

What Does the Future Hold for Our State?

American Dental Association President-Elect, Robert M. Brandjord, has noted that access to care is the umbrella for the major issues facing dentistry. He stated also that the challenge to dentistry was to motivate the political will of state legislatures and Congress to properly fund access to dental care.¹² A lack of political will in our state would appear to be demonstrated in two recent illustrations:

- Acting on the recommendation of the North Carolina IOM Task Force, during the 1999 General Assembly session, Senators Howard Lee and Beverly Purdue introduced North Carolina Senate Bill 752 to appropriate funds to add three UNC-Chapel Hill School of Dentistry pediatric dentistry residents (one per year) at a sustained state funding level of \$100,000 per year. This bill was not passed, and securing funding to support an increased number of training positions in pediatric dentistry at UNC-Chapel Hill remains elusive. Considering its current heavy dependency on federal support through the Maternal and Child Health Bureau

Table 1.
Number and Percentage of Private Dentists Participating in the Medicaid Program

	2001	2002	2003	2004
Total number of private dentists who practice in NC (not including public health dentists)*	3,280	3,381	3,414	3,621
Number of private dentists who "actively" treat Medicaid enrollees**	644	670	712	855
Population of North Carolina***	8,198,173	8,311,778	8,421,050	8,541,263
Number of Medicaid enrolled children under 21 years of age*	536,795	580,990	616,874	643,922
Dentist-to-Medicaid ratio	1:833	1:867	1:846	1:753

* Source: Cecil G. Sheps Center for Health Services Research. North Carolina Health Professions Data System with data derived from the North Carolina Board of Dental Examiners. Chapel Hill, NC: Cecil G. Sheps Center for Health Services Research, University of North Carolina.

** Source: Data provided by North Carolina Division of Medical Assistance. The 1999 IOM Task Force on Dental Care Access Report defined "active participation" in the Medicaid program as those dentists who received more than \$10,000 in Medicaid reimbursements in a fiscal year.

*** North Carolina State Demographics online at: <http://demog.state.nc.us/>

grant, the program is at high risk of being forced to reduce the number of training positions to even lower levels as federal funding sources evaporate, a prospect with a high likelihood in the future.

- Recently, the General Assembly (Session Law 2005-276) passed a budget that puts all children five years of age or younger covered by North Carolina Health Choice program into the Medicaid program effective January 1, 2006.¹³ Medicaid reimbursements for dental procedures are significantly less than North Carolina Health Choice. Younger children have had the most difficulty in establishing a dental home in the past. This legislation has the potential to aggravate the access to dental care issue for affected children.


Summary

The 2000 North Carolina IOM report contained 23 recommendations. To date 16 have been fully or partially implemented. This represents progress, but accomplishing full compliance remains a goal. Absent new training programs in our state, as current federal training grants phase-out, identifying financial support to continue training an adequate number of pediatric dentists for North Carolina will be a challenge. **NCMedJ**

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U.S. General Services Administration

Dentist Participation in Medicaid: Key to Assuring Access for North Carolina's Most Underserved

Mahyar Mofidi, DMD, MPH

Dental care is essential to overall health.¹ Despite improvements in prevention and oral health status, millions of people still experience preventable dental disease.^{1,2} There are glaring and persistent socioeconomic disparities in the distribution of oral health problems with persons from low-income families and minority backgrounds being affected to a much larger extent than their counterparts.^{1,2}

Research has documented many factors, both complex and inter-related, that contribute to the persistence of oral health disparities.¹ Inadequate access to regular dental care represents a chronic, significant problem to achieving oral health.^{1,2} Even though Medicaid has the potential to markedly improve access to dental care for millions of economically disadvantaged persons, this federal-state program has unfortunately not lived up to its potential. Less than one in every five children enrolled in Medicaid uses preventive services in a given year.^{1,2}

Among the primary reasons for poor utilization of dental services by Medicaid enrollees is scarcity of available dentists.² Numerous studies on access to dental care have been completed, including those of dentists who consistently cite three major issues for their lack of participation in the Medicaid program: (1) inadequate reimbursement rates; (2) broken appointments and patient non-compliance; and (3) burdensome paper work associated with Medicaid.² Of these, insufficient reimbursement rates, which are often less than what it costs to operate a dental practice, constitute the principal reason for keeping many dentists away from treating Medicaid enrollees.²⁻⁴ In North Carolina, the 1999 North Carolina Institute of Medicine Task Force on Dental Care Access identified a significant increase in reimbursement rates as its number one recommendation for improving access to dental care.⁵ It noted that more dentists would be willing to see more Medicaid patients if reimbursement rates were increased.

Increasing Medicaid Reimbursement Rates

Over the past several years, a number of states have developed comprehensive approaches to increase dentist participation in the Medicaid program.⁴ Establishing competitive, market-based reimbursement rates has been a central strategy.⁴ These efforts appear to have improved both the dentist participation rate in Medicaid and access to dental care for beneficiaries.

What has the experience in North Carolina been? There have been several rate changes since 1999. These payment rates, however, are still below dentists' fees charged to non-Medicaid patients and are not consistent with a market-based approach. Nonetheless, by April 1, 2003, as a result of a dental care law suit settlement, there was a significant reimbursement rate change for

many dental procedures benefiting children.⁶ The majority of targeted dental services affected by the reimbursement rate change also happen to be available to the adult Medicaid recipients. These services include, but are not limited to, comprehensive exams, radiographic x-rays, fillings, and extractions.

Common adult procedures, however, such as scaling and root planning (i.e., deep cleanings) and dentures were not affected by the rate change.

How have increased reimbursement rates impacted dentists' participation in the Medicaid program and, more importantly, the beneficiaries' utilization of dental services? This question is a difficult one to answer as causality sequencing cannot be established with available data. Preliminary evaluations suggest that increased rates have indeed coincided with improved participation and utilization levels.⁷ Following is a brief summary of results:

“Less than one in every five children enrolled in Medicaid uses preventive services in a given year.”

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Dentists' participation

- During 2001 and 2004, there was a 33% increase in the number of dentists "actively participating" in the Medicaid program (from 644 to 855, respectively). The 1999 North Carolina Institute of Medicine Task Force defined "active participation" in the Medicaid program as those dentists who received more than \$10,000 in Medicaid reimbursements in a fiscal year.
- Between 2003 and 2004, 143 new dentists began actively participating in the Medicaid program bringing the overall active dentist participation rate to 24%.

Utilization

- The percentage of Medicaid enrollees receiving dental services increased from 20% in 1998 to 27% in 2004.
- From 2001 to 2004, utilization of dental services among children jumped from 28% to 31%, while utilization among adults aged 21-64, went from 24% to 25%.
- Utilization rates for older adults aged 65 and older remained relatively stable, going from 16% in 2001 to 17% in 2004.

Challenges and Concerns Associated with Reimbursement Rates

Notwithstanding the progress in dentist participation and dental access for the enrollees, a number of challenges and concerns associated with increasing reimbursement rates must be mentioned.⁷

- Increase in access to dental care is primarily attributable to those dentists who were participating in the Medicaid program, but who began to serve more patients after the reimbursement changes. While the number of these dentists is on the rise, it is important to note that among all providers who billed for Medicaid procedures in 2004, only half can be considered as "active" providers in the Medicaid program. In addition, over the past several years, the number of all dentists participating in the Medicaid program has remained relatively flat and may be decreasing as a proportion of all dentists in the state.⁷
- Despite an increase in the dental utilization rate for children, the 31% rate for 2004 still lags below utilization levels of children in the general population. For example, children between 200% to less than 400% of the federal poverty guideline (FPG) and children equal to and greater than 400% FPG have 49.4% and 65.2% dental utilization rates, respectively.⁴ In addition, among children whose families can afford private dental insurance, 55.8% were reported to have at least one dental visit during the past year.⁸ A more reasonable benchmark against which to compare the progress of the North Carolina Medicaid dental program for children may be the Healthy People 2010 goal that at least 57% of children from low-income families receive a preventive dental visit each year.⁹
- There has been little change in older adults' utilization levels. In fact, dental utilization rates for older adults in the Medicaid program falls far behind those of their counterparts in the general population. In a national study, among older

adults with private insurance coverage, 65% reported at least one dental visit during the past year, while among those without private dental coverage, 33.9% had at least one visit.⁸

- The reimbursement rates for certain frequently used and needed services for Medicaid-eligible adults, such as deep cleaning and dentures are low.⁷ For example, Medicaid pays \$78.11 for a quadrant scaling and root planning, while the standard fee at University of North Carolina at Chapel Hill (UNC-Chapel Hill) dental faculty practice for the same procedure is \$196. Medicaid also pays \$309 for a complete denture, whereas the fee charged by UNC-Chapel Hill is \$903. Such low reimbursement rates may discourage dentists from treating Medicaid-eligible adults who, in turn, without adequate access will be vulnerable to experiencing oral health problems.
- Although the state has taken action to address reimbursement concerns, stakeholders agree that a more comprehensive approach that strives to mirror market-based fees and regularly accounts for inflation is needed.⁷ States such as Alabama, Michigan, and Tennessee have established competitive Medicaid reimbursement rates to significantly improve access to dental care.⁴ For example, dentists in Tennessee are reimbursed at the 75th percentile of the East South Central region's fees, as determined by the American Dental Association's Survey of Dental Fees. The 75th percentile fee level for a particular region indicates that 75% of dentists in that market are charging that amount or less for a particular service, and 25% of dentists are charging more than that amount for that particular service. States that come close to the 75th percentile fee have experienced positive outcomes. For example, the number of Medicaid-participating dentists in Tennessee increased from about 380 before the rate change to approximately 700 participating dentists after the rate change. Access to dental care rose from 24% to 47%, approaching a range that is seen in the private sector in Tennessee.

At the 2005 North Carolina Oral Health Summit, it was generally agreed that, as an ultimate goal, Medicaid rates should reflect the 75th percentile of market-based fees in North Carolina.¹⁰ Subsequent to the Oral Health Summit, the North Carolina General Assembly appropriated \$2.0 million in each year of the biennium to increase Medicaid dental rates.¹⁰ It remains to be seen whether Medicaid payments that approximate private sector markets will result in increased dentist participation in Medicaid and increased access above and beyond current levels.

Nonfinancial Factors in Dentists' Participation in Medicaid

Raising dental reimbursement rates is necessary, though not sufficient, in getting more dentists to treat Medicaid patients. As stated, dentists cite a number of nonfinancial barriers to treating Medicaid patients. Often cited are administrative burdens, including complex provider enrollment procedures, burdensome

patient eligibility processes, and prior authorization requirements. Several states have reported that administrative fixes in Medicaid operations combined with funding improvements have led to increased dentist participation.

North Carolina is illustrative. Medicaid now accepts both electronic and paper claims submissions.¹¹ Prompt payment mechanisms have been implemented, such that dentists are paid in 17 days and 35 days, respectively. To improve dentist participation and reduce Medicaid claim problems, the North Carolina Division of Medical Assistance (DMA) provides information and education to dental offices on how to file Medicaid claims.

A high “no-show” rate among Medicaid enrollees and patient noncompliance also explain dentists’ reluctance to participate in Medicaid. These problems have often been attributed to lack of consumer awareness about the importance of oral health and lack of care coordination within the Medicaid program.¹² Two of the North Carolina Institute of Medicine Task Force’s recommendations focused on these issues.⁵

No statewide action has been taken with respect to educational activities for Medicaid consumers.⁶ North Carolina would be well advised to look at the oral health promotion programs of other states. In Michigan, for example, the state, collaborating with the Michigan Dental Association, developed an educational publication, *Don’t Wait Until it Hurts*, to encourage enrolled beneficiaries to seek preventive dental care.¹² Other states have used a more targeted approach, focusing on populations that are at greater risk.¹² In Maine and Michigan, caregivers of children who have not had a dental visit in the previous year receive periodic reminder mailings to encourage them to schedule a dental exam for their children.

As for care coordination, case management services are needed to help some Medicaid beneficiaries access dental care services and adhere to treatment plans and oral hygiene protocols. The North Carolina DMA has pilot-tested dental care coordination models in some counties.¹⁰ It has found that there are currently insufficient numbers of care coordinators to provide adequate dental care coordination for all Medicaid recipients. Again, our state would be well advised to learn from the experiences of other states. Medicaid agencies in some states have established innovative strategies to enhance care coordination, which include targeting preschool children in Head Start and Early Head Start programs and their families.¹² In Alabama, to improve patient attendance, a “Rights and Responsibilities” packet, which describes the patient’s responsibilities and sanctions if the patient misses an appointment, has been developed for use by dentists.¹²

Among the suggestions offered at the 2005 North Carolina Oral Health Summit regarding dental care coordination, was to extend care coordination to beneficiaries with an enhanced risk for dental caries or for complications from dental disease.¹⁰ Studies will be needed to assess whether more intense and organized assistance to beneficiaries will result in increased access to dental care.

Success in increasing dentist participation in the Medicaid program also hinges on successful outreach efforts targeting dentists.⁴ Over the past several years, the North Carolina Dental Society, whose membership includes approximately

86% of private dentists in the state, has been at the forefront of encouraging private dentists to treat patients on Medicaid.⁷ Through newsletters and statewide and regional meetings, the Dental Society has been actively promoting changes, financial (e.g., rate changes) and administrative (e.g., enhanced claim filing systems), which have been implemented within the Medicaid dental program.⁷ In a joint effort with the DMA, a Frequently Asked Questions (FAQ) document, which addresses common provider questions and concerns, was developed and subsequently promoted within the membership. Similarly, seminars and workshops have been conducted not only to respond to provider inquiries and address misconceptions about Medicaid, but also to share the positive relationship that exists between the Dental Society and DMA. These and other outreach activities need to continue in an effort to increase dentist participation in Medicaid and improve access to dental care.

Provider Attitudes and Behaviors

An important aspect of dental care access, which has received little attention, is the reportedly negative attitudes and behaviors of some dentists and their staff toward patients who are insured by Medicaid.¹³ Stigma associated with those on a public assistance program may keep some dentists away from treating Medicaid clients. It is not known if these dentists would see Medicaid patients even after addressing the financial and nonfinancial factors presented above.

In a North Carolina study, a diverse group of Medicaid beneficiaries explained that, after negotiating one barrier after another (e.g., finding a provider, obtaining convenient appointment times, securing transportation, etc.) to get a dental appointment, they faced what they perceived as judgmental, disrespectful, and discriminatory attitudes and behaviors from dentists and their staff because of either their race and/or public assistance status.¹³ For some beneficiaries, such perceived treatment discouraged their efforts to pursue dental care. Quality patient care requires that health professionals be aware of and respond to individual differences among patients, evaluate information about them in an objective, unbiased manner, and develop relationships that promote open and trusting communication. The current proposals aimed at improving access to dental care for Medicaid enrollees (e.g., increased reimbursements, patient education) fall short of addressing the more vexing obstacles to dental care that beneficiaries face. Thus, strategies to improve dental care access for Medicaid enrollees should also focus on cultivation among dentists of more “patient-centered care” that is culturally respectful and responsive to patients’ values and needs.

North Carolina Health Choice for Children

In October 1998, North Carolina implemented its State Children’s Health Insurance Program (SCHIP), entitled North Carolina Health Choice for Children (NCHC). NCHC offers healthcare coverage to uninsured children who come from working families with incomes that are too high to qualify for Medicaid, but too low to afford private insurance. NCHC

provides comprehensive health insurance coverage, including dental, vision, and hearing services. A major feature of NCHC has been reimbursing dentists generally at 90 to 95% of usual, customary, and reasonable fees.¹⁴

NCHC has greatly improved access to dental care.^{14,15} These children have experienced much better access to dental care when compared to children enrolled in Medicaid. Evidence shows that participation in NCHC is associated not only with increased dental utilization and regular dental care, but also reduced unmet dental needs. Improvement in access to dental services for low-income children in North Carolina is consistent with the results that other states have witnessed under SCHIP.¹⁶ The success of state SCHIP programs in increasing access to dental care has been attributed to a variety of factors. Central among these has been paying dentists' fees close or equal to their usual private practice charges.

Despite these reported gains, because of budgetary constraints, the North Carolina General Assembly has recently enacted legislation to transfer coverage of children aged birth to five from NCHC to Medicaid.¹⁰ The General Assembly also passed legislation to reduce all of the NCHC provider payments from the current reimbursement rates to the Medicaid rates for children aged 6-18 by July 1, 2006.¹⁰

Such actions prompt a number of questions and concerns.

For example, how will the new changes impact access to dental care for the affected children? What type of effect will these changes have on dentists? Will affected children lose their usual source of dental care? It would seem that an important first step toward ensuring that low-income children have access to dental care is for the state to adopt the kind of Medicaid fees that will attract sufficient numbers of providers. Without such a commitment, we may well lose the important gains made by NCHC toward reducing the dental access gap for low-income children.

Conclusion

Issues surrounding participation of dentists in the Medicaid program are complex. Accordingly, increasing such participation requires a multifaceted strategy. Stakeholders in North Carolina have taken significant steps toward improving dentist participation in Medicaid. Notable among these has been a consistent increase in Medicaid reimbursement rates, which has been associated with improved participation and access to dental care. But, challenges remain with respect to attracting more dentists. Adequately addressing these and other challenges should significantly improve access to dental care for underserved populations and reduce oral health disparities. **NCMedJ**

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Special Care Dentistry Delivers a Formula for Change: A Model Has Been Developed but Must Be Implemented Statewide

William E. Milner, DDS, MPH

The Reality of Now

Not-so-pretty scenarios are being played out daily in our communities:

- The benefit of a lifetime of dental care rapidly disappears for patients who cannot access a local dentist's office. Longtime dental patients are frequently turned away from practices because of complicating medical conditions, limited mobility, or change in financial status. Lack of on-site care in skilled nursing facilities, group homes, or home health programs forces them to receive only emergency care at best. A lifelong routine of regular checkups and preventive and restorative care is forced to come to an end.
- Unable to clean their own mouths, these compromised residents depend on the facilities or home caretakers for daily preventive care. Almost universally, caretakers shy away from cleaning mouths; they will take care of every other part of the body, but avoid the mouth out of fear that they will hurt the resident or that they will be bitten. What results is a filthy mouth with rapidly progressing root decay and gum disease. It gets worse for the typical dementia, head trauma, or non-communicative stroke patient who cannot say he or she hurts.
- After a few months of little or no oral healthcare, residents are in a constant state of oral infection, a dangerous condition with spin-off effects. Oral bacteria and debris can be aspirated into the lungs, which causes aspiration pneumonia and necessitates costly treatment and trips to the hospital. Diabetics have trouble controlling their disease because of this constant source of infection. Oral bacteria can also enter the blood stream, landing on heart valves and causing infection.
- Families are frustrated with the lack of availability of basic dental care. Caretakers are willing to drive anywhere for help, but help doesn't exist. Those with autism, cerebral palsy, muscular dystrophy, and a dizzying variety of syndromes are left without the hope of care.

Talk to a facility director of nursing, a health coordinator for group homes, or any family member providing care for a home health patient, and you will hear the same scenarios confirmed. Fragile, disabled, dependent North Carolinians deserve better. Luckily a solution is at hand. North Carolina has a tested and proven model of care, the established networks to create a statewide system, and the political will to provide quality, consistent care to its most vulnerable populations.

Four major areas must be considered from a public policy perspective to change this situation.

Table 1.
North Carolina's Rapidly Growing Senior Population

NC ranks 10th among states in the number of persons age 65+.
By 2020, the population 65+ will have grown 71% from the 2000 baseline.
By 2030, there will be 2.2 million 65+ (17.8% of the population).
In 2000, 219,068 persons with disabilities received Medicaid.
Total Nursing Home Residents – 47,336 in over 400 facilities.
Total Group Home Residents (mental/physical disabilities) – 4,520.
Total Home Based Residents (mental/physical disabilities) – 5,364.

A Different Dental Practice and a Provider with a Mission

A new type of dental practice is emerging because of the huge growth in numbers of the older population. To accommodate this demographic and health status shift in the population, the North Carolina Dental Society has initiated a new service area—Special Care Dentistry.

What is it? Special Care Dentistry serves those living in nursing homes, assisted living facilities, group homes, or the community at-large—patients who have intellectual and/or physical disabilities and are medically compromised. There are a few special care practices in the state. This infant area of expertise needs the support of North Carolina's dental care proponents and special care interest organizations in order to expand to serve the state's entire special care population.

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There are two major similarities between a traditional dental practice and a practice dedicated to special care.

- The treatment philosophy is the same. No matter what the disability, all patients deserve the same quality of care that any of us within the community receives.
- The other similarity involves how care is provided. Special Care Dentistry involves the complete dental team—dentist, dental hygienist, dental assistant, and office support staff.

But to be successful, the practice of Special Care Dentistry, whether on a full-time or part-time basis, requires a completely different practice organization.

- For instance, it requires an expanded practice location. Although Special Care Dentistry can be delivered in the fixed-office setting, most special care patients either cannot be easily moved to an office or exhibit behaviors that cannot be managed in a waiting room. Because of this, most patient care takes place at a facility, community center, or in the hospital operating room. Local private practitioners working in a limited number of facilities can provide emergency care and some clinical services, but they cannot provide comprehensive services for the entire special care community.
- It requires different equipment. Equipment needs to be mobile because it needs to go into a variety of settings, such as a long-term care facility, community center, or home. Residents who are sick or who have trache tubes or cumbersome geri-chairs cannot be transported outside to a “Winnebago style” van for care, especially in the middle of winter.
- It requires different reimbursement rates. Because 80% of special care patients depend on Medicaid to pay for their dental care, and Medicaid reimburses at approximately 62% of cost, a special care practice cannot serve the entire community with comprehensive, quality care, and be fiscally sustainable based solely on fee-for-service reimbursement.
- It requires a different legal structure. The most workable structure to emerge is the nonprofit practice. Nonprofit status allows the funding of start-up costs through grants and provides tax deductibility for contributions that help offset the cost of providing care to most patients at Medicaid rates.

Beyond the changes in practice organization and reimbursement, it requires a provider with a specific set of dental and interpersonal skills.

- It requires a different mindset. Direct patient care for special care patients requires more time per patient. It requires special training, flexibility, creativity, and a dedication to serve these difficult patients. In addition, this type of practice is more physically demanding than the traditional practice, both because of moving portable equipment into and out of facilities on a daily basis and treating patients who may be combative.
- It requires extensive communication about care because more individuals are involved in treating or approving treatment plans for the patient. The dental provider in a nursing home works with facility and hospital administrators, physicians, directors of nursing, charge nurses, social workers, other

ancillary providers, a variety of responsible parties, those responsible for the daily oral hygiene of the patient, state facility surveyors, and the patient. Communication with these team members adds extra time to the process.

- It requires attention to detail. The nursing home chart is huge compared to the typical dental chart. Twenty percent of special care patients require conscious sedation for treatment. Conscious sedation monitoring by nurses and the dental team greatly extends treatment time. The long list of drugs these patients are taking requires a specialized knowledge of pharmacology. Treatment forms include a variety of permission requirements for guardian, power of attorney, and healthcare power of attorney.

Formula for Change: Expand the Number of Comprehensive, On-Site Programs

Making excuses for intermittent, less than comprehensive care is unacceptable and degrading to special care patients. To serve the special needs populations, dentistry must expand the recruitment efforts and the number of training opportunities for special care dental providers who will serve all patients, no matter their reimbursement source, location, type of dental care needed, or disability.

The nonprofit practice is the most workable model to date. It is a model that can be expanded to accept special needs patient referrals from local practitioners; serve the rapid influx of retirees to North Carolina; relieve the gap in service to those deinstitutionalized by North Carolina’s mental health hospital system; and support special care patients, families, local health-care providers, and organizations representing the special needs patients.



Access Dental Care mobile equipment and truck.

Changes Require a New Breed of Community Practitioner

The growth of this special needs population requires a dental team with special training. Until recently, the few practitioners providing comprehensive special care worked at the University of North Carolina at Chapel Hill (UNC-Chapel Hill) School

Special Care Dental Programs

North Carolina's Special Care Dentistry programs emerged in the late 1990s and have created a sample framework for a statewide system.

- In the mid-1980s, The North Carolina Dental Society created a special care committee to address the treatment needs of patients and education needs of providers.
- In 1997, this committee supported the development of Carolinas Mobile Dentistry (CMD) at Carolinas HealthCare System, Charlotte. It began service to nursing homes in the Charlotte area. CMD covers 1,800 beds.
- In 2000, the North Carolina Dental Society initiated Access Dental Care. This Greensboro non-profit assisted Wake Forest University Baptist Medical Center (WFUBMC) in creating their Special Needs/Portable Dentistry program in 2002. It also teamed with Healthy Cabarrus, Kannapolis to start a branch of Access Dental Care in a four-county region around Concord/ Kannapolis. Access Dental Care has now absorbed the WFUBMC program to serve 4,000 beds and plans an expansion of service to the Triangle region.
- By 2006, the Carolinas Mobile Dentistry and Access Dental Care programs will cover over 7,000 beds.

Table 2.
Access Dental Care Five-Year Summary

Totals from August, 2000 – July, 2005*

Clinical

- 3702 Total Patients in the Practice
- 19,505 Total Patient Visits
- 32,116 Patient Services Provided

Financial

- \$2,815,966 billed with an average gross of \$98 per patient.
- \$1,908,824 paid to date
- Over \$903,000 in uncompensated care provided. This amounts to almost two years of net revenue. (80% of our patients are Medicaid beneficiaries)
- 162 Operating Room Patients (MR/DD patients-Medicaid) with an average gross of \$1350 per patient.

*Figures do not include the newly acquired WFUBMC program.

of Dentistry, in a limited number of hospital dentistry programs, in the state mental retardation hospital system, or in a local private pediatric practice. A few private practice dentists go to a limited number of nursing facilities on their "day off;" most work with few dental staff and carry basic portable equipment. Unfortunately, none of these is sufficient for today's special care dental treatment needs.

The UNC-Chapel Hill School of Dentistry is, first and foremost, a teaching center, not an access to care facility. Its staff's expertise has made it the default special care referral source over the years for local practitioners. The special care population has grown so rapidly and is so difficult to transport that the school cannot continue to provide statewide access to care. To complicate matters, the School of Dentistry has experienced decreases in public funding, limiting its ability to start new teaching programs targeting special care populations. This means that neither dental school students nor faculty members have the opportunity to learn how to treat special needs populations in the community setting. If dental students are not introduced early in the education process to delivering care in community on-site programs, we lose the opportunity to put future practitioners into the special care professional pipeline.

State mental hospital dental staff experience on-the-job training because they handle North Carolina's toughest cognitively disabled patients daily. But, a few years ago, North Carolina decided to initiate a program of de-institutionalization, placing many of these severely and profoundly handicapped residents back into community group homes. Now group home programs are desperately seeking local dental care for these residents, arguably the most difficult to treat in dentistry. Communities without special care providers have no resources to call on.

Some larger hospitals have dentists on staff and/or graduate training programs that care for special care residents, primarily in the operating room setting. These dental teams are also responsible for in-house physician referrals, preparing patients for surgery, and providing oral care to support cancer therapy. To this point, they are at capacity providing in-house care and have not been able to expand to on-site community programs.

There are some dentists providing limited care to long-term care residents. Because of the extreme shortage of comprehensive special care programs, facilities contract with these providers knowing that many of their residents will not get the care they need. Mass examinations are followed by some extractions and denture work. Treatment plans for the remaining residents are provided, and the facility is required to find a dentist willing to provide care. This is a dead-end referral because most local dentists are not trained to deal with these patients.

Some local dentists will continue to treat some special care patients. Pediatric dentists still care for children with disabilities, but their practice volumes have forced them to restrict the number of older special care patients they see. General practitioners have an important role in caring for early dementia patients and the manageable chronically ill.

Formula for Change: Special Care Professional Education

A new model of care requires a new program of education for dental providers. At this point, North Carolina does not have a program that trains special care providers. Short student rotations and courses at the UNC-Chapel Hill School of Dentistry provide exposure to the special care patient, but do not provide the formal training necessary to enter an active practice. A post-graduate residency would allow dentists and hygienists to gain across-the-board dental skills provided in fixed, mobile, and hospital settings. Education for current local practitioners interested in Special Care Dentistry can be supplied by mini-residencies, regular continuing education, and on-site practical experiences.

Residents and their families are asking legitimate questions about the lack of daily oral care. Facility administrators and directors of nursing must finally make oral health and daily oral hygiene a priority. When this happens, special care dental staff can train the facilities' admitting nurses and education coordinators, who can, in turn, maintain a consistent teaching and monitoring process of direct care staff. Charge nurses and nursing aides must understand the ramifications of not providing daily oral hygiene and be held accountable. Failure to do this will, at some time in the future, put the facility at risk (e.g., families will take legal action).

There are a few existing education programs that need to continue. North Carolina Division of Facility Services surveyors, those in charge of ensuring that federal and state Medicaid funds are spent wisely, receive regular training. This training should be expanded to include other long-term care advocacy groups. Future facility administrators are provided oral health programming information during the North Carolina School of Public Health Administrator in Training course. Every future administrator knows what a comprehensive dental program looks like. University interdisciplinary training should continue giving various future healthcare providers an understanding of oral health issues.

Funding that Matches the Practice

As it is currently structured, Medicaid reimbursement does not address the unique practice nature of special care dental services. Many services required by these patients are not even deemed eligible for reimbursement. Right now, 75-80% of skilled nursing home residents and almost all group home residents depend on Medicaid to reimburse their medical and dental providers.

To correct this inequity and to draw more practitioners into special care practice, higher reimbursement rates must be implemented, taking the following factors into account for special care patients.

- Special care patients take longer to treat. Their behavior must be handled before their dental needs can be treated. All of this requires working with the gamut of care givers and responsible parties. This takes more time that is not

reimbursed and allows fewer patients to be treated in a day. (Access Dental Care currently averages 15 patients per day) For example, the autistic patient requires a special treatment regime and environment. It takes many appointments to gain the patient's trust, none of which are reimbursable. The treatment setting must be quiet, consistent, and supportive of parents.

- Patients with special care needs require more expertise to treat. Each new employee, dentist, or auxiliary must spend six months to one year learning to care for these individuals. None of this training experience is reimbursable to organizations.
- On-site programs require travel time and expenses, none of which is reimbursed. Access Dental Care fuel costs have doubled in the past five years. Each team spends approximately two hours each day going to a facility, setting up the dental equipment, breaking down the dental equipment, and returning to the administrative office.
- Communication with responsible parties takes time and is not reimbursed.

Public funding of dental services for the truly needy and vulnerable populations continues to be a problem. Historically dentistry has received 1-2% of total Medicaid funding, and now, in North Carolina, Dental Medicaid rates reimburse at 62 cents on the 2001 dollar. A lawsuit several years ago increased Medicaid rates by 12%, but inflation has now neutralized these gains with no sign of significant increases in the future. Although the overall population is increasing dramatically, the relative numbers of the special needs population are small, and what might seem to be a large increase in reimbursement rates would actually result in a relatively small increase in overall expenditures.

Formula for Change: Innovative Funding of Special Care Dentistry

Existing special care programs have been created through "grassroots" community efforts, with initial funding from grant support. Generous seed money from several North Carolina foundations is the reason for Special Care Dentistry's successful programming to date. Medicaid's inclusion of adult services has given providers the chance to deliver comprehensive care. There is ample financial data to craft an expanded list of reimbursable services for Special Care Dentistry. It should include funding for education priorities, public policy initiatives, program development, and fair fee-for-service reimbursement.

Public Policy Initiatives

Starting a new field of service delivery involves creating a new structure of practice. Old rules must be reviewed, present practices changed to improve service, and future programs created to deal with a changing population. Special care providers are currently treating patients five to six days a week plus trying to develop awareness of special needs in education, research, local program building, and public policy development. It is an overwhelming

task. This core of individuals has the expertise to manage this change process, but they need the time. Unfortunately, the present organizations operate on such a thin profit margin, any time spent not treating patients puts them at financial risk. The following action areas need to be implemented.

- Provide support for long-term care provider organizations to establish consistent, quality Special Care Dentistry services.
- Work with communities wanting their own special care dental program. Several North Carolina communities are requesting help, but there is no time available to help them develop a program.
- Create health services research projects that support the development of community programs and ensure the quality of care provided.
- Review North Carolina's existing dental practice laws to allow for the more efficient practice of Special Care Dentistry.

Formula for Change: A Special Care Dentistry Center

Fund a North Carolina Special Care Dentistry Center to coordinate the activities mentioned in this commentary. A part-time dentist, a hygienist, and an office assistant can bring together the necessary parties to do the job right. Funding must be sustainable, giving this group the chance to work on the necessary issues and not spend all their time raising money.

Our Next Step

Many North Carolina foundations, the North Carolina Dental Society, long-term care organizations, individual nursing/group homes, and responsible parties of the mentally and physically disabled have "put their money where their mouths are." North Carolina's long-term care organizations understand the need for change and are asking special care dental providers what they can do to help create a statewide system. Dentistry has developed a successful model for providing care, but now needs the support of other organizations that will benefit from these changes. It is time to agree on a workable business/policy plan and make sure that specific changes are made. North Carolina's future long-term care residents deserve a better quality of life—one that puts the mouth back into the body. **NCMedJ**

For More Information:

To learn more about Access Dental Care and Carolinas Mobile Dentistry, visit their Web pages.

Access Dental Care

www.accessdentalcare.org

Carolinas Mobile Dentistry

www.carolinas.org/services/seniorcare/mobiledentistry.cfm



Caregivers Don't Need To Do This Alone!

- ◆ Significant increase in the number of persons providing care to a friend or family member age 60 or older from 2000 to 2003
- ◆ Over 25% of adult North Carolinians now provide care to an older friend or relative
- ◆ Almost half of those receiving care are reported to have memory loss or dementia

Many people need the support of others who are in similar situations or perhaps the support of a professional. They may need education on caregiving issues. Caregivers may need respite or a "time-out" from their caregiving duties. Seeking information on what services are available and assistance to help connect with these services can be an important first step.

North Carolina Family Caregiver Support Program
<http://www.dhhs.state.nc.us/aging>

Public Health Dentistry and Dental Education Services: Meeting the Needs of the Underserved through Community and School-Based Programs

Rebecca S. King, DDS, MPH

One essential role of public health is to reduce the prevalence of disease in populations through proven preventive measures, thereby reducing the need for treatment services. The ongoing problems of the lack of access to quality oral healthcare, along with the difficulty of establishing a “dental home” for all North Carolina citizens, and especially for its children, continues to challenge dental care provider resources in North Carolina. Dentists in private practice deliver the majority of direct patient care services to all segments of the population. However, an increasing amount of care is now being rendered by numerous public health safety net dental clinics. Collaborations of publicly and privately-funded services have directed resources to augment the care provided by dentists in private practice. The collaborations are various combinations of state, local, and federal levels of government, non-profit agencies, faith-based community organizations, and volunteer efforts by concerned citizens. The result is that disadvantaged citizens who previously could not access a dental care provider can now more easily receive dental treatment and preventive services.

Perhaps the overarching description of the efforts of all dental public health and safety net providers is stated in the North Carolina Oral Health Section’s mission “to promote conditions in which all North Carolinians can achieve oral health as part of overall health.”¹

With a focus on the three principles of public health—assessment, policy development, and assurance—the North Carolina Oral Health Section and other dental public health agencies have developed strategies to address both the *supply* of available care and the *need* and *demand* for care. Efforts concentrate on:

- Oral health monitoring—assessment and surveillance of treatment and need,
- Dental disease prevention—policy development to reduce need,

- Dental health education and health promotion—assurance to reduce need while increasing demand, and
- Access to dental care—assurance to increase supply.

State Level Strategies: North Carolina Oral Health Section

The North Carolina Oral Health Section is the only public program in the nation that provides statewide dental health prevention and education services specifically for children. The Oral Health Section is in the Division of Public Health, Department of Health and Human Services. Its function is mandated by the North Carolina General Assembly under the statutory authority of G.S. 130A-366, with services delivered at the county level. The majority of staff is funded by 77% state

“The youngest North Carolina children at risk for tooth decay lack access to preventive oral care, as well as to dental treatment services.”

appropriations and 23% Federal Financial Participation. In addition, one county funds four public health dental hygienist positions with county and Smart Start funds, and one county funds a hygienist position with Maternal and Child Health Block Grant funds.

Too many citizens, particularly children, experience preventable oral diseases. Prevention is the key to improved oral health. No matter how many treatment resources are established in the state, the treatment of dental disease cannot solve the problem.

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The vision is for North Carolina children to be cavity-free forever. The goal of the North Carolina Oral Health Section is to *prevent* dental disease, especially in children. To achieve this goal, the Section's programs are organized into five broad components: (1) Dental Disease Prevention Services, (2) Oral Health Monitoring Systems, (3) Dental Health Education/Health Promotion, (4) Access to Dental Care, and (5) Dental Public Health Residency Program. Section services are based on best practices as defined by the Centers for Disease Control and Prevention (CDC). Because of the limited number of staff, the Section primarily serves elementary school children, in order to have the greatest and longest-lasting impact. Since the 'patient' of dental public health is the community, the majority of the programs are geared toward the general public, including healthcare providers, with specific activities targeted to high-risk elementary and preschool school children. Eighty-three percent of the Section's staff—54 public health dental hygienists and two public health dentists—reside in the counties they serve and provide direct services in cooperation with local health departments. The Section serves over 288,000 children annually.

Programmatic Components of the North Carolina Oral Health Section

Dental Disease Prevention Services

The citizens of North Carolina continue to suffer from several oral diseases, including tooth decay, periodontal disease, and oral cancer. Tooth decay is the most prevalent childhood disease with more than 60% of North Carolina's schoolchildren still experiencing this disease. Several Section activities focus on decay prevention through the use of fluorides and protective dental sealants.

Community water fluoridation. Fluoridation of community water supplies continues to be the most effective evidence-based strategy for preventing dental decay. The CDC promotes community fluoridation as one of the two most effective public health measures to reduce dental decay, the other being school-based dental sealant programs. CDC's Water Fluoridation Reporting System (WFRS) database shows that 85% of North Carolina citizens served by municipal water supplies now receive fluoridated water. The Section provides technical assistance and uses federal Preventive Health and Health Services Block Grant funds to provide financial assistance to water systems wanting to fluoridate or to update older fluoridated water systems. These Block Grant funds have been reduced significantly over the last few years and are currently at risk for elimination by Congress. If that happens, other resources will have to be identified to support fluoridation and other proven dental preventive efforts.

The water systems that are not currently fluoridated are small and/or have structural or logistical problems that make it difficult to fluoridate. Systems that fluoridate often require hiring a water plant operator with a higher level certification than would be required if the system did not fluoridate. The higher level certification commands a higher salary, which is a burden

on a small system. If their water comes from multiple sites, these systems can require additional fluoridation equipment, placing an additional financial burden on a small system. Each site of the water systems that add fluoride must be checked at least daily. For example, a water system with six well heads, each requiring its own fluoridation equipment, must have a properly certified operator check each injection point daily. Most future growth in the proportion of the population served by community water fluoridation will be in response to (1) increased population in the fluoridated areas as the state becomes more urban, (2) fluoridated water systems extending into rural areas, and (3) small water systems merging with larger fluoridated systems.

Into the Mouths of Babes (IMB). The youngest North Carolina children at risk for tooth decay lack access to preventive oral care, as well as to dental treatment services. Except for that provided by the relatively few pediatric dentists in North Carolina, dental care for this group is practically nonexistent. A partnership of six North Carolina agencies addressed the issue by developing a medical model for the provision of preventive dental services to Medicaid-covered children under age three. This model, called *Into the Mouths of Babes*, trains physicians and other medical providers to perform an oral screening and refer children for dental treatment if necessary, counsel parents on taking care of their child's teeth, and apply fluoride varnish. Medicaid reimburses the medical provider for these preventive oral procedures up to six times per child before the third birthday.

IMB is part of the Section and continues to partner with the North Carolina Division of Medical Assistance (Medicaid), the North Carolina Pediatric Society, the North Carolina Academy of Family Physicians, and the University of North Carolina at Chapel Hill Schools of Dentistry and Public Health. Representatives from each of these agencies form the IMB Advisory Committee, which partners with the North Carolina Dental Society. IMB trainings occur through collaboration among the Oral Health Section trainer, the North Carolina Academy of Family Physicians, and North Carolina Pediatric Society.

As of June 2005, approximately 400 physician offices, residency programs, and health departments were providing the IMB preventive oral procedures, with approximately 40% of Medicaid-eligible children receiving the services. Section staff are working with Early Head Start to develop new training materials for teachers and educational materials for parents to emphasize the importance of preventing disease in the primary teeth and to seek early dental preventive services.

Because North Carolina data show that dental decay is on the increase in the preschool population, the Section is examining ways to effectively address the dental needs of this vulnerable group of children. Medicaid requires at least 90 days between IMB oral preventive procedures. Eliminating this requirement would allow more scheduling flexibility. In addition, children qualify for the oral preventive services only up to their third birthday. Extending the eligibility to allow children to receive the procedure at the three-year well-child checkup would increase the opportunity to receive all six encounters, resulting in an increased preventive benefit.

Preliminary North Carolina data analysis shows that children having four, five, or six of these fluoride varnish procedures before their third birthday need less treatment for tooth decay. The analysis shows a dose-related response, with some benefit seen even in children having fewer encounters. The proportion of children with repeat visits for IMB oral preventive services has increased, and we hope to see this trend continue. The dissemination of the data demonstrating the effectiveness of these early preventive procedures should encourage more physicians to participate in IMB and more parents of high-risk children to request these services.

Dental Sealant Initiative. The expanded use of protective dental sealants has great potential for reducing the rate of tooth decay, especially in areas of the teeth not as affected by fluorides. The CDC recommends school-based dental sealant programs as one of the two most effective public health measures to reduce dental decay. The Section's sealant initiative has two parts:

- School-based sealant projects are targeted to children in the elementary school setting. The projects are conducted by teams of the Section's public health dentists and dental hygienists, who set up a temporary "Dental Office" in the school. Patient examinations and treatment plans are provided for eligible children by the dentists and public health dental hygienists place sealants for these at-risk children at no cost to the participants.

This model received a recent boost by one of the recommendations of the 1999 North Carolina Institute of Medicine Task Force on Dental Care Access.² The recommendation led to a change in the North Carolina Dental Practice Act,³ which now allows public health dental hygienists, trained by the Section, to place dental sealants when the public health dentist, who is providing the legally required direction of this activity, is not on-site during the sealant project. Approximately 15,000 sealants are provided annually for children at high risk for tooth decay. While the projects deliver direct preventive services to children who are at high risk for decay, they are also designed to educate children, parents, and others in the community about the need for sealants and to encourage them to ask their private dentists about sealants.

- Sealant promotions that occur in offices of private dentists are a public/private partnership where privately practicing dentists use their facilities to place sealants for eligible children at no cost. Another public/private partnership model uses a private office facility or other site, such as a community college dental clinic, where sealants are placed by both private and public health practitioners working side by side.

Such sealant initiatives illustrate the Section's focus on prevention, coupled with dental health education/promotion and services.

Oral Health Monitoring Systems

The Oral Health Section has always used evidence-based monitoring systems to guide programmatic strategies.

Statewide Oral Epidemiological Surveys. North Carolina is the only state with a series of statewide oral epidemiological surveys dating back to the early 1960s. The Section conducts these surveys about every ten-to-15 years. The most recent survey was conducted in 2003-2004. These surveys assess the oral health needs of the citizens of the state, and the data are used to plan and evaluate the state's dental public health program. They also evaluate the effectiveness of specific public health efforts, such as community fluoridation, dental sealants, and fluoride mouthrinse.

Dental Health Assessment. State dental public health professionals assess more than 134,000 elementary school children each year for oral disease. Their calibrated assessment is useful for identifying and referring those children who need dental care, as well as conducting disease surveillance and tracking disease patterns. This surveillance technique is used annually for kindergarten and fifth grade children in North Carolina. Children who are in need of dental care are identified and, with the help of school nurses, are referred to local providers. The assessment collects data on cavities, past restorative treatment, and sealant prevalence. The collected data allow for the evaluation of goals established as part of overall community health-based objectives.

Dental Health Education/Health Promotion

Statewide school-based education programs include classroom education, videos and other audiovisual tools, educational materials, and interactive exhibits. Portable educational/promotional dental exhibits, educational videos and slides, and media promotion campaigns are used statewide.

Education for professionals includes programs, educational information and materials, and in-service training for teachers and allied health professionals. Other training and instructional materials are provided to healthcare professionals through local organizations, the university system and dental and medical publications. A comprehensive dental health curriculum, *Framework for Dental Health Education*, and innovative on-line educational materials are available to elementary school teachers.

Children's Services. In 2004-2005, almost 151,000 children were provided instruction on topics, such as dental care, sealants, nutrition, oral conditions, fluoride, plaque control, tobacco use, and injury prevention. Section field staff also emphasize teacher training and support so that classroom instruction on dental health will be an ongoing process during the school year.

Adult Services. More than 13,000 adults are provided educational services each year in keeping with the Section's emphasis on preventive dental education and promotion to parents and teachers.

Professional Services. Section staff provide a number of services to health professionals. These services include educational/informational programs for local and state healthcare professional meetings and state and local dental societies, training programs for health department staff and other health professionals, and consultation with healthcare professionals across the state and nation. Section staff work with dental programs in community

colleges as part of their public health curriculum. The Section mentors students and residents from the University of North Carolina at Chapel Hill Schools of Public Health and Dentistry.

Consultation Services. Educational consultation is provided by the health educators, upon request, to dental public health staff in addition to teachers and other healthcare providers.

Educational Materials. Approximately 500,000 pieces of educational materials are printed and distributed statewide each year, primarily to schools and health departments.

Educational Exhibits. Almost 5,000 people annually attend and receive information through point-of-contact dental health education exhibits used in various sites. With 11 different topics, the exhibits are used by individuals including Section staff, county staff, Department of Health and Human Services employees, community college staff, and related healthcare professionals.

Access to Dental Care

Access to dental care includes two aspects. These are (1) referral and follow-up for those persons in need of dental care and (2) improved access by the indigent population to dental care funded by third-party reimbursement. One measure of access to dental care in a population is the level of untreated dental cavities. According to the 2003-2004 North Carolina School Oral Health Survey, 19% of white, 30% of black and 38% of other (predominantly Hispanic) North Carolina children had untreated dental cavities. The Section's 2004-2005 kindergarten and fifth grade (K-5) statewide assessment data indicate that 22% of kindergarten children have untreated cavities in primary (baby) teeth, and 5% of fifth grade children have untreated cavities in permanent teeth.

In 2004-2005, almost 8,600 children received needed dental care as a result of follow-up by Section staff. Lack of access to appropriate dental prevention and treatment for the medically indigent is a major and worsening problem. Current access obstacles need to be reduced to improve participation from the private sector. Participation in Medicaid by privately practicing dentists has improved somewhat in the last few years as reimbursement has been increased, and paperwork has been streamlined.

The IMB program has increased access to oral preventive services and referrals for dental treatment for North Carolina's very youngest children. North Carolina 2003 Medicaid data show an eight-fold increase in the number of Medicaid-covered children under age three who received oral preventive services in a *medical* (i.e., physician's) office, with many referred for dental treatment.

The Section's successful collaboration with the North Carolina Dental Society continues with the North Carolina Dental Society-sponsored *Give Kids a Smile!* program. Statewide, dentists participate in and open their private offices to at-risk children for restorative care and sealant delivery. The 2005 *Give Kids a Smile!* Program provided 10,887 sealants for children. A variety of restorative services were provided, including 1,556 fillings. The approximate value of all of the services provided

for the children was \$1,170,000. The total number of patients treated was 4,832. Approximately 3,000 volunteers gave their time to provide these needed services. Collaborative projects enable public and private partners to work together to have an impact on access to dental care.

The American Academy of Periodontology states that periodontal (gum) disease is a risk factor for preterm and low birth weight babies. Medicaid pays for dental treatment for eligible pregnant women. However, many dental practitioners are reluctant to treat pregnant women. As part of professional education, the Oral Health Section needs to work more closely with the North Carolina Dental Society, UNC-Chapel Hill School of Dentistry, UNC-Chapel Hill School of Public Health, and North Carolina Area Health Education Centers to educate dental practitioners about the importance of addressing the oral health needs of pregnant women. These efforts would help expectant mothers decrease their risk of having low birth weight babies and reduce the transmission of decay-causing bacteria to their newborns.

In 1998, the North Carolina General Assembly charged the North Carolina Department of Health and Human Services to evaluate and recommend strategies to improve access to dental care for the Medicaid population and to improve the Medicaid program's provision of preventive services for their clients. The Secretary of the Department of Health and Human Services asked the North Carolina Institute of Medicine to convene a group to make recommendations to be reported back to the Legislature in April 1999. The resulting 23 recommendations have been reviewed every two years to document progress. The most recent review occurred in an Access to Dental Care Summit sponsored by the Section in April 2005. The Summit gathered community and dental care leaders to discuss potential strategies for improving dental care access, whether by further implementation of the original 1999 recommendations or through new strategies to improve access. The Summit report was published by the North Carolina Institute of Medicine in December 2005 as the "2005 NC Oral Health Summit Proceedings and Proposed Action Plan." If implemented, the updated action plan will help ensure access to dental care for more underserved North Carolinians across the state.

Dental Public Health Residency

The purpose of the North Carolina Dental Public Health Residency program is to allow dental practitioners with formal academic dental public health training, such as a Master's in Public Health (MPH), to gain valuable practical experience in the field of dental public health and to prepare candidates to become board certified in the American Dental Association accredited specialty of Dental Public Health. Dental public health residents participate in the planning, administration, and evaluation of programs that seek to reduce oral disease incidence and to improve the oral health of the community. The Section offers one of only two such residencies in the United States based in a state or local dental public health program. Chapter 130A-11 of the North Carolina Public Health Laws mandates the creation of a state

public health residency, while the Residency Advisory Committee is an official committee within the Department of Health and Human Services. The Section's residency program is accredited by the American Dental Association's Committee on Dental Accreditation and as such, adheres to the Association's *Standards for Advanced Specialty Education Programs in Dental Public Health*.

Local Government Strategies

Ninety-four of the 100 counties in the state have established some type of safety net dental care access facility or program, with many programs established within the past ten years.⁴

Most of these programs are operated by local health departments. Many of these programs combine mobile and fixed clinical facilities. They mostly serve children and adults with emergent care needs. Funding for these programs comes from local county budgets, grants, and reimbursement from third-party payers—mainly Medicaid and North Carolina Health Choice (S-CHIP). Recent increases in Medicaid fee-for-service reimbursements help

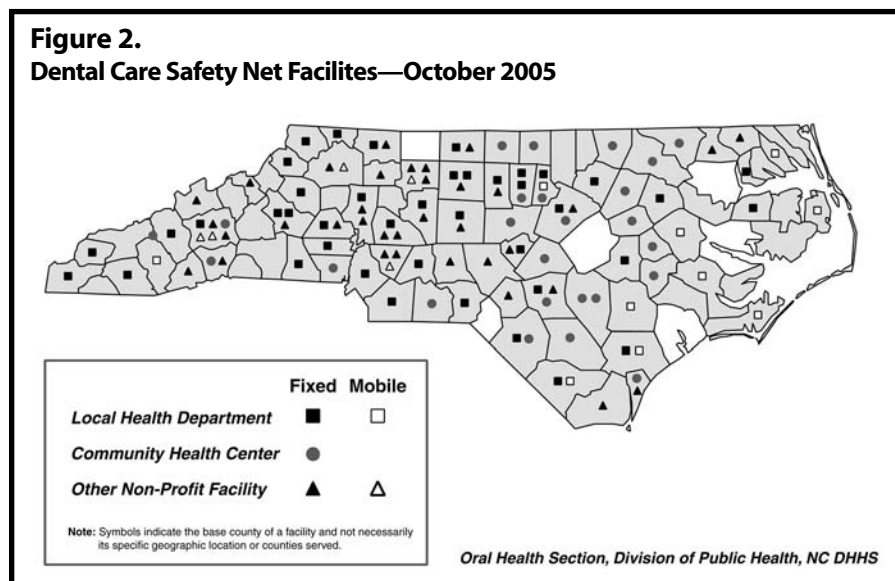
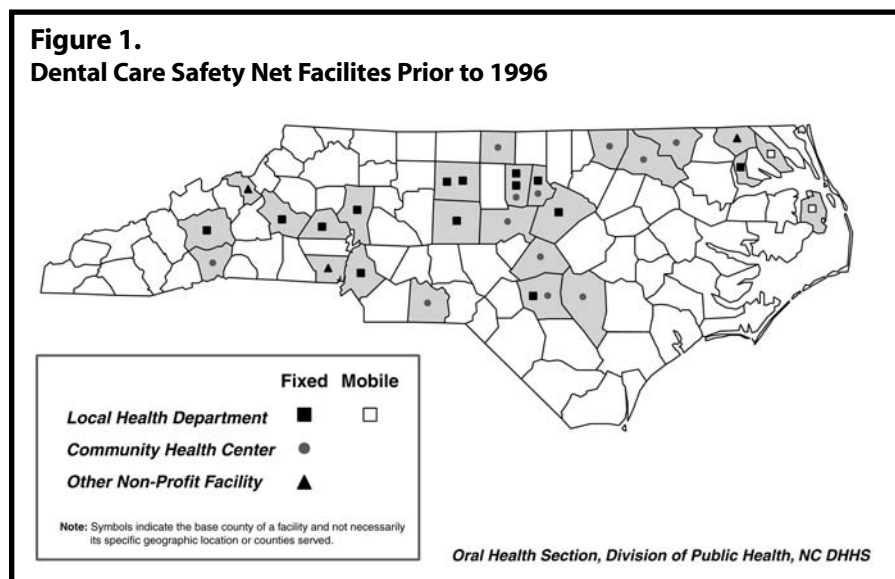
these programs maintain viability. Many of these local programs were planned and implemented with technical assistance from representatives of the Section. Annual data from the community's kindergarten and fifth grade students that is collected by the Section demonstrates the need for these treatment resources and their funding. By providing assessments, referrals, case-management, school-based sealant projects, and education, public health dental hygienists employed by the Section or by county health departments contribute to a comprehensive community-based dental public health program.

As previously described, one of the recommendations of the 1999 North Carolina Institute of Medicine Task Force on Dental Care Access³ resulted in recent changes in the North Carolina Dental Practice Act.⁴ These changes allow public health dental hygienists employed or contracted by county health departments to provide sealants and other specific preventive and therapeutic services for established patients already treatment-planned by the county's public health dentist, but without the on-site presence of that dentist.

Since 2000, the Section has certified 49 public health dental hygienists employed by local health departments to provide services without the on-site presence of a dentist. Thirty-three of these hygienists still work in dental public health programs. Of these, 17 provide clinical services to patients, and 31 provide community-based services, such as screenings for preschool and school age children.

Federal Funding for Dental Care Programs

Twenty-three federally qualified/community/rural health centers operate dental clinics in North Carolina. These clinics treat citizens in need, especially children, under guidelines established by the Health Resources Services Administration (HRSA). In Dental Health Provider Shortage Areas (DHPSAs), private and public health dentists are eligible to receive professional student loan repayments as an incentive to serve in geographic areas where the lack of access to dental care is documented. Coordinated by the North Carolina Office of Research, Demonstrations, and Rural Health Development, many DHPSAs have attracted and employed dentists to serve their residents. New federal guidelines require the construction of all new centers to include dental clinics.



Nonprofit Agencies and Volunteer Initiatives

Several communities rely on the dental services provided by local nonprofit agencies. Often these agencies collaborate with health departments to widen the scope of local resources. Also meaningful are open-door or “free” clinics staffed by volunteer dentists from the community. Most of these clinics are operated part-time, mostly in the evenings, and use either their own facility or another facility.

State Staffing Limitations

All of these activities are contingent on having qualified dental public health staff. Oral Health Section data indicate that improvements in dental health for permanent teeth have leveled off or are decreasing. Tooth decay in the preschool population is increasing. Additional staff (public health dentists, dental hygienists, health educators, and support staff) are needed to provide the preventive and educational services needed to reverse these trends. Yet, over the last 15 years, the Oral Health Section has lost almost 20% of its staff due to budget cuts. In addition, one-third of Section staff will be eligible for retirement in the next five years. The Office of State Personnel has acknowledged repeatedly since 1996 that salaries for Section dentists and dental hygienists are not competitive with private practice or local health departments, yet funding has not been identified to address these inequities. There are serious concerns about how the Oral Health Section will attract good staff to replace the retiring career dental public health practitioners as they leave the workforce.

Conclusions

Great strides have been made in reducing dental disease in the North Carolina population, particularly for our children. As described above, needed action steps include:

- Assuring adequate funding to support community water fluoridation and other dental preventive best practices.
- Increasing the proportion of young children at high risk for dental decay who receive the optimal number of IMB dental preventive services.
- Developing collaborations to educate dental practitioners about the importance of addressing the oral health needs of pregnant women to decrease the risk of low birth weight babies and to reduce the transmission of decay causing bacteria to their newborns.
- Supporting the action steps in the “2005 NC Oral Health Summit Proceedings and Proposed Action Plan,” released by the North Carolina Institute of Medicine in December 2005.
- Maintaining and strengthening state public health resources and services to assure access to needed oral health services and programs for those most in need.

It is critical that adequate resources be directed toward prevention so that all North Carolinians can achieve oral health as part of their overall health. **NCMedJ**

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The Role of Free Dental Programs in Care Provision for the Underserved

Steven D. Slott, DDS

Of the approximately 4,000 licensed dentists in North Carolina, only 24% accept Medicaid reimbursement for dental services to any appreciable degree. Therefore, for the 1.5 million citizens of the state currently enrolled in the Medicaid program,² there are less than 1,000 dentists statewide from whom they may seek treatment. This translates into one dentist per 1,500 Medicaid recipients. Factoring in those who do not qualify for Medicaid, yet are unable to afford dental treatment, it may be noted that the number of available dentists to treat the underserved population, in private practice, is inadequate. Additionally, other factors, such as (mal)distribution of dentists, and location of clinics, add to the difficulties for the underserved, further reducing their ability to access needed dental care. Anecdotal information from dental Medicaid providers frequently

to serving low-income patients who have limited access to dental care. These safety net clinics include public health, community health centers, and free clinics.³ Although it is somewhat difficult to ascertain the exact number of free dental clinics or programs with a free dental component, of the 63 members of the North Carolina Association of Free Clinics, 21 list dental care as a component of their overall program.⁴

Table 1 shows the number of free dental components among 58 out of 63 members of the North Carolina Association of Free Clinics (NCAFC). Although these figures represent only those clinics who are members of NCAFC, they do offer some perspective on the amount of time, services, and equivalent dollar amounts donated toward dental needs, which comprise only 3.6% of overall visits to the free clinics.

Table 1.
Dental Component Statistics of North Carolina Free Clinics*

2004 Dollar Equivalent for Dental Services		Percentage of Total Free Clinic Visits for Dental Care	
\$1,409,252		3.6%	
Dental Employees, Volunteers, and Hours of Service			
Number of Paid Dental Employees	Paid Dental Employee Hours	Number of Dental Volunteers	Dental Volunteer Hours
12	36,663	509	17,657
Type Dental Services Provided			
Preventive	Restorative	Emergency	Rehabilitative
31 clinics	32 clinics	38 clinics	25 clinics***

* 58 clinics participated in this survey Source: North Carolina Association of Free Clinics

includes reports of patients traveling long distances in order to find a provider who will accept Medicaid reimbursement. Given the inadequacy of the existing dental care delivery system, the value and necessity of safety net programs becomes clearly evident.

According to the Oral Health Section of the North Carolina Division of Health and Human Services, currently within North Carolina, there are more than 75 dental clinics dedicated

Program Hurdles for Free Clinics: Funding and Personnel

Focusing on the free dental clinics, there are two main hurdles with which these programs must deal in order to be successful. As would be expected, these are funding and personnel. In addressing funding issues, it should be realized that there are many available sources for viable dental nonprofits, including,

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but not limited to, governmental organizations/grants, charitable trusts, local organizations, and private donations. Additionally, there are dental supply dealers and other organizations with programs providing free or low-cost supplies to qualified free dental clinics. The problem in funding often resides not in the lack of available resources, but in the lack of awareness of these resources by volunteers or paid personnel who are inexperienced in searching them out, inexperienced in grant writing, or lack an understanding of the various funding or resource entities' requirements. Table 2 provides examples of some sources of

funding, in-kind donations, or other support. Each source has its own restrictions, but the long-term success and sustainability of the dental programs will depend to a large part on their ability to seek out these resources, match their needs to the needs and desires of the sources, and on their ability to keep expenses to a minimum while still providing necessary services for their targeted population.

The second main hurdle is that of personnel. The recruitment, retaining, and scheduling of volunteer workers is crucial to the viability of any nonprofit organization, free dental clinics being no exception. Whether or not there are paid personnel within the organization, this aspect of the program certainly requires constant oversight and effort. Additionally, as these clinics are a part of the healthcare field in which licensure, liability, competence, confidentiality, political, worker safety, and other complicated issues abound, the task of recruiting and maintaining an adequate workforce is even more challenging. Without strict strategies and policies in place with which to handle these issues, the chance of long-term success of a free clinic decreases dramatically.

Summary

Due to the shortcomings of the existing healthcare delivery system in general, and the dental field in particular, safety net programs are not simply optional; they are mandatory to help meet the overwhelming healthcare needs of the underserved. Free dental clinics are a vital part of this system, and indeed, millions of actual dollars,

Table 2.
Examples of Available Resources for Free Dental Care Programs

Source	Type of Resource
Charitable Foundations	
Kate B. Reynolds Charitable Trust	Grant/Monetary
The Duke Endowment	Grant/Monetary
Canon Foundation	Grant/Monetary
Governmental	
NC Office of Rural Health	
Department of Health and Human Services	Monetary
Private	
NC Dental Society	Monetary
NC Association of Free Clinics	Monetary (available to members only)
Henry Schein Cares	Supplies
World Dental Relief	Supplies (reduced cost)
3M ESPE Dental Products	Supplies
Local	
Civic Organizations	Monetary/other
Local Foundations	Monetary
Local Benefactors	Monetary
Local Businesses	Monetary/in-kind/other
Local Hospitals	Monetary/in-kind
Local Dental Societies	Monetary/in-kind/other
Churches	Monetary/in-kind/other
Local Government	Monetary/in-kind/other

“Given that most dental professionals have limited contact with the underserved, the free clinics offer the opportunity to bring in volunteer dentists, hygienists, and dental assistants who may then gain first-hand knowledge of the access crisis and work directly with North Carolina’s growing population in greatest need of dental care.”

The Open Door Dental Clinic of Alamance County

The Open Door Dental Clinic of Alamance County originated in October of 1998 operating one night per week in the newly opened Alamance County Health Department Dental Clinic facility. Although the focus of the health department clinic was to be on children, the Health Director and the Dental Advisory Committee desired to provide some dental services for the adult population as well. Thus, arose the idea of a free adult clinic to meet one or more nights per week. Dr. Steven Slott, a local dentist, and member of the Alamance County Board of Health, agreed to undertake the project, and the Open Door Dental Clinic was born.



Portable dental care in action—hundreds receive dental care at Burlington Missions of Mercy, October 2005

The clinic operated on Tuesday nights for extractions only. The list of volunteers included ten dentists from the local dental society, ten dental assistants, one dental hygienist, four front desk personnel, and dental assisting students from the Alamance Community College dental assisting program. Due to the overwhelming need, a second night of clinic was initiated for extractions only. In 2002, with funding from the Kate B. Reynolds Charitable Trust, in cooperation with the Alamance Regional Medical Center, a third night was initiated for restorative needs. An integral part of the restorative night was the involvement of dental students from the University of North Carolina at Chapel Hill (UNC-Chapel Hill) School of Dentistry. Through a cooperative effort between UNC-Chapel Hill, the health department, and the Open Door Dental Clinic, dental students were allowed to provide clinical services to the patients in the clinic.

In 2004, planning for a new program operating under the Open Door Dental Clinic was undertaken. A portable dental program modeled after the Virginia Dental Association's Missions of Mercy program was the desired goal, which would help the underserved not only in Alamance County, but in many different dental care shortage areas of the state as well. This program includes utilization of portable dental chairs, units, lights, and all necessary peripheral equipment to set up large portable dental clinics in which volunteer providers would render free dental treatment to hundreds of financially qualified individuals during two- or three-day weekend events. Once again, through the generous support of the Kate B. Reynolds Charitable Trust, in

cooperation with the Alamance Regional Medical Center, along with funding assistance from other local and state organizations, enough portable equipment was purchased to have a 30-chair portable clinic, complete with full sterilization, x-ray, all necessary instruments and supplies, and a large truck in which to store and transport the equipment. Utilizing this equipment, as many as six or seven free clinic weekend events will be held in different areas of the state each year.

During 2005, in addition to the fixed-site clinics in Burlington, five portable clinics have been held, in the west, east, and central areas of the state. In each clinic, 250-350 needy patients received dental treatment consisting of extractions, fillings, cleanings, and other services. Volunteers for each event included ten-20 dentists; ten-30 dental students; two to eight hygienists, dental assistants, and assisting students from community college programs; and scores of general volunteers. Tentative plans for 2006 include portable clinics in Murphy, Boone, Washington (NC), Burlington, and Wilmington. Treatment for 500 or more patients per weekend event will be the targeted goal for 2006, with increases each succeeding year. For 2005, it is estimated that the dollar value of donated dental services from the Open Door Dental Clinic of Alamance County will be in excess of \$350,000, with increases to be seen in each succeeding year. Patient visits for 2005 for both fixed-site and portable clinics will be estimated to be between 2,500 and 3,000. Estimated visits for 2006 will be 3,500-4,000.



Needy patients waiting for treatment in Burlington, October 2005

Funding for the Open Door clinic has come from many different sources. As previously stated, two grants have been received from the Kate B. Reynolds Charitable Trust, the first in the amount of \$41,000 to fund the start up of the restorative night and, most recently, \$140,000 to fund the portable initiative. In addition, funds have been received from local Alamance County foundations, the Alamance-Caswell Dental Society, civic organizations, the Alamance Regional Medical Center, and other private donors. In-kind donations of dental equipment, facilities, and supplies have also been donated by the Alamance County Health Department, the Henry Schein Cares program, and from numerous dentists in the area.

millions of dollars worth of services and thousands of hours of professional manpower are donated each year to provide free dental services for the needy. The short-term benefits of these clinics are obvious, the rendering of dental care to tens of thousands of individuals per year who would otherwise go without. The long-term advantages may be somewhat less than obvious, however. Given that most dental professionals have limited contact with the underserved, the free clinics offer the opportunity to bring in volunteer dentists, hygienists, and dental assistants who may then gain first-hand knowledge of the access crisis and work directly with North Carolina's growing population in greatest need of dental care. Additionally, the free clinics often offer the same benefit for dental students from the University of North Carolina at Chapel Hill, as well as for undergraduate pre-dental students. This is a key aspect, as for every one of these students who may eventually enter the dental profession with a willingness to provide for the underserved population, tens of thousands of individuals in need could potentially receive dental treatment over the span of a dental career.

The challenges of beginning and maintaining a free dental program over the long term are daunting. However, for those willing to invest the time and effort, the resources are available for long-term success with a resultant

significant, positive impact on the dental care access crisis now in existence. As stated by Dr. Franklin M. Boyar in describing his free dental program in Florida, "Project: Dentists Care is simply an organization that brings together unmet health needs of indigent populations within our communities with the desire of individual dentists to help their fellow man, along with the responsibility of a profession to deliver needed care to the underserved."⁵ Inherent in consideration of itself as a profession is the understanding by the component members of dentistry that it is indeed a responsibility, not simply an option, to deliver needed dental care to all citizens, regardless of their ability to pay. At the heart of any successful resolution of the dental care access crisis is the ability of dental providers to accept this responsibility, significantly increase Medicaid acceptance, willingly participate in access initiatives, and provide the care for which they have been granted licensure by the citizens of North Carolina. **NCMedJ**

For More Information:

To learn more about the Open Door Dental Clinic of Alamance County, visit their Web page.

www.alamanceopendoordental.net

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Improving Access to Dental Care Remains a Priority of One of North Carolina's Largest Philanthropies

John H. Frank

For more than a decade, improving access to dental care has been a priority for the Health Care Division of the Kate B. Reynolds Charitable Trust. Since 1995, the Trust has awarded more than 130 grants totaling \$21.2 million in support of programs addressing multiple facets of the issue. Yet, in meetings, workshops, and consultations, front-line professionals in every corner of the state continue to list dental access as one of the top three healthcare concerns facing their communities.

With funding provided by the Kate B. Reynolds Charitable Trust and The Duke Endowment, the North Carolina Institute of Medicine Task Force on Dental Care Access began a study of the issue in 1998. Results of the study, which were released in 1999, showed that North Carolina ranked 47th in the supply of dentists to serve state residents, with only 3.8 dentists per 10,000 population—far below the national rate of 6.0 dentists per 10,000. Uneven geographical distribution of practicing dentists intensified the shortages, particularly in rural areas. At that time, four counties had no dental practice; another 36 counties had no dental practice that offered services to Medicaid patients. Although a significant number of private dentists regularly volunteer their time at free clinics and community or rural health centers, the number of Medicaid- and uninsured- or underinsured-patients exceeds the

number that can be served by available providers. Following the study, the task force issued 23 recommendations intended to lay the foundation for delivering adequate preventive and curative dental care to all residents across the state.

Even before the dental access study was undertaken, the Health Care Division of the Trust had begun funding programs to establish and expand existing dental services around the state, and that emphasis continues today. The programs funded

by these grants typically rely on cooperative programming among existing organizations and generally fit one of four structural categories: hospital-based, health department-based, community or rural health center-based, and free-clinic-based.

Many of the expansion programs target children and other special needs groups, in which dental disease often remains untreated. At the time of the Task Force report, 25% of all of North Carolina's kindergarten children exhibited untreated dental disease, and a large number of those were from low-income populations living in rural areas.

In an effort to extend dental care to these children, the Trust has awarded several grants for providing mobile dental services. An example is a 1996 grant to Mission St. Joseph's Hospital in Asheville for a dental van, called the ToothBus. Although it began as a stand-alone unit, a second ToothBus was soon

“Although a significant number of private dentists regularly volunteer their time at free clinics and community or rural health centers, the number of Medicaid- and uninsured- or underinsured-patients exceeds the number that can be served by available providers.”

John H. Frank is Director of the Health Care Division of the Kate B. Reynolds Charitable Trust, one of the state's largest private foundations with assets of more than \$500 million. The Trust was established solely for the benefit of the people of North Carolina. The Health Care Division, which awards three fourths of the Trust's funding each year, supports healthcare programs directed to the financially needy in communities across the state. Mr. Frank can be reached at john@kbr.org or 128 Reynolda Village in Winston-Salem, NC 27106. Telephone: 336-723-1456.



The ToothBus is a 40-foot dental office on wheels that serves children who have no other access to dental care. It is a program of the Billy Graham Children's Health Center at Mission St. Joseph's Hospital in Asheville.

added, and within four years, ToothBus vans were delivering services to 46 elementary schools in ten counties. The ToothBus and numerous other mobile clinics around the state reach thousands of children each year.

During the day-long meeting, the North Carolina Institute of Medicine presented a progress report on the implementation of its Task Force recommendations. The Trust also selected panelists from successful dental programs to discuss features of their programs with attendees. The event was intended to disseminate information while encouraging innovation and collaboration in addressing dental access at the community level.

Although significant dollars have been invested since 1995, the Trust continues to include improving dental access for the financially needy among its priorities. In reviewing grant requests, the Trust is particularly receptive to applications that address the following issues:

- A plan for ensuring adequate staffing,
- A back-up plan for dealing with "no shows,"
- Evidence of support for the program from dentists practicing in the community, and
- A financial plan that includes Medicaid reimbursement numbers adequate to sustain the program over the long term.

Please visit our Web site (www.kbr.org) to learn more about the types of programming that fall within Trust grantmaking guidelines and the procedures for submitting an application. **NCMedJ**

Table 1.
Grantees by Region

	Grants	Amount*
Western	35	\$5.5
Eastern	32	\$5.2
Northern Piedmont	23	\$3.6
South Piedmont	21	\$3.7
North Central	12	\$1.9
South Central	11	\$1.3
TOTAL	134	\$21.2

* Grant in millions.

Another area of emphasis for the Trust is manpower development. Grants awarded in support of manpower development are intended to increase the overall number of dental professionals in the state, with particular focus on reducing shortages in underserved areas. A majority of these education grants have been awarded to community colleges for expanded training programs for dental hygienists and dental assistants. Grants have also been made to the University of North Carolina at Chapel Hill (UNC-Chapel Hill) School of Dentistry to support student internships served in rural North Carolina counties.

As part of our commitment to improving dental access, the Trust hosted a Promising Practices Meeting in September 2003 in Winston-Salem for representatives from public and private agencies across the state.

Table 2.
Dental Grantees

	Grants	Grantees	Amount*
Health Departments	54	37	\$7.8
Rural/Community Health Centers	37	23	\$6.1
Hospitals	10	7	\$2.2
Community Colleges	9	8	\$1.9
Gree Clinics	11	5	\$1.6
Others	13	13	\$1.6
TOTAL	134	93	\$21.2

* Grant in millions.

Access to Primary Dental Care: A Commentary on the Economics of Dental Practice and Thoughts on Solutions to Improve Access to Primary Dental Care

John N. Williams, DMD, MBA

Imagine a world in which there were no self-induced health problems. A world in which there were no obesity, no hypertension, no motor vehicle accidents, and no oral health problems. Realistically however, we realize that all of these conditions exist because accidents happen, individuals ignore information that contributes to healthful lifestyles, and most people are not motivated to change their unhealthy habits to healthful ones, and sometimes healthcare services are not available to provide care for those in need. In addition to accidents, knowledge, and motivation, economics play a major role in the availability of healthcare services.

A current topic of discussion in dentistry and medicine is lack of access to services to prevent and manage unhealthy conditions. It has been observed that many people living in the 100 counties of North Carolina, particularly those in counties with a lower-economic vitality, lack access to dental care. An uneven distribution of dentists practicing within the state exists in that only eight counties have a dentist-to-population ratio at or above the national average of 5.8 dentists per 10,000. These eight counties contain the large population centers in the state. Another 78 counties have fewer than the national average numbers of dentists and, thus, are designated by the federal government as dental shortage areas. Four counties of North Carolina have no dentists.¹ Much of the dental workforce literature uses a simple calculation of dentist-to-population ratio to determine shortage or surplus numbers of dentists relative to

national averages without much consideration of today's dental practice economic influences on access.

Access is a complex concept with a strong economic influence. Having adequate access, requires certain behaviors on the part of both the providers of health services and the receivers of health services. The United States healthcare system operates in a free market, capitalist economy where producers and consumers have a variety of alternatives upon which to base healthcare purchasing decisions. As with any free market, those with more financial resources have more choices. An important distinction is that *medical* care costs function differently than *dental* care costs

“Much of the dental workforce literature uses a simple calculation of dentist-to-population ratio to determine shortage or surplus numbers of dentists relative to national averages without much consideration of today's dental practice economic influences on access.”

when medical insurance is available. Most consumers with medical insurance are oblivious to the costs of services in advance of receiving them, and prior to the consumer seeing the final costs, much discounting of the full fees charged occurs through third-party contracting and negotiated prices. In contrast, dental costs, with or without insurance, are usually known in advance of receiving treatment, and the consumer can make an informed economic decision.

Another significant difference between medical and dental

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market costs is the extent to which third-party payers (insurance companies) are present. In North Carolina, fewer persons are covered by some form of third-party payment mechanism for dental care than for medical care, which has approximately 87% of the population covered by an employer, individual, or government-sponsored programs.² Dentistry has avoided much of the market influence of third-party payers, who can establish what they will pay through a schedule of benefit payments or determine payments based on regional usual, customary, and reasonable (UCR) fees. In economic terms, dentists, for the most part, are price makers, which gives them freedom to set fees for professional services, while our medical colleagues have become price takers—receiving whatever a third party decides to pay regardless what fee a physician may charge. This difference is significant because it has a major influence on the way dental care and, ultimately, dental care access is made available.

The supply of providers (physicians and dentists) also has an impact on the free market system. In the mid-1980s, there was a national concern over the existing number of dentists graduating from dental schools, which in some parts of the United States was perceived as an “over-supply” of dentists. Between 1983 and 2001, six private dental schools closed, and the national number of dental graduates fell from 5,756 in 1983 to 3,778 by 1993, a decline of 34%. In recent years, three new dental schools have been established, but enrollments have only increased to approximately 4,300 dental students nationally.³ The reduction in the national supply of dental graduates by over 30% gives the dentist of today a huge market advantage when determining what fees to charge, where and when to practice, and what type of payment source (i.e., private pay, insurance, or Medicaid) to accept. Therefore, from a purely economic standpoint, dentists operating in the free market can optimize their economic benefit and avoid less financially beneficial payment arrangements. In practical terms, this explains why dentists locate in urban areas (generally more vital economic environments relative to rural areas) and avoid participation in poorly funded, third-party payment programs like Medicaid. The financial alternatives are simply too compelling.

This is not to suggest that dentists aren't concerned about access and don't participate individually or as part of various programs to reduce the access problem by providing free dental care. Many dentists do these altruistic things. From a purely economic perspective, however, this market phenomenon explains how and why dental care is delivered in the United States today, and why many states, including North Carolina, have an uneven distribution of dentists and access problems.

In contrast, enrollments in medical schools during this same 22-year time span remained unchanged despite a national call in the mid-1990s to reduce the entering medical school class size by 20-25% by 2005.⁴ This reduction did not occur. While

the numbers of primary care physicians in North Carolina are also a concern, relative to dentists, there are large numbers of physicians in the healthcare economic market.* This has limited physician influence over what fees to charge, where and when to practice, and what type of patients to see due to heightened competition. Third-party payers can more easily dictate the economic terms within a more competitive healthcare market.

At this point, one might ask what all this discussion of healthcare economics has to do with dental care access. I assert that our current economic climate is the basis for understanding this extremely complex topic of access and will add to one's understanding of what solutions might or might not work to improve access for the underserved populations in North Carolina.

Access to care is not only complex, but a relative concept as well. I draw on my personal knowledge of access to dental care problems in Kentucky. Kentucky is a state not very different from North Carolina in demographic and economic characteristics, but with less than half the population of North Carolina and enrolling twice as many dental students in two dental schools. Comparisons of oral health status and behavior reported by the Centers for Disease Control and Prevention (CDC) as part of the Oral Health Surveillance Program make it possible to study some dental behaviors and outcomes nationwide. Findings related to North Carolina and Kentucky indicate that, relative to the United States as a whole, Kentucky and North Carolina are doing a comparable job of providing some dental care access for the public. Compared to Kentucky, in percentage terms, in 1999 about the same percentage of people in North Carolina visited dentists annually (67.2% vs. 67.6%), and about the same percentage of the population received a tooth cleaning (68.2%), while fewer people in North Carolina had lost their natural teeth (24.4% vs. 44.3%).⁵

In 1999, these North Carolina dental health outcomes were achieved in a state with one dental school enrolling 75 doctor of dental surgery (DDS) students per year and with a statewide DDS-to-population ratio (4.3 DDS per 10,000) below the national average (6.4 DDS per 10,000).⁶

At this point, I'll summarize my commentary on today's economic market on the access question as follows: (1) access is a complex topic; (2) the free market of economics in dental care delivery has a significant influence over dentists in terms of where, when, type of practice dentists choose, and the extent of their participation in Medicaid programs; and (3) determining whether a problem with access to dental care exists is relative to the desired dental care outcomes.

With this economic context in mind, and having a major influence over the current dental delivery model, we can do better for the citizens of North Carolina. There are compelling reasons to work harder to improve the dental health outcomes of the state. As the old economies of tobacco, textiles, and

* In 2004, there were 7,401 primary care physicians and 3,628 dentists practicing in North Carolina. That same year, the physician-to-population ratio was 8.6 per 10,000, and the dentist-population ratio was 4.2 per 10,000 population. Cecil G. Sheps Center for Health Services Research. University of North Carolina at Chapel Hill. Health Professions Database. Available at: <http://www.shepscenter.unc.edu/hp/prof04.htm>. Accessed November 2005.

furniture have gone away, new economic opportunities will depend even more on a healthy workforce, which includes a population with good dental health. I suggest four strategies to consider as alternatives to improve access and, ultimately, the quality of oral health for our state's population.

Expand DDS Educational Capacity at the University of North Carolina at Chapel Hill (UNC-Chapel Hill) School of Dentistry

Given the projected 52% growth in the North Carolina population (more than 12 million individuals) over the next 25 years and making some cursory assumptions about the state's current dental workforce demographics (retirements, etc.), it is prudent to increase the capacity for enrolling a larger DDS class size at UNC-Chapel Hill for a period of time.⁷ University planning for this event started two years ago. We need to expand the dental education enrollment capacity by 50% (to an enrollment capacity of 120 per class) and be sensitive to ever-present market forces such that we can adjust enrollments either up or down in response to the demand for dental services. The rationale for expanding the UNC-Chapel Hill program is: (1) economy of scale, (2) availability of dental faculty, and (3) a 50-year history of graduating dentists as primary care general practitioners.

First, the American Dental Association monograph on the Economics of Dental Education reports that economies of scale are provided by expanding an existing dental school's enrollment (lower marginal cost per student) rather than incurring higher educational costs per dental student enrolled in a small (less than 50-member class) dental school.⁸ Over time, adding 20-to-40 more dental students to the existing class size of 81 could be done in an incremental fashion. An upgrade in facilities would be needed to handle the maximum capacity of up to 120 dental students per class, and planning is already underway.

Second, at the national level, there is a concern about the availability of dental faculty to teach. The American Dental Education Association (ADEA) states that in 2003-2004, there were more than 240 vacant, but funded dental faculty positions existing at the 56 United States dental schools.⁹ While this number has declined over the past five years, it has remained above 200, with most vacancies occurring in the clinical sciences. An established dental school with an existing faculty can more readily handle faculty shortages by reallocating faculty responsibilities in the short run.

Finally, most dental school graduates, and certainly those at UNC-Chapel Hill, enter primary care general practice. Since 1954 when the first DDS graduated from UNC, over 75% of the students have entered primary care general practice and have located throughout the state.¹⁰

Enhance the Integration of the Dental Care Delivery System

North Carolina is fortunate to have an existing Community College network of educational programs for educating dental hygienists and dental assistants. Better integration of the dental team during their education programs can improve productivity once in practice. There are dental care delivery systems in other states that make use of expanded-duty dental assistants and have

expanded duties for dental hygienists. These arrangements can add to dental office productivity and, hence, expand access. It has been suggested that dentists should enhance their productivity through new workforce models, and North Carolina should be active in these discussions.^{11,12}

Institute a Required, One-Year Post-DDS General Dental Residency Program for All Newly Licensed North Carolina Dentists

Utilizing the emerging network of dental clinics in low-access areas, the existing Federally Qualified Health Centers (FQHCs), contemporary instructional technologies and in partnership with the state Area Health Education Centers (AHEC) system, it is feasible to deploy dental graduates into a one-year general dental residency program. This could be a requirement for all graduates who attend UNC-Chapel Hill. This concept has been discussed as a realistic way to better prepare dentists for the future and can improve access.^{12,13} The advantage of using dental graduates over the reliance on third- or fourth-year dental students to provide care is the graduate's better understanding and application of comprehensive care. They are more efficient and can expand their knowledge, skills, and values by serving the state in one of several selected low-access areas. In this way and through existing partners, the state could establish a network of facilities with an annual revolving dental workforce. Given the economic attractiveness of private dental practice today, it is unrealistic to expect past models of loan forgiveness to provide any long-term solution to expanding access. These facilities could establish the continuity of place, but the workforce would revolve annually. It would be hoped that some dental participants may elect to establish themselves in practice within the underserved geographic area and help to address the access issues over the longer term.

Improve Medicaid Reimbursement Rates for Dental Care

With a better understanding of the economics of today's dental practice, an immediate way to improve access to dental care for the state of North Carolina is to increase reimbursement rates paid to dentists to at least the 75th percentile of North Carolina private practice market rates in 2005. This would provide an economic incentive to dentists and increase the number of dentists accepting Medicaid patients. This was a major recommendation from the North Carolina Institute of Medicine Task Force on Dental Care Access in 1999.¹⁴ Today, dentists operate in a free market and will respond favorably to these raised rates for treating Medicaid patients. The numerous practice opportunities available to dentists will require this type of program to create a broad enough Medicaid network across the state to meet the dental care access challenge.

Conclusion

In conclusion, I have provided a brief commentary on the economics of dental practice today, and how it influences the dental care access dilemma and current dental care delivery model in the state. There are compelling reasons to work harder

to improve the dental health outcomes of the state. I suggested four strategies to consider as alternatives to improve access and, ultimately, the quality of oral health for our state's population. Working in partnership throughout the state with other educational programs, the AHEC program, the North Carolina

Dental Society, state government, and others, we can and will do innovative things to engage the public and improve access to dental services for the citizens of North Carolina. It is my hope that one day we will be able to live in a world in which all citizens may enjoy optimal oral health. **NCMedJ**

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FAITH
IN ACTION

— Della Reese. *Entertainment Legend.*
Faith in Action Believer.



Improving Oral Health in North Carolina: Exploring the Potential of a New School of Dentistry at East Carolina University

Michael J. Lewis, MD, PhD, D. Gregory Chadwick, DDS, MS, and F. Terri Workman, JD

Dental care is an essential component of healthcare. Inadequate attention to dental health issues can have deleterious effects on the health of our population at every age level and especially among school-age children and the adult workforce. North Carolina faces enormous challenges, as do other states, in both the recruitment and retention of dentists serving rural and low-income areas. While it is clear that dental care technologies and modes of clinical practice have made it easier, more efficient, and, often, less costly to serve larger numbers of patients' dental care needs with the same number of dental care providers, there are demographic challenges. In our rural and smaller counties, there is a serious shortage of dentists, and a number of these dentists are nearing the age of retirement. The opportunity for dentists in rural and smaller counties to implement these technological efficiencies is not likely to be in place for many more years.

Since the publication of the North Carolina Institute of Medicine Task Force Report on Access to Dental Care for Low-Income Persons,¹ there has been a growing consensus that the state faces a shortage of dentists, and that the supply is not likely to meet demand in the near-term, given current levels of productivity from the existing School of Dentistry at the University of North Carolina at Chapel Hill (UNC-Chapel Hill) or the recruitment of dentists from other states and schools of dentistry.

The Current Dental Workforce and North Carolina Demographics

In North Carolina, the dental workforce is growing older; in order to keep current ratios of dentists-to-population, we will need to replace at least one third of the 3,628 dentists in the current professional workforce in the next ten-20 years. As important, the number of dentists of African-American or other minority-group status is only 10% compared with a state

population that is 34% nonwhite. There are as many as 40 North Carolina counties where no dentists provide services to persons covered by Medicaid. Four counties (in eastern North Carolina) have no dentists. There are too few pediatric dentists in North Carolina (a total of 108 as of 2004, representing 3% of the total North Carolina dental workforce), and there are many counties, particularly in the eastern part of the state, where residents would have to drive at least two hours to find an emergency care facility that would be able to treat the dental care needs of a child. It is estimated that North Carolina needs an additional 1,209 dentists to enter practice over the coming ten-20 years—without considering the impact of deaths and relocations of North Carolina dentists out-of-state—to meet the anticipated needs represented by current demand.

North Carolina was the 11th largest state as of 2000 in terms of total population (8.0 million), and it is one of the seven fastest growing states. With a population of 8.4 million in 2003, North Carolina is predicted to become the seventh largest state by 2030 (with a population of 12.2 million) and absorb the seventh largest population increase among the 50 states.² North Carolina has the second largest number of rural residents; only Pennsylvania has more.

Nationally, there are 5.7 dentists per 10,000 population. As of 2004, North Carolina had 4.2 dentists per 10,000, representing a slight increase since 2003. The ratio of dentists-to-population is quite different in metropolitan and rural areas of the state. Urban areas have a ratio of 4.8 dentists per 10,000 population, while rural areas have only 3.1 dentists per 10,000 population in rural areas. Despite the rapid increases in our state's population, the dentist-to-population ratios for North Carolina have remained relatively unchanged since 1987, and North Carolina's ratios are consistently low by national standards. It is significant that only eight out of 100 North Carolina counties have dentist-to-population ratios that either meet or exceed the national level of 5.7

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F. Terri Workman, JD, is Associate Vice Chancellor for Health Sciences at East Carolina University.

dentists per 10,000 population, while as many as 28 counties have only two dentists or fewer serving 10,000 or more people.

To bring the state as a whole up to the *national* level of 5.7 dentists-per-10,000 population, would require the addition of 1,251 dentists. If an effort were made to raise the ratio of dentists-to-population statewide to the *current state rate for urban areas* (i.e., 4.8 dentists per 10,000 population), an additional 480 dentists would be required. Since retirements, deaths, and relocations further increase the number of needed dentists, it is clear that current state efforts to produce more dentists cannot meet either of these goals.

The East Carolina University Response: A New School of Dentistry in Eastern North Carolina

It is against this background of need and demand for dental care in North Carolina that the Chancellor and Trustees of East Carolina University (ECU) propose to initiate the planning process leading to the development of a four-year school of dentistry in Greenville. ECU offers an appropriate location and academic venue for such a school. The University is located in and serves a geographic region of the state with a clear need for additional dental care and resources. Moreover, the professional dental community in Greenville and surrounding counties of

small and socio-economically disadvantaged populations. An examination of the data shows that a large proportion of the populations in several counties of eastern North Carolina have incomes that place them below federal poverty guidelines (FPG). Although the percentage of their populations living in poverty since 1980 has declined, 31 out of the 41 counties have as many as 20% of their children living in poverty. Further, median household income in North Carolina statewide was a modest \$38,194 in 2002, but in only four of these 41 counties does median household income rise above this statewide average. Families in these lower-income areas have less disposable income and healthcare purchasing power as well as limited access to public health and other subsidized sources of dental or other healthcare.

ECU is in the fortunate position of having existing land sufficient to accommodate the footprint of any physical plant for a new school of dentistry that might be designed. Moreover, the utilities infrastructure within the Health Sciences campus is already in place and will not require significant upfitting to facilitate such construction. The implications of adding a school of dentistry to the Health Sciences Division have been carefully considered, and the faculty and administration at ECU and, in particular, at the Brody School of Medicine, are well aware of the demands of adding yet another healthcare professional school at ECU.

“...the new school of dentistry at ECU will give emphasis and exposure to the variety and excitement of practice in communities throughout North Carolina where dental care is presently in short supply.”

eastern North Carolina has given strong support and encouragement to the idea of a new school of dentistry located in Greenville.

There is no question that the oral healthcare needs of North Carolina's underserved populations will require multiple, not single, strategies. Moreover, the persistent and urgent need for additional dentists, particularly in the largely rural areas of eastern North Carolina and the western-most counties of the state, validates the need for multiple initiatives if the oral health of North Carolina's population is to improve. But, a critical factor in all of these policy deliberations is the adequacy of professional dental workforce supply, as well as the geographic maldistribution of these professionals within the state.

Eastern North Carolina Demographics

Eastern North Carolina is a region characterized by both

ECU is proposing to develop a dental school with a mission similar to the one embraced by the Brody School of Medicine at the time of its inception. With this history and the current need as guideposts, it is our intent to develop a “community-oriented” school of dentistry. By this terminology we specifically refer to our intent to develop a school of dentistry whose primary mission will be to attract into the profession individuals of high intellectual capacity who have a desire to practice dentistry in this state, and who are oriented toward a professional lifetime career of service to communities in need of high-level dental care. Moreover, the new school of dentistry at ECU will give emphasis and expo-

sure to the variety and excitement of practice in communities throughout North Carolina where dental care is presently in short supply.

Many of the students admitted to the Brody School of Medicine are from rural and underserved counties, are identified as having a passion for primary care and are given intensive exposure to the day-to-day challenges of serving populations with either socio-economic or other barriers limiting access to care. Students are also enabled to visit and learn about constructive and effective healthcare organizations within the region that have made substantial efforts to meet the needs of these traditionally underserved populations. This same approach to be integrated with the overall plan for an ECU school of dentistry will be developed in partnership with local public health and dental professionals in private practice throughout the region.

“Our intent is to develop a school of dentistry whose primary mission will be to attract into the profession individuals of high intellectual capacity who have a desire to practice dentistry in this state, and who are oriented toward a professional lifetime career of service to communities in need of high-level dental care.”

ECU embraces a global commitment to the community-based practice of dentistry, whether among those now in practice who will become involved as adjunct clinical faculty assisting our students in understanding the challenges of practice in the local settings where these practitioners now reside, or whether it is in our programs that help graduating students select a practice location where their services will be most needed and where they can satisfy both professional and personal goals.

Feasibility of a New School of Dentistry at East Carolina University

As the proposal for a new school of medicine at ECU was taking shape in the 1970's, it was the intent that this institution would address what was widely viewed as a shortage of primary care physicians in the state, particularly those serving in rural and underserved counties. Although the goals of the new school of medicine at ECU were widely shared as highly salient policy objectives, there was anxiety over how a second publicly-supported medical school would impact the existing four-year school of medicine at the University of North Carolina at Chapel Hill. In the 24 years since the graduation of its first four-year class, the Brody School of Medicine has clearly delivered on its mission. The school has (1) improved access to care; (2)

graduated classes of physicians with a high proportion choosing to practice in North Carolina after finishing their clinical residencies, one of the highest percentages of in-state practice locations among United States medical schools; and, (3) graduated one of the nation's highest percentage of graduates who have chosen to practice in primary care fields. In addition, the Brody School of Medicine often has one of the highest percentages of minority population graduates of all the United States medical schools. In fact, last year, the school was number one in the United States (with the exception of the three historically African American schools of medicine). Given the low percentage of minority dentists (10%) in North Carolina contrasted with the growing need for minority providers, this would be a great advantage.

Moreover, the claims or the fears that the existence of a medical school at ECU would threaten the programs and strengths of the medical school at UNC-Chapel Hill have not been borne out. While the two institutions are different in so many ways, having different overall philosophies and programs, each serves the state in distinctive ways. The schools enjoy a collaborative relationship in both educational and research ventures. A new school of dentistry would continue with this same level of collaboration to benefit of the people of North Carolina.

Conclusion

This proposal is offered by *East Carolina University* for it is now clear, and has been clearly demonstrated through our very successful Brody School of Medicine, that we know how to do this, and have done it successfully. This proposal is offered because *the people of North Carolina deserve no less.* **NCMedJ**

REFERENCES

- 1 NC Institute of Medicine (NC IOM). North Carolina Institute of Medicine Task Force on Dental Care Access. Report to the North Carolina General Assembly and the Secretary of the NC Department of Health and Human Services. NC IOM: Durham, NC: 1999. Available at: <http://www.nciom.org>. Accessed October 2005.
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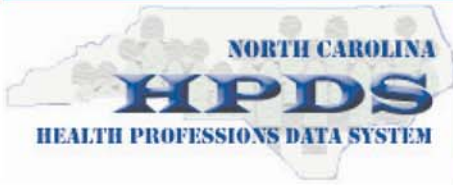
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North Carolina
MEDICAL JOURNAL



DENTISTS 2004

TRENDS IN PROFESSIONAL SUPPLY

Did you know ...

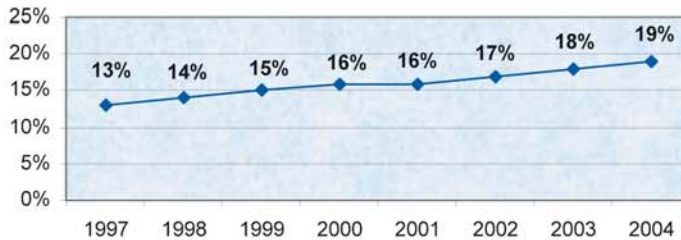
In 2004 there was a 15% increase in the number of dentists indicating that their primary specialty was dental public health.

STATE TOTAL

There were 3,628 licensed, active, in-state dentists in North Carolina in 2004.

- Between 2003 and 2004, North Carolina experienced a 4.8% (+167) increase in its supply of dentists.
- Twelve counties lost dentists between 2003 and 2004, thirty-seven counties had no change in supply and fifty-one counties had an increase in the number of dentists.
- Gates, Graham and Northampton each have only one dentist and Camden, Hyde, Jones and Tyrell have not had a dentist indicating a primary practice location in those counties since 1995.

Percentage of Female Dentists in NC
1997-2004



AGE

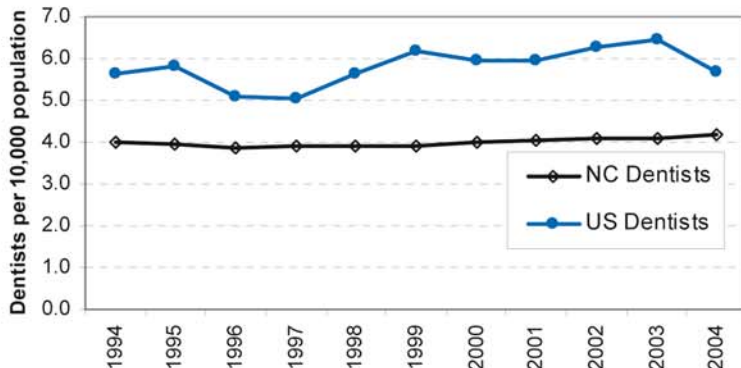
- <31 8.7%
- 31-40 25.2%
- 41-50 26.3%
- 51-60 26.4%
- 61-70 9.5%
- >70 3.8%

RACE

- White 87.9%
- Black 7.0%
- Asian 2.3%
- American Indian 0.5%
- Hispanic 0.4%
- Other 1.8%

DENTISTS PER 10,000 POPULATION

Dentists per 10,000 Population,
US and NC, 1994 to 2004

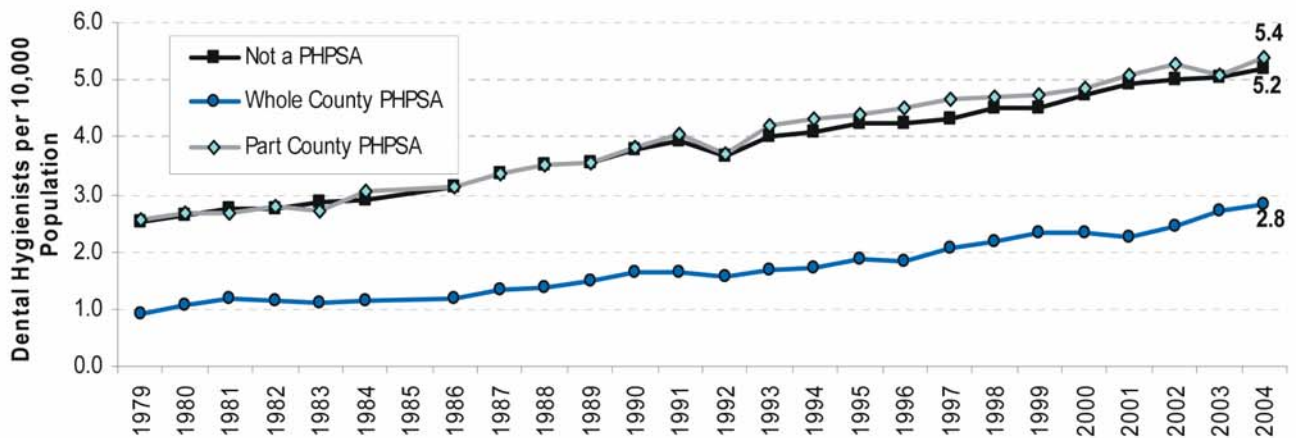


North Carolina had 4.2 dentists per 10,000 population in 2004—a very slight increase from 2003. There were 4.8 dentists per 10,000 population in metropolitan areas and 3.1 dentists per 10,000 population in non-metropolitan areas.

Nationally, the ratio was 5.7 dentists per 10,000 population in 2004.

Sources: North Carolina Health Professions Data System and the Southeast Regional Center for Health Workforce Studies, 1979 to 2004; HRSA, Bureau of Health Professions; US Bureau of the Census; North Carolina Office of Management and Budget. Figures include all licensed active dentists. Population data are smoothed figures based on 1980, 1990 and 2000 Censuses.

PERSISTENT HEALTH PROFESSIONAL SHORTAGE AREAS, 1979-2004



Persistent HPSAs are those designated as HPSAs by HRSA from 1993 through 1997, or in 6 of the last 7 releases of HPSA definitions. Source: Area Resource File, HRSA, Department of Health and Human Services, 1998.

FORM OF EMPLOYMENT

- Individual Practice 64%
- Partnership or Group 22%
- Local/County/State/Federal Gov. 6%
- Unknown 6%
- Other 2%

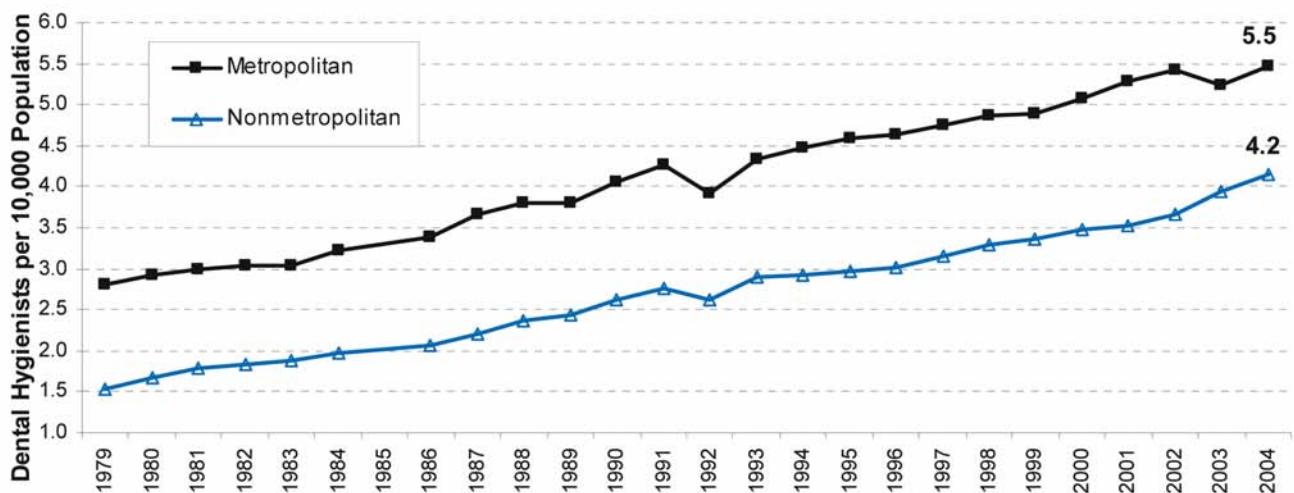
EMPLOYMENT SETTING

- Non-federal Practice Office 84.1%
- School/Educational Institution 2.4%
- V.A./ Public Health/Indian Health 1.6%
- Unknown 6.3%

Less than 1% each:

- Federal Health—Military
- Clinic—Non-Federal
- Group Health
- Hospitals
- Nursing Homes
- Other

DENTAL HYGIENISTS PER 10,000 POPULATION BY METROPOLITAN AND NON-METROPOLITAN COUNTIES, 1979-2004



Sources: North Carolina Health Professions Data System, 1979 to 2004. North Carolina Office of State Planning (Office of State Management and Budget). Figures include all licensed active in-state dental hygienists.

The data for the N.C. Health Professions Data System are provided to the respective licensing boards by health professionals at the time of initial licensure or renewal. The data are tabulated by the Sheps Center but at all times remain the property of the boards.



DENTAL HYGIENISTS 2004

STATE TOTAL

In 2004 there were 4,324 licensed, active, in-state dental hygienists in North Carolina and 99% (4,291) were female.

DID YOU KNOW ...

In 19 states, dental hygienists can initiate treatment and provide dental hygiene services without the specific authorization of a dentist.

Source: ADHA, May 2005

TRENDS IN PROFESSIONAL SUPPLY

- In 2004, there was a 5.6% (+229) rise in the number of dental hygienists registered with the Board of Dental Examiners. This is a return to moderate growth rates seen in 2002 (4.9%, +192) and 2001 (5.4%, +197) after the drop in growth seen in 2003 (0.9%, +37).
- Sixty counties showed growth in 2004 while 19 counties decreased their supply of hygienists. There were twenty-one counties that had no change in their number of hygienists.
- Three counties had only one hygienist with a primary practice location (Currituck, Jones, Northampton) and 4 counties did not possess any (Bertie, Gates, Hyde and Tyrrell).

DENTAL HYGIENISTS PER 10,000 POPULATION

State of North Carolina: North Carolina has 5.1 dental hygienists per 10,000 population—slightly more than the 4.8 per 10,000 population ratio in 2003.

Metropolitan and non-metropolitan counties: In 2004 there were 5.5 dental hygienists per 10,000 population in metropolitan counties, and 4.2 dental hygienists per 10,000 population in non-metropolitan counties.

National ratios: National statistics show a ratio of 4.4 dental hygienists per 10,000 population in 2004, a slight increase from 4.3 per 10,000 population the previous year.

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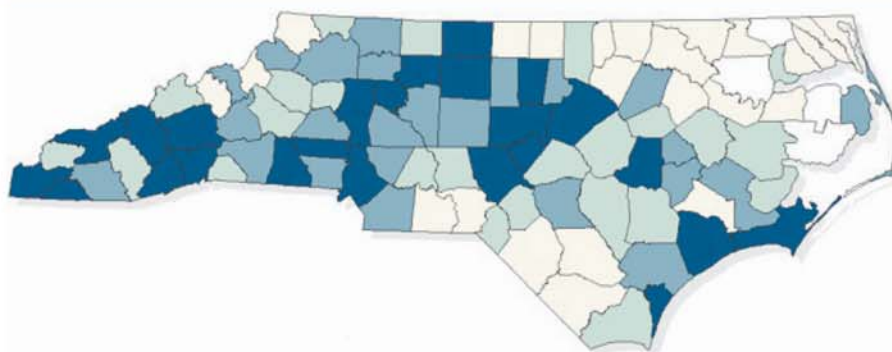
• < 31	24%
• 31-40	33%
• 41-50	32%
• 51-60	10%
• >60	1%

RACE

• White	95%
• Black	3%
• Hispanic	<1%
• Asian	<1%
• Native American	<1%

The dental hygienist workforce profile by race in North Carolina differs slightly from the workforce profile for the United States as a whole, which is 92% White, 4% Hispanic, 3% Black and 1% Asian.

DENTAL HYGIENISTS PER 10,000 POPULATION BY COUNTY, 2004

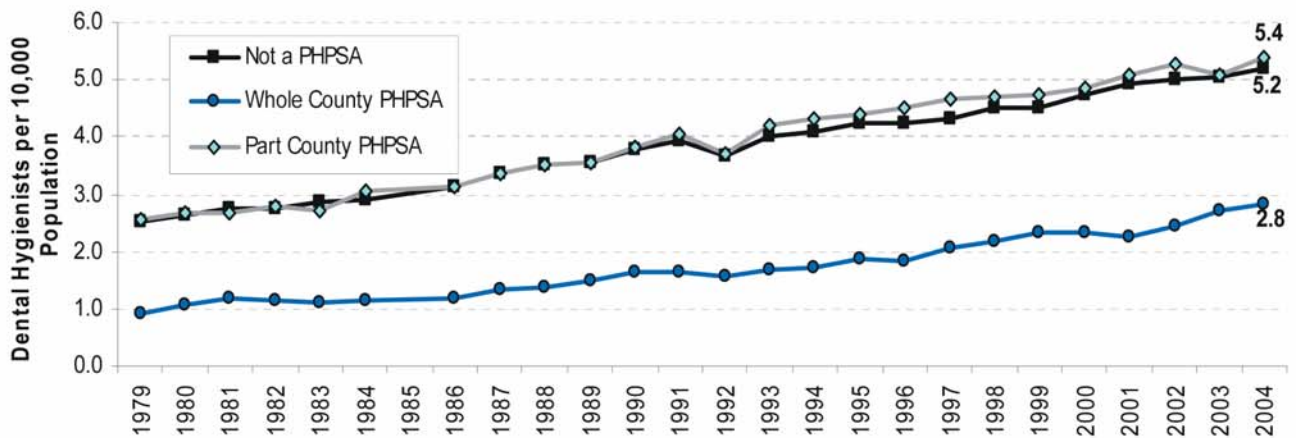


Dental Hygienists per 10,000 Population (# of Counties)

■ 5.35 to 8.43	(24)
■ 4.23 to 5.34	(24)
■ 2.80 to 4.22	(24)
■ 0.01 to 2.79	(24)
□ No active dental hygienists	(4)

Sources: Bureau of Labor Statistics; "Employed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity," <ftp://ftp.bls.gov/pub/special.requests/lf/aa2004/aat11.txt> National resident total population estimates: "Table NST-EST2004-01—National Population Estimates: April 1, 2000 to July 1, 2004" <http://www.census.gov/popest/states/tables/NST-EST2004-01.pdf>

PERSISTENT HEALTH PROFESSIONAL SHORTAGE AREAS, 1979-2004



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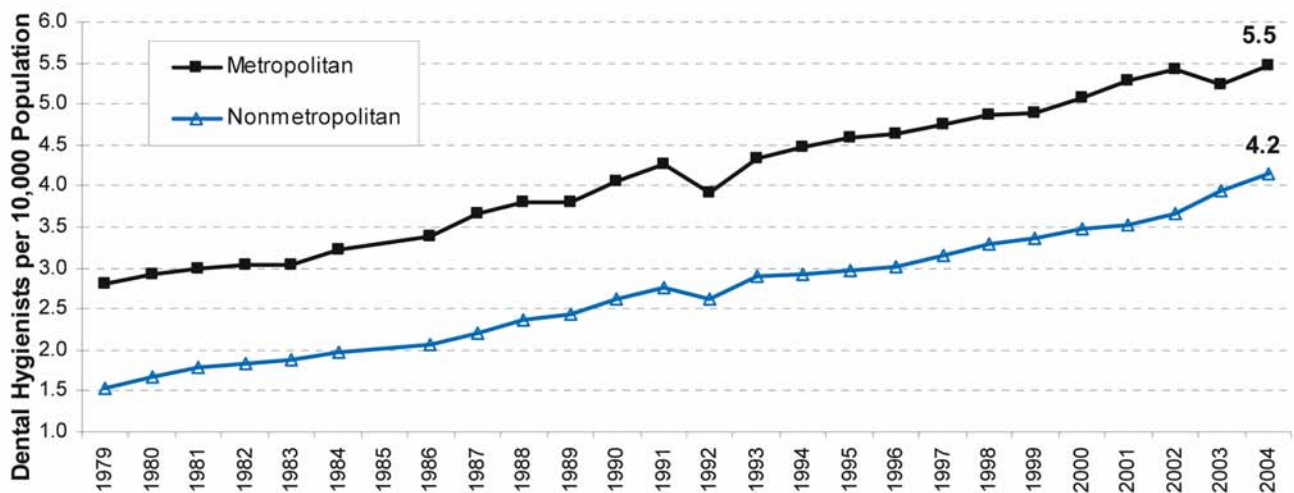
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Readers' Forum

To the Editor:

I read the issue of the *North Carolina Medical Journal*, "Preventing Child Abuse and Neglect," with interest. I note, however, that even scientists do not face up to the real issues when faced with the tenets of religion, no matter how illogical those beliefs may be.

To discuss child abuse without even mentioning that at least half of all children are unwanted and born into dysfunctional families who cannot care for them, reveals the fear and reluctance of society to disagree with religious teachings. It is well known that crime and child abuse decrease as the number of unwanted children decreases.



There is a big difference if a functional family unit has an unplanned pregnancy as compared to a single woman without family support who is forced to continue her pregnancy on the basis that a god doesn't like contraceptives or abortions.

Until we face the necessity of family planning, we are "spitting in the ocean" and will just be throwing money at another welfare program. Until we can rationally discuss the necessity of family planning, contraceptives, day-after pills—yes, even abortions—we are only fooling ourselves about the prevention of child abuse.

John A. Henderson, MD
Asheville, NC

Editorial note: The full report of the North Carolina Institute of Medicine Task Force on Child Abuse Prevention includes a recommendation to expand the Medicaid family planning waiver to provide family planning services to more people more quickly. For complete details on the report, please visit the North Carolina Institute of Medicine's Web site at <http://www.nciom.org/projects/childabuse/childabusereport.html>.

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Prevent Child Abuse North Carolina in collaboration with the Child Medical Evaluation Program and Greensboro AHEC will offer continuing education credits for the CMEP program and Category 1 credits toward the AMA Physician's Recognition Award.



Prevent Child Abuse
North Carolina

The North Carolina Institute of Medicine

Since January 2002,
Publisher of *The North Carolina Medical Journal*

In 1983 the North Carolina General Assembly chartered the North Carolina Institute of Medicine as an independent, nonprofit organization to serve as a nonpolitical source of analysis and advice on issues of relevance to the health of North Carolina's population. The Institute is a convener of persons and organizations with health-relevant expertise, a provider of carefully conducted studies of complex and often controversial health and healthcare issues, and a source of advice regarding available options for problem solution. The principal mode of addressing such issues is through the convening of task forces consisting of some of the state's leading professionals, policy makers and interest group representatives to undertake detailed analyses of the various dimensions of such issues and to identify a range of possible options for addressing them.

Members of the North Carolina Institute of Medicine are appointed for five-year terms by the Governor, and each task force convened by the Institute typically includes at least one-third of its membership from among the appointed members. Topics to be addressed through task force efforts are chosen following requests from the Governor, the General Assembly or agencies of state government. In some cases, topics are selected on the basis of requests from a number of stakeholder organizations across the state where this type of analytical process is considered to have potential value.

The North Carolina Institute of Medicine assumed the role of publisher of the *North Carolina Medical Journal* in January 2002 through an agreement with the North Carolina Medical Society, which founded the Journal in 1845. The Institute views the *North Carolina Medical Journal* as an extension of its mission. The Journal provides a forum for stakeholders, healthcare professionals, and policy makers and shapers to study and discuss the most salient health policy issues facing our state. Like many states, North Carolina is grappling with issues such as an increasing number of uninsured, the unmet health needs of the growing Latino population, a critical shortage of nursing personnel, the health risks of tobacco and obesity, rising prescription drugs costs, mental health system reform, the increasing societal burden of chronic illness care, the threat of bioterrorism and the necessity of assuring adequate public health preparedness—all in the midst of an economic downturn. Each of these issues presents unique challenges to healthcare providers and state policy makers. Yet, a fully implemented task force to consider each of these sets of issues is not feasible. The Journal makes it possible to present an organized and balanced overview of some of these issues, six times per year, and allows interested persons the opportunity to engage in the ongoing discussion of these issues throughout the year. The Institute hopes that our readers of the *Journal* will, in this way, become involved in the continuing debate about the most promising avenues for assuring the highest standards of health and healthcare for all North Carolinians.

health policy
North Carolina Institute of Medicine

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North Carolina MEDICAL JOURNAL

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