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Tar Heel Footprints in Health Care

A periodic feature that recognizes individuals whose efforts—often unsung—enhance the health of North Carolinians

Rob Doherty, DDS, MPH

Though Rob Doherty went to school expecting to open a private dental practice, his early experience with the US Public Health Service sparked a sense of purpose that prompted his choosing a career in public health dentistry. Doherty has worked in community health centers (CHCs) for the last 22 years, bringing dental care to underserved North Carolinians.

Doherty is currently the dental director for Greene County Health Care, a community health center in Snow Hill, North Carolina. Since it began in 2003, Doherty has helped build the Snow Hill dental program in response to the overwhelming need in the community. In 2007, he helped lead the expansion of the Greene County Health Care dental program to its second site at the Bernstein Community Health Center in Greenville, North Carolina. CHC dental programs strive to offer comprehensive oral health care programs to meet the many needs of adults and children in the area. The Snow Hill and Bernstein clinics offer dental care at reduced rates to 15,000 low-income patients, about 80% of whom are uninsured.

Doherty's colleagues speak highly of his efforts. Dr. Tom Irons, director of the Jim Bernstein Community Health Center outside Greenville, describes Doherty as a valuable resource to his patients saying he has been "deeply impressed by Rob's commitment to his patients, his extraordinary innovativeness, and his ability to relate to low-income families across cultures." Doherty emphasizes the importance of providing culturally competent and accessible care. The clinics are open 6 and sometimes even 7 days a week to accommodate as many patients as possible and to offer accessible times for patients such as occasional Sunday afternoon clinic hours for farm workers.

The centers' staffs work closely with both the University of North Carolina-Chapel Hill School of Dentistry and East Carolina University School of Dental Medicine, as well as private practice colleagues. In addition to opportunities for continuing education, Doherty notes, "Young dentists join us and are exposed to complex oral surgery, endodontics, removable and fixed prosthetics, implants, orthodontics, and pediatric dentistry."

Though relatively few of North Carolina's dentists work in community health center settings, Doherty speaks highly of his experience, saying he "cannot imagine a more challenging, vital, satisfying, and enjoyable career choice than working with a community health center. To many of us, this is the most appealing part of the work — if these patients did not get this work done, in this setting, at these reduced fees, they would not get the work done. They have no other place to go." NCMJ

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"I'm not afraid to be the pale girl in the bathing suit. It doesn't bother me anymore."

"I have friends who use tanning beds or lie out in the sun.

I tell them about Jaime.

Jaime was in her early 20s when she was diagnosed with melanoma, and she died right before she turned 30.

One person dies from melanoma every hour.

After Jaime's death, I completely walked away from tanning.

People think it's safe. But I know it's not. You could die - just like Jaime did."

-Amanda Asplin

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Learn more about Jaime's skin cancer story at www.aad.org/PSA

ORIGINAL ARTICLE

Reasons for Tanning Bed Use:
A Survey of Community College Students in North Carolina

Ashley Neenan, C. Suzanne Lea, Erin B. Lesesky

BACKGROUND Tanning bed use is classified as carcinogenic and is associated with an increased risk of skin cancer. The aim of this cross-sectional survey was to identify the most commonly stated reasons for tanning bed use among a sample of male and female community college students in eastern North Carolina.

METHODS A brief, self-administered survey was distributed to students during English, Art, or Psychology class periods in 5 eastern North Carolina community colleges during the 2010 fall semester.

RESULTS The 95% response rate consisted of 487 returned surveys. Of the 487 respondents, 12.7% (N = 62) were current users, 24.5% (N = 119) were past users, and 62.2% (N = 303) reported never using tanning beds. Women (79%) were more likely than men (18%) to be current or former tanning bed users. Three African Americans reported current tanning bed use (4.8%). Reasons for tanning bed use were similar among men and women, with "I think I look better when I am tan" being the most commonly cited reason (70.2%) for tanning bed use.

LIMITATIONS A convenience sample limits generalizability to all North Carolina students attending community college.

CONCLUSIONS Current tanning bed use was not widely reported. However, educational strategies for preventing tanning bed initiation or recurrence among male and female community college students should include appearance-driven factors.

Excessive ultraviolet radiation (UVR) from ambient sun exposure has historically been the major cause of basal, squamous, and melanoma skin cancers [1]. In recent decades, indoor tanning has become a common source of ultraviolet A (UVA) and ultraviolet B (UVB) radiation. UVR in these wavelengths and tanning bed devices have been classified as human carcinogens by the International Agency for Research on Cancer (IARC), an agency of the World Health Organization [1, 2].

Many epidemiologic studies link use of tanning bed exposure to skin cancers [2-6]. While the incidence of non-melanoma skin cancers are not tracked systematically in the US, melanoma skin cancer is the most common form of cancer for young adults aged 25-29 and the second most common form of cancer among young adults 15-29 years old [7, 8]. In North Carolina, female melanoma diagnosis peaks at ages 30-34 years, and in males, diagnosis peaks at 45-49 years [9]. Use of indoor tanning facilities has been speculated as one of the primary factors contributing to the rising incidence of melanoma among young adults. Based on the available studies, approximately 40%-60% of college students have used indoor tanning booths, with higher rates among women [10].

Several studies have been conducted to understand why young adults patronize tanning facilities. Among study findings relating to appearance-based motivations, improvement in the appearance of acne [11, 12], body image [11, 13], increase in sex appeal [11, 12], general attractiveness [11, 12, 14-16], and increased confidence in appearance [11-14,17] have been cited as motives for tanning bed use. Other studies have indicated social persuasion from friends [15, 17-19], family [17], and media [11, 17] as influences for indoor tanning use. Lastly, research has found sensation-seeking reasons for tanning use, including mood enhancement [20], relaxation [12, 18, 20-23], and even addictiveness of tanning behavior [21, 23]. The purpose of this study was to identify the reasons for tanning bed use among young adults in eastern North Carolina.

Methods

This cross-sectional survey was approved by the University and Medical Center Institutional Review Board at East Carolina University. The study population was a convenience sample determined by community college instructors that approved distributing the survey in the classroom. Department chairs and individual professors of health, psychology, art, and English were contacted during the summer and early fall of 2010. Professors of courses provided written consent for participation which granted permission to administer the survey during 17 class periods including psychology classes at community college campuses in Craven, Lenoir, and Wayne counties; psychology and art classes at Nash Community College; and English classes at Johnston

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Community College. Eligible participants were students over the age of 18 and were enrolled in the courses for which professors expressed agreement to participate.

Demographic information, tanning bed use, and reasons for tanning bed use were obtained via paper survey. Findings of previous studies were reviewed to develop the 20-item survey. Respondents were asked to indicate tanning bed use from one of the following 3 options: "I currently use tanning beds/booths," "I have used tanning beds/booths in the past but do not anymore," and "I have never used tanning beds/booths." Current or former tanners were then asked to choose 1 primary reason and any other reasons from among 16 items to indicate reasons for tanning bed/booth use.

During the months of September and October 2010, surveys were distributed and collected by the principal investigator (A.N.). After data entry, statistical analysis was conducted in Stata Statistical Software, release 7 (2001).

Results

There were 645 students ≥18 years of age enrolled in the participating course sections. Of these 645 students, 512 (79%) were in attendance the day of the survey and 487 (95%) surveys, representing 17 course sections across 5 campuses, were completed, returned, and included in the data analysis. Classes surveyed convened between 8:00 am and 3:30 pm and attendance ranged from 63% to 94% on the day of the survey, which took no more than 10 minutes to complete. Some respondents did not fully complete the survey. Respondents were primarily female (58.3%) and white (63.2%). The majority of respondents were 18 years of age, however the age range of students surveyed was wide (ages 18-67), making the mean age of respondents 23.8 years of age (Table 1).

Table 1 presents age, sex, and race by current, former, and never users of tanning beds. Sixty-two students (12.7%) reported current tanning bed use, 119 (24.5%) reported past use, 303 (62.2%) reported never using tanning beds, and there were 3 non-responses. Current and former tanning bed users were mostly white, 83.9% and 87.4%, respectively. Seven black students reported current or former tanning bed use. Females (82.3%) were more likely than males (16.1%) to report current tanning bed use ($\chi^2 = 16.72$, $P < .001$), as well as former tanning bed use, 77.3% and 19.3%, respectively ($\chi^2 = 23.36$, $P < .001$).

The most frequently stated reason for tanning bed use among current and former tanning bed users was, "I think I look better when I am tan," followed by, "I tan to prepare for summer," and "I tan for special events" (Table 2). "Tanning beds are safer than getting tan via natural sun" and "Media/celebrities have influenced my decision to tan" were the least frequently stated reasons for tanning bed use. Findings were very similar when stratified by age. The most frequently stated reasons for tanning among female current and former tanning bed users were identical to that of the entire sample.

Among males, "I think I look better when I am tan" followed by "I tan to prepare for summer" were the 2 most frequent reasons for tanning among current and former male users. Slightly different, however, was the third most frequently stated reason for tanning bed use among males, in which "I tan to prepare for vacation" and "I have more self-confidence when I am tan" were tied.

Reasons for tanning bed use obtained through write-in responses included: allusions to curiosity and boredom, such as "to try something new" or "nothing better to do"; matters of convenience or cost, such as "my parents owned a tanning salon" or "brother in law's family owns a tanning salon

TABLE 1.
Prevalence of Tanning Bed Use Among 487 Community College Students, North Carolina, 2010

	Current tanners % (N = 62)		Former tanners % (N = 119)		Never tanners % (N = 303)		No response % (N = 3)		Total % (N = 487)	
	%	No.	%	No.	%	No.	%	No.	%	No.
Sex										
Male	16.1%	10	19.3%	23	50.2%	152	33.3%	1	38.2%	186
Female	82.3%	51	77.3%	92	46.2%	140	33.3%	1	58.3%	284
No response	1.6%	1	3.4%	4	3.6%	11	33.3%	1	3.5%	17
Age in years										
18-21	66.1%	41	51.3%	61	59.7%	181	66.7%	2	58.5%	285
22-29	17.7%	11	21.8%	26	18.5%	56	0	0	19.1%	93
30+	16.1%	10	21.0%	25	17.5%	53	33.3%	1	18.3%	89
No response	0	0	5.9%	7	4.3%	13	0	0	4.1%	20
Race										
White	83.9%	52	87.4%	104	49.5%	150	66.7%	2	63.2%	308
Black	4.8%	3	3.4%	4	37.3%	113	33.3%	1	24.8%	121
Other	8.1%	5	3.4%	4	7.9%	24	0	0	6.8%	33
No response	3.2%	2	5.9%	7	5.3%	16	0	0	5.1%	25

Note: Due to rounding or missing values, percentages may not total 100%.

TABLE 2.
Reasons for Tanning by Sex and Use, North Carolina, 2010

Reasons	Current tanners		Former tanners	
	Female % (N = 51)	Male % (N = 10)	Female % (N = 92)	Male % (N = 23)
I think I look better when I tan	86.3% (44)	100.0% (10)	64.1% (59)	60.9% (14)
I tan to prepare for summer	72.5% (37)	60.0% (6)	59.8% (55)	52.2% (12)
I tan for special events (dances, weddings, photos, etc.)	66.7% (34)	20.0% (2)	60.9% (56)	17.4% (4)
Tanning relaxes me	60.8% (31)	40.0% (4)	52.2% (48)	17.4% (4)
I have more self-confidence when I am tan	47.1% (24)	30.0% (3)	42.4% (39)	34.8% (8)
I tan to prepare for vacation	37.3% (19)	60.0% (6)	27.2% (25)	21.7% (5)
I tan to treat skin conditions (psoriasis, acne, etc.)	31.4% (16)	30.0% (3)	14.1% (13)	4.3% (1)
I have increased energy when I am tan	13.7% (7)	40.0% (4)	3.3% (3)	8.7% (2)
Friends have influenced my decision to tan	11.8% (6)	30.0% (3)	21.7% (20)	13.0% (3)
My boyfriend/girlfriend has influenced my decision to tan	11.8% (6)	30.0% (3)	6.5% (6)	21.7% (5)
Family has influenced my decision to tan	7.8% (4)	10.0% (1)	5.4% (5)	4.3% (1)
I tan to make sure I am getting enough vitamin D	7.8% (4)	40.0% (4)	2.2% (2)	8.7% (2)
Tanning puts me in a better mood	5.9% (3)	30.0% (3)	19.6% (18)	8.7% (2)
Tanning beds/booths are safer than getting tan via natural sun	0.0 (0)	20.0% (2)	0.0 (0)	0.0 (0)
Media/celebrities have influenced my decision to tan	0.0 (0)	10.0 (1)	3.3 (3)	0.0 (0)

here in town, so I work there" or "I tan for free"; and allusions to efficacy and efficiency, such as "to prevent burning" or "it gives results quickly." Write-in responses closely related to relaxation were also obtained: "I get the best naps in the tanning bed" or "time to myself." Further, write-in responses related to mood were reported: "it helps with depression" or "I feel better when I am tanned." Lastly, one write-in suggested the addictiveness of tanning, "it's an addiction."

Discussion

Among a sample of community college students in 5 noncoastal, rural counties in eastern North Carolina, the prevalence of ever using tanning beds was 37% with approximately 62% never using tanning beds. Of all survey respondents, white women were the most likely to be current or former tanning bed users. Appearance-driven motivations were the primary reasons for tanning bed use ("I look better when I tan") among both male (100%) and female (84%) respondents.

Our findings are consistent with previous research on reasons for tanning bed use. Appearance-driven motivations (look better, prepare for vacation) are some of the most commonly cited and most studied factors for tanning bed use [11-17]. Unique to this study was the inclusion of males in the sample, who also reported appearance-driven motivations as the main reason for tanning bed use. In addition, 7 black students reported ever use of tanning facilities.

Findings among the write-in responses were reasons related to convenience of use such as free or low cost. These free or low-cost tanning opportunities appear to be marketed to college age women in particular. In many eastern North Carolina college towns, rental apartment complexes market tanning beds as an inclusive benefit. Furthermore, the density of tanning bed facilities mirrors the distribution of colleges and universities throughout North Carolina [9]. One study found that tanning facilities were more likely to be built in neighborhoods with a higher percentage of women aged 15-29 years [24]. Given the growing trend of tanning devices for zero- or low-cost at workout facilities or apartment complexes, tanning beds as a marketing incentive warrants further study.

Despite the potential health risk, the tanning industry is loosely regulated in the US and is growing rapidly, with an estimated 10% of Americans patronizing indoor tanning facilities each year [25]. Tanning facilities in North Carolina are regulated by the Radiation Protection Section, Division of Health Service Regulation in the North Carolina Department of Health and Human Services. Facilities are inspected biannually to comply with tanning bed safety requirements, and operators must maintain a certification to operate.

Findings indicate that young adults who feel more attractive with a tan are being targeted for tanning services, are demanding tanning services, or both. An opportunity exists to provide educational interventions regarding the dangers of tanning bed use to college age adults. Nonetheless, warning those motivated to tan about damage to physical appearance from tanning may not be a deterrent [26].

There are several limitations to this study. A small sample size obtained from a convenience sample of students attending class on a particular day limits generalizability to young adults in North Carolina. It should be noted that although survey response rates were high (95%), class attendance at some sites was low on the day the survey was distributed. This could introduce some bias among those who were not present for survey distribution. Behavior was also assessed by self-report, which may not correspond to actual tanning bed use.

In contrast, this study has several strengths. Those sampled are likely to be representative of the community college population since they were sampled from freshman-level required courses. Presence of the researcher, distribution at beginning of class time, and immediate collection contributed to the 95% response rate. While most studies evaluated reasons women frequent tanning beds, this study included assessment of both males and females and included an array of potential reasons for tanning providing novel insight not seen in previous studies.

This study found appearance-based factors to be the most common motivator for tanning bed use among community college students in North Carolina. Strategies are necessary to decrease the number of young adults using tanning facilities and thereby reduce repeated expose to a known carcinogen. While females may be the primary target group, findings from this cross-sectional survey suggest that all races and both sexes should be included in intervention strategies among college students to decrease the use of tanning facilities. NCMJ

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ORIGINAL ARTICLE

Two Controlled Trials to Determine the Effectiveness of a Mailed Intervention to Increase Colon Cancer Screening

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OBJECTIVE Colorectal cancer (CRC) screening is underutilized. Effective and efficient interventions are needed to increase its utilization in primary care.

METHODS We used UNC Internal Medicine electronic medical records to perform 2 effectiveness trials. Eligible patients had no documentation of recent CRC screening and were aged 50-75 years. The mailed intervention contained a letter documenting the need for screening signed by the attending physician in wave A and the practice director in wave B, a postcard to request a decision aid about CRC screening options, and information about how to obtain screening.

RESULTS Three-hundred and forty patients of attending physicians in wave A, 944 patients of resident physicians in wave B, and 214 patients of attending physicians in wave B were included. The intervention increased screening compared with controls for attending physicians' patients in wave A (13.1% vs. 4.1%, 95% CI, 3.1%-14.9%) but not for resident physicians' patients in wave B (1.3% vs. 1.9%, 95% CI, -2.2% to 1.0%). A small increase in screening with the intervention was seen in attending physicians' patients in wave B (6.9% vs. 2.4%, 95% CI, -1.4% to 10.5%). Requests for decision aids were uncommon in both waves (12.5% wave A and 7.8% wave B).

LIMITATIONS The group assignments were not individually randomized, and covariate information to explain the differences in effect was limited.

CONCLUSIONS The intervention increased CRC screening in attending physicians' patients who received a letter from their physicians, but not resident physicians' patients who received a letter signed by the practice director.

Effective and efficient methods to promote colorectal cancer (CRC) screening are needed to increase utilization in clinical practice and decrease CRC morbidity and mortality. Some interventions that target barriers to CRC screening have been shown to increase screening [1-6], but not all have been effective [7, 8]. One of these interventions, which provided a CRC screening decision aid (ie, a tool to help patients make informed decisions about screening test options) during a clinic visit, has been shown to increase screening in an efficacy trial [9]. However, to be widely adopted, effective interventions must also be easy to implement, efficient, and cost-effective [10, 11].

Implementing interventions, including decision aids, widely in clinical practice poses difficulties. Space and time constraints limit feasibility, and decision aids may not reach all eligible patients. A more efficient method to increase CRC screening may be to intervene outside the visit. In a previous pilot trial, we found an 11% increase in screening test completion in attending physicians' patients who were mailed a package containing a letter from their doctor encouraging screening, a decision aid to facilitate screening test choice, and information about how to get a screening test completed without an office visit [12]. However, the cost of this intervention was relatively high, $94 per additional patient screened. This high cost was primarily due to the expense of mailing the decision aid to everyone. Further, the burden of repeated mailings to all unscreened patients may not be sustainable; therefore, we wanted to test a less costly and less labor-intensive approach. We also wanted to examine whether the intervention would be as effective among resident physicians' patients.

Thus, we sought to test whether an intervention that includes a mailed letter signed by a patients' personal physician, an invitation to receive a decision aid, and instructions for obtaining screening could increase screening among attending physicians' patients and to compare how differences in the letter (signed by personal physician vs. practice director) and in the group receiving the letter (attending physicians' patients vs. resident physicians' patients) would affect screening uptake.

Methods

Our previous work demonstrated the efficacy of the decision aid on screening test completion in a randomized controlled trial conducted among patients recruited from primary care practices that served mainly insured patients [9]. For these studies reported here, we designed an effec-

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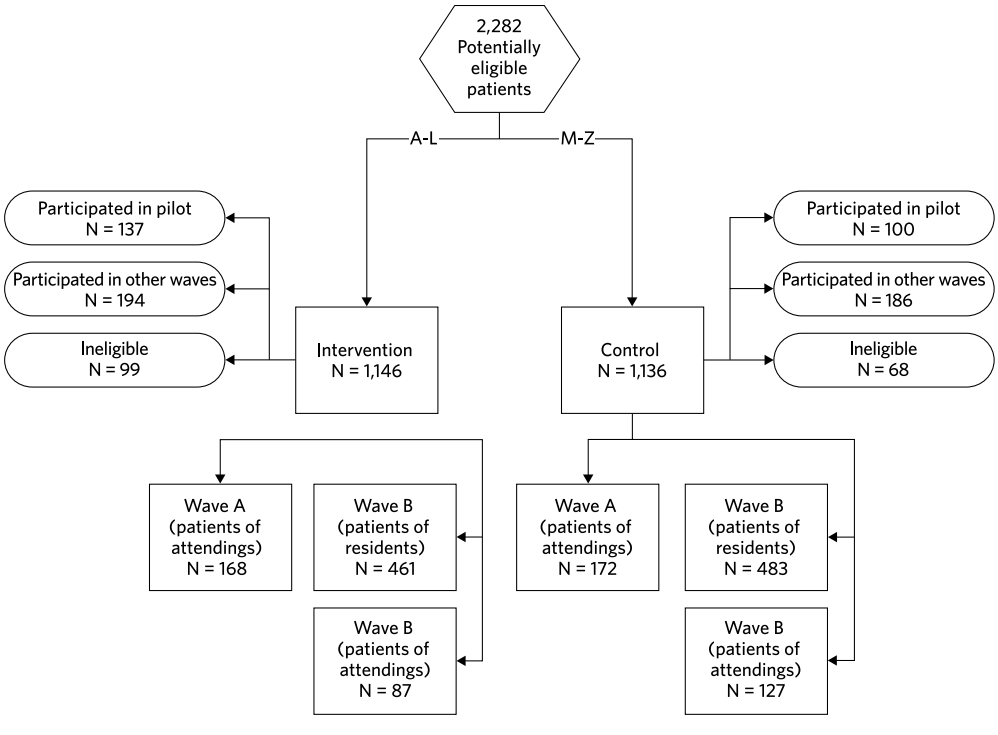
tiveness trial to test our approach among an unselected, diverse practice population. To do so, we designed a study that used a waiver of signed consent and assessed outcomes without requiring patient contact or questionnaire completion, relying on the electronic medical record to assess test completion and covariates. The University of North Carolina's Biomedical Institutional Review Board approved this study.

These 2 studies are part of a series of effectiveness trials in one academic internal medicine practice to evaluate mail-out strategies to improve CRC screening. The principal features of the improvement strategies were a letter reminding the patient that they were due for CRC screening, a CRC screening decision aid, and improved direct access to CRC screening tests for patients. In our pilot trial, the intervention package, including a letter and the decision aid, was mailed to attending physicians' patients directly, without requiring request (by the patient). This increased screening by 11 percentage points [13]. We report here the results of 2 of 3 subsequent larger trials (Figure 1). In the 2 trials reported here, called waves A and B, patients initially received a letter, instructions for scheduling tests, and a decision aid request card. Wave A consisted of attending physicians' patients, and wave B predominately consisted of resident physicians' patient. We report the results together here because the methods for these trials were identical except for the signature on the study letters in the intervention package. For wave A, study letters were signed by each patient's physician, and for wave B, study letters were signed by the practice director.

Setting and patient recruitment. We conducted our trial in the UNC Internal Medicine practice. The practice has a diverse population of over 10,000 adults who are cared for by 16 attending physicians and 75 resident physicians. Eligible patients were aged 50 to 75 years, had no record of being up-to-date with screening, and had been seen in the practice within the previous 2 years. "Up-to-date" was defined using the Multi-Society Task Force guidelines for CRC screening and included a fecal occult blood test (FOBT) within the past 12 months, sigmoidoscopy within the past 5 years, barium enema within the past 5 years, or colonoscopy within the past 10 years [14]. We ascertained potentially eligible patients through a review of laboratory and billing databases and divided them alphabetically into intervention and control groups. We then assigned each patient a study identification number.

Assignment to intervention or control group. Eligible patients were assigned to intervention or control groups based on their identification numbers, which were allocated based on their last names and stratified by physician type. We chose to assign eligible patients in this manner to avoid individual randomization (which would have required written consent per our IRB), and thus maintain our unselected population. We divided our eligible patients into waves to maintain feasibility given the large number of unscreened patients. Assignments were all performed initially, before

FIGURE 1.
Wave and Group Assignments



any of the intervention mailings were carried out. Before the mailing of each wave, we reassessed eligibility and removed any participant that had evidence of up-to-date screening.

Description of interventions. Intervention patients received a packet containing the study letter documenting the need for screening, instructions for scheduling a screening test without an office visit, and a postcard to request the decision aid either in DVD or VHS format. We also included a short questionnaire to assess current screening status and personal or family history of CRC; however, because we elicited this information only from the intervention group, we did not use it to determine eligibility. If requested, the decision aid was sent with a post-viewing questionnaire and information about how to obtain screening without an office visit, identical to that which was included with the initial mailing. The decision aid was created by the Foundation for Informed Medical Decision Making [15]. Standing orders were implemented in the practice for FOBT, and a nurse facilitator was available by phone to provide FOBT cards for completion without a visit. For flexible sigmoidoscopy and colonoscopy, schedulers in the gastroenterology practice's endoscopy unit were instructed to schedule patients who requested either test.

The initial mailing occurred on March 1, 2006 and July 24, 2006 for waves A and B, respectively. Reminders containing the same information as the initial intervention mailing were sent at 1 and 2 months after the initial intervention mailing for patients who had not yet responded. Control group patients received the intervention materials after data collection was complete.

Measures.

Colon cancer screening test completion. CRC screening test completion was determined by chart reviews of the electronic medical records and was based on evidence of screening test completion from 7 to 130 days after the initial mailing. Research assistants searched our health care system's electronic medical record for gastroenterology reports, indicating flexible sigmoidoscopy or colonoscopy; lab results for FOBT; radiology reports for barium enema; and clinic notes from the patient's most recent internal medicine visit for mention of any of the applicable tests not otherwise identified. Age, race, insurance status, and gender were also recorded from the medical record. We used 2 reviewers for each patient. Inter-rater reliability was assessed using the kappa statistic and found to be very high (0.89 for patients in wave A and 0.85 for patients in wave B). Discrepancies were resolved by team review.

Cost per additional patient screened. We calculated approximate cost per additional patient screened by estimating direct costs of materials and staff time but did not consider other costs, such as patient time (Table 1).

Post-decision aid survey. The post-viewing survey assessed self-reported decision aid viewing, intent to be screened, screening test preferences, knowledge, and satisfaction.

TABLE 1.
Cost Per Additional Patient Screened in Wave A

Item	Cost	Quantity	Total
Postage			
Initial mail out	$0.39	194	$75.66
Reminder mail outs	$0.39	292	$113.88
Mail back	$0.45	53	$23.85
Mail out package	$1.84	21	$38.64
Mail back package	$5.00	3	$15.00
Postage total			$267.03
Materials			
Duplication cost of videos not returned	$2.50	18	$45.00
Paper and envelopes*	$0.10	486	$48.60
Package materials*	$1.00	21	$21.00
Materials total			$114.60
Staff			
Tracking and mailing time**	$17.00	4	$68.00
Staff total			$68.00
Grand total			$449.63

*estimated costs incurred
**based on hourly wage of research assistant

Power calculations. Based on our pilot study we estimated that in order to have 80% power to detect a 10% difference in screening rates between the intervention and control groups, we would need 160 patients per group, assuming a control group screening rate of 5% and a 2-sided α of 0.05. We elected to use the full population of patients available, however, to ensure equity.

Data analysis. First, we compared patient characteristics between intervention and control arms for each group using χ^2 tests to determine whether the intervention assignment method adequately balanced the treatment groups. We then compared screening rates between intervention and control arms stratified by group (wave A attending, wave B resident, wave B attending) using χ^2 tests. We also calculated 95% confidence intervals around the absolute difference in screening rates. We attempted to control for clustering within providers but, due to the small number of persons with evidence of screening, these models did not converge. Our principal analysis included all patients not excluded on the basis of chart reviews. Using the same methods, we performed an alternative analysis to examine the effect of excluding those in the intervention group found to have had recent screening.

To investigate the differences we found in the intervention effects, we performed additional χ^2 tests across the 3 waves. First, we compared the characteristics of the patients across the 3 groups: wave A attendings' patients, wave B residents' patients, and wave B attendings' patients. Then we performed a formal test for differences in the intervention effects across the 3 groups using the Breslow-Day test for homogeneity. We used logistic regression to determine if

imbalances in patient characteristics (age, sex, race, insurance status) between the intervention and control groups were influencing the crude intervention effects. We also conducted a logistic regression with all groups combined to determine the impact of patient characteristics on the interaction between the intervention effect and the 3-level group variable (wave A attending, wave B attending, and wave B resident). This was done to determine if the differences in characteristics between attending and resident providers' patients were driving the inconsistency in the intervention effects. Covariates were considered one at a time due to the limited number of screening events.

Results

Figure 1 shows the study flow, divided by intervention status, wave, and physician type (attending vs. resident). Table 2 shows the demographic characteristics by intervention group. Intervention and control groups were relatively similar in terms of available demographic characteristics except for 2 modest differences: in wave A, the control group was more likely to be uninsured than the intervention group and in wave B, the intervention group patients were slightly older.

Primary outcome: colorectal cancer screening. For the attending physicians' patients in wave A, the intervention produced a significant net increase in screening rates of 9.0% (95% CI, 3.1- 14.9) (Table 3). For resident physicians' patients in wave B, we observed no difference between groups: -0.6% (95% CI, -2.2, to 1.0). However, for attending physicians' patients in wave B, the intervention produced a smaller, statistically non-significant increase of 4.5% (95% CI, -1.4% to10.5%) in CRC screening test completion.

Among wave A patients, controlling for insurance status (insured vs. not insured) did not reduce the magnitude of the intervention effect (P = .0055, adjusted Wald). Among wave B patients of attending physicians, after adjustment for age, the intervention effect remained positive but not statistically significant (OR, 3.15 [95% CI, 0.76-13.07]). The difference in the intervention effect across the 3 groups was statistically significant (P = .04, Breslow-Day test for homogeneity).

In logistic regression models individually controlling for insurance status, race, and age, the statistical tests for difference in intervention effects across groups did not change appreciably. This suggests that these demographic factors do not explain the differences in intervention effects between groups.

Cost per additional patient screened. For wave A, where the intervention showed a significant effect on screening, we calculated the cost per additional patient screened over that of the control group to be about $30 ($449.63/15 additional patients, Table 1). Most of the cost was attributable to the postage paid for repeated mailings ($267).

Decision aid viewing. The proportion requesting and viewing decision aids in response to the intervention mailing was small for both waves: for wave A, 12.5% (N = 21) of the patients responded and requested the decision aid; 3 participants returned the decision aid and questionnaire, and 2 of these reported viewing the decision aid. The 2 that viewed the decision aid were among the 26 that were screened. For wave B patients of resident physicians, the results were similar: 7.8% (N = 36) responded and requested the decision

TABLE 2.
Patient Characteristics for Intervention and Control Groups in Each Wave

	Wave A Attending patients		Wave B Resident patients		Wave B Attending patients	
	Intervention	Control	Intervention	Control	Intervention	Control
	N = 168	N = 172	N = 461	N = 483	N = 87	N = 127
Mean age[a]	62.5	61.6	61.1[b]	60.0	64.1[c]	62.3
Women (%)	101 (60)	96 (56)	229 (50)	261 (54)	45 (52)	73 (57)
Race (%)[a,d]						
White	114 (68)	115 (67)	229 (50)	222 (46)	62 (71)	84 (66)
Black	43 (26)	47 (27)	199 (43)	216 (45)	20 (23)	39 (31)
Other	11 (7)	10 (6)	33 (7)	45 (9)	5 (6)	4 (3)
Insurance status (%)[a,d]						
No insurance	10 (6)[e]	22 (13)	139 (30)	146 (30)	11 (13)	11 (9)
Medicaid	16 (10)	21 (12)	78 (17)	79 (16)	10 (11)	17 (14)
Medicare	57 (34)	38 (22)	116 (25)	115 (24)	35 (40)	33 (26)
Private insurance	66 (39)	78 (45)	113 (25)	115 (24)	24 (28)	56 (45)
Other	19 (11)	12 (7)	15 (3)	28 (6)	7 (8)	8 (6)

[a]P < .0001 comparing the distribution of these variables in the combined intervention and control groups across the 3 groups.
[b]P = .008 comparing intervention and control groups in wave B for age for patients of resident physicians.
[c]P = .06 comparing intervention and control groups in wave B for age for patients of attending physicians.
[d]percentages may not add to 100% due to rounding.
[e]P = .021 comparing intervention and control groups in wave A for insurance.

TABLE 3.
Patients Completing Colon Cancer Screening by Chart Review

	Intervention	Control	Difference (95% CI)*
Wave A (attending)	13.1% (N = 22)	4.1% (N = 7)	9.0% (3.1%-14.9%)
N = 340 patients			
N = 14 providers	(N = 168)	(N = 172)	
Wave B (residents)	1.3% (N = 6)	1.9% (N=9)	-0.6% (-2.2%-1.0%)
N = 944 patients			
N = 83 providers	(N = 461)	(N = 483)	
Wave B (attending)	6.9% (N = 6)	2.4% (N = 3)	4.5% (-1.4%-10.5%)
N = 214 patients			
N = 19 providers	(N = 87)	(N = 127)	

*The Breslow-Day test for homogeneity for intervention effects across all 3 groups: P = .0412; for intervention effects between attending groups (wave A and wave B): P = .86; for intervention effects between wave B resident patients and wave B attending patients: P = .089.

aid; 12 returned the decision aid, and 6 reported that they had viewed the decision aid.

Alternative analysis. In our alternative analysis, we excluded intervention group members who self-reported higher risk status or previous screening. The primary results, CRC screening differences between groups, were no longer significant but did not change directions. In wave A, we observed a net increase of 5.4% (95% CI, 0.3%-11%), and in wave B resident physicians, we still observed no difference (-0.9% [95% CI, -2.4% to 0.6%]). The effect sizes in wave A and wave B attending patients were no longer different; we observed a 5.3% net increase in screening in the attending patients in wave B (95% CI, -1.1%-11.9%).

Discussion

In these 2 effectiveness trials, we found that an intervention mailing that included a letter encouraging screening, a card to request a decision aid, and instructions on how to obtain a screening test outside an office visit was effective in modestly increasing CRC screening in attending physicians' patients who received a letter signed by their physician, but not effective for resident physicians' patients who received a letter signed by the practice director. Attending physicians' patients who received the reminder signed by the practice director had intermediate results. Requests for the decision aids were low for all groups (12.5% and 7.8% for attending and resident patients, respectively) suggesting that the decision aid itself had little effect on screening rates. The cost per additional patient screened (among patients of attending physicians who received the letter signed by their regular provider) was modest ($30) compared to our pilot study ($94) [12].

We found some evidence to suggest that the signature of the patient's physician on the study letter may have had an effect on the CRC screening test completion for attending physicians' patients. Attending physicians' patients in wave B, who received a letter in the intervention package signed by the practice director, were less responsive to the intervention. These findings are consistent with a previous study demonstrating that invitations signed by the patient's personal physician are more effective at increasing uptake than general invitations, such as from a national screening program [16].

We were unable to fully explain the difference in the effect of our intervention between the attending and resident physicians' patients with the limited individual characteristics available in the electronic medical records. It is possible that the differences observed could be explained by other unmeasured characteristics that may have differed between groups, such as income, health status, or the duration of the physician-patient relationship. Additionally, when we explored the effect of excluding those with evidence of screening on the pre-questionnaire, differences were smaller.

Recent randomized controlled trials of relatively low-intensity interventions for CRC screening in a variety of populations have shown mixed results. Dietrich and colleagues demonstrated a 13% increase in screening among low-income women with calls from prevention care managers [2]. Denberg and colleagues sent a mailed brochure to patients in 2 academic practices who were scheduled for a colonoscopy and found a 12% increase in adherence to testing compared to usual care [1]. However, Walsh and colleagues did not demonstrate a difference in screening test completion in patients from academic and community practices who were randomized to receive a mailed intervention including a letter from their physician, information about CRC, and FOBT cards [8]. Sequist and colleagues found that a mailed intervention with a tailored letter, educational brochure, and FOBT kit increased screening by 6 percentage points, with a cost of $94 per additional patient screened [17].

Including the option of requesting the decision aid did not appear to have much of an effect on the promotion of screening, as numbers of requests in both groups were low. The intervention may have mainly served as a patient

reminder about screening rather than encouraging a better decision-making process. While decision aids have been shown to improve decision quality when viewed [18], this method of encouraging their use was not effective.

We chose our study design—alphabetical pseudo-randomization to intervention and control, no direct patient contact for covariates, and chart review for outcomes assessment—to remove some of the privacy and human subjects concerns that might require written informed consent or otherwise limit the pool of participants. By not filtering our study population, we sought to improve the generalizability of our results, including patients who would not usually actively enroll in a trial. These choices, however, created some potential limitations. Although we alphabetically allocated participants to intervention or control groups and did not observe large differences in the measured covariates, important unmeasured differences may have been present. The lack of covariates also limited our ability to explore and explain the difference in the intervention effect between patient groups, apart from the signature on the study letter.

Our outcomes assessment was also limited by the study design. We had limited follow-up time (130 days), and some patients may have been screened after this time period. However, this would only affect our results if late screening occurred preferentially in the control group. It is also possible that screening could have occurred outside of our health system, but it is again unlikely that this misclassification would differ between intervention and control groups, and there are few other local sources for screening. For video viewing, we relied on self-report. It is conceivable that patients viewed the video and did not respond to the questionnaire. However, when we assessed this in our pilot study, this number was small [12]. Finally, our results may not be generalizable because the study was conducted in 1 academic practice that has been a site for other decision aid and quality improvement studies.

In conclusion, we found that an intervention mailing that included a letter encouraging screening, a card to request a decision aid, and instructions on how to obtain a screening test outside an office visit was effective at increasing CRC screening among attending physicians' patients who received a letter signed by their physician, but not among resident physicians' patients who received a letter signed by the practice director. NCMJ

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POLICY FORUM

Oral Health

Introduction

The importance of oral health to overall health has become increasingly evident in the recent past. A growing body of evidence shows us that oral health is inextricably linked to overall health. Preventive oral health care and early treatment interventions have become more and more essential to obtaining and maintaining optimal overall health, yet the practice of dentistry stands apart from the practice of medicine for many complex and largely historical reasons. Nevertheless, our growing understanding of how enmeshed oral health is with overall health means that oral health is receiving more—and deserved—attention in the realms of healthy policy, preventive care, and disease treatment.

This issue of the NCMJ speaks to the assumption of this new role by dentistry. Our authors describe programs and initiatives that bring preventive services and treatment to children, underserved North Carolinians, and special needs populations; explore the capacity of the dentist workforce and the need to expand it; examine changes in how dentistry is managed; and discuss access to oral health care for all North Carolinians. Issue brief author R. Gary Rozier tells us that the oral health problems the state faces are stubborn and that their solutions depend upon the participation of dentists and dental practitioners and professionals who see the need to care for all the people of the state. The profession is aware of these persistent problems.The policies, programs, and other interventions we read about here intend to address them.

North Carolina Dental Society Executive Director M. Alec Parker calls dentistry the "last cottage industry remaining in health care." While this is true, dentistry has quickly become a very dynamic profession that makes extensive use of technology for diagnostics and treatment, combines complex professional roles in delivery sites, and coordinates the work of multiple technicians and practitioners to provide care. Dentistry may remain tied to the cottage, but the cottage has become a very high-tech structure.

North Carolina is unique in its commitment to public health dentistry. A great asset in the state is its public, higher-education system, which now houses 2 dental schools. In the University of North Carolina-Chapel Hill, the state has a dental school that is closely linked to a school of public health. The dental and the public health schools emphasize population health in both their research and training. However, we have a relatively low number of dentists in the state, and poor oral health in certain parts of the state and in particular segments of the population persists. State policymakers have responded to these issues by supporting the new school of dental medicine at East Carolina University and giving it a special mandate to train dentists to practice in places where poor oral health and access to oral health care remain problematic.

Of last note is the current national landscape where health reform has a constant presence in the news media, the costs and performance of the US health care system are high on the political agenda, and health care makes up a large and growing part of our economy. The context used to illustrate this landscape is almost always a medical one, and oral health care is often left out of the picture. This issue of the NCMJ strives to highlight the prominence of oral health as we consider health overall, the opportunity oral health presents to make improvements in population health, and how dental professionals are significant contributors to a healthier North Carolina, and thus a healthier America. NCMJ

Thomas C. Ricketts III, PhD, MPH
Editor in Chief

ISSUE BRIEF

Oral Health in North Carolina:
Innovations, Opportunities, and Challenges

R. Gary Rozier

Dental disease can have negative and lasting effects on overall health and quality of life. The Institute of Medicine of the National Academy of Sciences reported last year that close to 5 million children in the United States did not receive needed care in 2008 because of costs. Increasing use of dental care has been selected by the US Department of Health and Human Services as one of a small number of national leading health indicators, designating it as a national priority. Innovative initiatives have been undertaken in North Carolina to promote oral health, and there have been improvements in the state. For example, both the use of dental services among children and their oral health status are improving. Yet persistent and difficult challenges remain, such as ensuring an adequate workforce for the future, improving oral health literacy, maintaining existing programs, and resolving disparities in oral health and lifetime access to preventive and treatment services for all North Carolinians. This issue brief reviews some oral health initiatives and their outcomes—with a focus on youth. Commentaries in the policy forum also focus on access to oral health care; assessing, educating, and building the dental workforce; new practice models and trends; insurance innovation; and patients with special needs.

Important national publications about oral health bookend an unprecedented amount of activity in dentistry during the last decade. In 2000, Oral Health in America: A Report of the Surgeon General, published by the US Department of Health and Human Services, highlighted the widespread prevalence of oral diseases and their significant impact on overall health and quality of life [1]. As with other reports from the Office of the Surgeon General, starting with the 1964 report on the adverse consequences of smoking, Oral Health in America focused the nation's attention on an important public health issue and triggered nationwide public and private efforts to address the identified problems. The report declared dental disease to be a silent epidemic and called for everyone to share in efforts to promote oral health.

In 2011, the Institute of Medicine and the National Research Council published Improving Access to Oral Health Care for Vulnerable and Underserved Populations [2]. It concluded that now, a decade after publication of Oral Health in America, millions of Americans still lacked access to basic oral health care. The report envisioned a country in which everyone has access to quality oral health care throughout life. The authors of the report considered oral health promotion and disease prevention to be essential in any strategies aimed at improving access to care, and argued that oral health is an integral part of overall health. Using these key principles as a foundation, the report concluded that, in order to ensure access for everyone, collaboration among multidisciplinary teams working across the health care system will be required.

Assessments of Oral Health Care in North Carolina

North Carolina began the last decade with its own set of policy recommendations about improving oral health, as well as a framework for action. In the late 1990s, at the request of the North Carolina General Assembly, the North Carolina Institute of Medicine (NCIOM) convened a task force to conduct a study on access to dental care for underserved and vulnerable residents of the state [3]. The resulting report by the Task Force on Dental Care Access, published in the spring 1999, found that North Carolina ranked close to the bottom among states in the supply of dentists per population and in their participation in Medicaid. Only 20% of individuals enrolled in Medicaid made a dental visit at the time. Dental caries was found to be the most prevalent chronic disease of children, and had the highest level of unmet need of any disease. Statewide, about 40% of children had experienced dental caries by the time they enrolled in kindergarten and only about half was treated.

The NCIOM report contained 23 specific recommendations for improving access to care, which were organized into 5 general strategies: (1) increasing dentist participation in the Medicaid program, (2) increasing the dental workforce supply, (3) expanding access to preventive dental services for young children, (4) expanding access to special care dentistry, and (5) educating Medicaid recipients about

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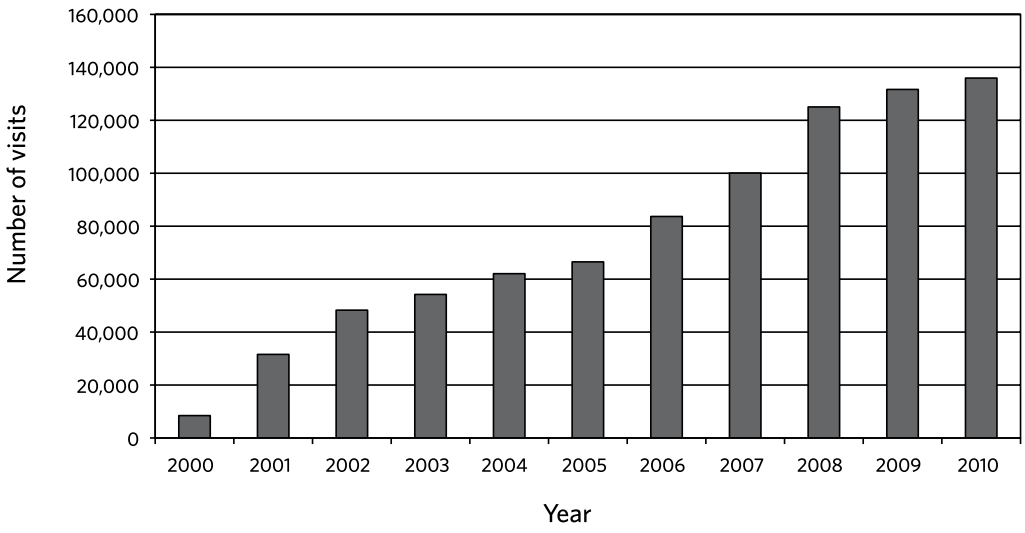
FIGURE 1.
Number of Annual Preventive Dental Visits in North Carolina Medical Offices, 2000-2010



Note. Data are from the Division of Medical Assistance, North Carolina Department of Health and Human Services.

the importance of ongoing dental care and removing nonfinancial barriers to using dental services.

The last comprehensive assessment of progress in implementing the 23 recommendations was completed in 2005 [4]. It concluded that significant progress had been made toward improving access to dental care for underserved populations in North Carolina during the intervening 5 years. About a third of the recommendations were met, with progress being evident on many more. For example, the number of dentists participating in Medicaid had increased, as had the proportion of eligible Medicaid recipients receiving dental services, even with an increase of more than 400,000 in the number of enrollees. A large expansion of the dental care safety net also occurred, increasing from 43 clinics in 1998 to 115 in 2004.

This issue of the NCMJ provides an update on dentistry in North Carolina. It includes invited commentaries on dental education, the status of the oral health workforce, barriers to dental care, emerging dental practice models, financing, public health programs, and dentistry for special needs populations. Together, they provide a review of important trends affecting the oral health of North Carolina's population that need to be considered in planning for the future.

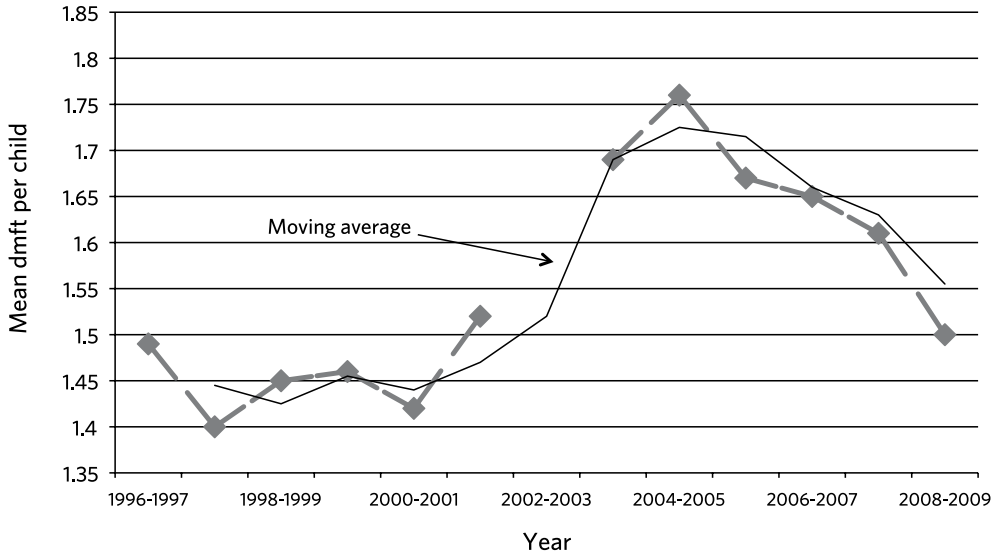
Progress in Meeting Children's Oral Health Needs in North Carolina

Only 22% of children enrolled in Medicaid received any dental services in 2000. By 2010 that number had more than doubled to 48%, when approximately half a million children received some type of dental care [5]. These utilization rates would approach 60% if infants without erupted teeth and children who are enrolled for only a part of the year were excluded from the denominator used in the calculation of rates. During the past decade, Medicaid participation rates among dentists in North Carolina increased from 16% to 45%. A decade ago, as many as 40 counties lacked a Medicaid-enrolled dentist. Now, only 4 counties lack a dentist who submits claims for reimbursement to the program. According to the North Carolina Division of Medical Assistance, North Carolina ranked sixth among state Medicaid programs in 2009 for children who used preventive services and ninth for children who received any dental services—a dramatic change in ranking from 44th place in 1999 [6].

Part of the success observed in the use of preventive services is due to the innovative program, Into the Mouths of Babes (IMB), referenced in the commentary by King and Spratt [7]. One of the more difficult challenges faced by the 1999 NCIOM task force was developing recommendations for addressing the high prevalence of dental disease in preschool children and their low use of dental care. Use was only 12% among 1- to 5-year-old children enrolled in Medicaid. In 2000, the North Carolina Division of Medical Assistance, in collaboration with a number of partners, implemented IMB, a program that now reimburses medical providers for dental screenings, parent counseling, and the application of fluoride varnish in children from birth to 3.5 years of age. At the time the program was being developed, only Washington state had considered such an option.

An extensive evaluation of IMB has been conducted because of its novel aspects and the limited information available at the time of implementation about the effectiveness of the provision of dental services by non-dental providers. The results of this evaluation indicate that IMB has been highly successful in improving access to preventive oral health services for Medicaid children [8]. Visits for preventive dental services have increased every year between 2000

FIGURE 2.
Mean Number of Decayed, Missing, and Filled Primary Teeth (dmft) per Kindergarten Student in North Carolina, by Year



Note. Data are from the Oral Health Surveillance System, Division of Public Health, North Carolina Department of Health and Human Services.

and 2010 (Figure 1). In total, children have made almost a million medical visits in which they received preventive dental services. Access and use of preventive services has been extended to every county in the state where previously as many as 40 of the 100 counties had no children of this age receiving professionally-provided preventive dental services.

The IMB program has reduced dental caries-related treatments such as restorations, nerve treatments, and tooth extractions among children enrolled in Medicaid who are 6 months to 6 years of age [9]. An analysis of Medicaid reimbursement claims for the first 7 years of program implementation found that children who received 4 or more IMB visits compared to zero IMB visits when they were 6 months to 35 months of age had a statistically significant reduction in cumulative caries-related treatments of 49% at 17 months of age. By 6 years of age, the estimated cumulative reduction in the number of treatments was 17%.

Recent Enhancements to the IMB Program

The screening and referral component of IMB is being strengthened as another strategy to help improve access to care for young children. These efforts began with a project known as the Carolina Dental Home initiative under the leadership of the Oral Health Section of the North Carolina Division of Public Health, and in collaboration with the medical and dental communities in 3 counties in eastern North Carolina. The specific objectives of this demonstration project, which was completed in 2010, were to enhance the ability of medical providers participating in IMB to provide risk-based dental referrals and to increase the availability of the dental workforce to meet the dental needs of preschool-aged children enrolled in Medicaid.

A decision support tool, known as the Priority Oral Health Risk Assessment and Referral Tool (PORRT), and associated referral guidelines were developed through consensus of local physicians and dentists to help prioritize dental referrals in medical offices in their communities where universal referral of children at 1 year of age was not possible. Adoption and implementation of PORRT and the referral guidelines resulted in an increase in referral rates, specifically for those children younger than 3 years of age who have dental caries in its early stages. Based on its success in linking physicians and dentists, the PORRT and guidelines are being tested further in other areas of the state with the ultimate goal of increasing the number of young children enrolled in North Carolina Medicaid who have a dental home. These activities are being funded through grants from the Health Resources and Services Administration and in collaboration with a quality demonstration grant specified in the Children's Health Insurance Program Reauthorization Act (CHIPRA) [10].

A Dental Public Health Crisis in Preschool-aged Children Averted

Statewide trends in dental caries experience for children enrolled in kindergarten over a 13-year period are displayed in Figure 2. These data are provided by the Oral Health Section and are based on standardized clinical assessments of about 85% of all 5-year-old children attending public schools in the state each year. Oral health surveillance for this age child is important because it can reveal effects from exposure to interventions targeting preschool-aged children

after only a few years of implementation.

The trend line for dental caries experience, or the mean of the person-level count of decayed, missing, and filled teeth (dmft) per person shows an increase between 2001-2002 and 2004-2005. A decline in dmft scores has occurred each year since the 2004-2005 school year. The absolute change in dmft is small, less than half a tooth, but amounts to a reduction of about 14% over the last 5 years.

The mean proportion of dmft that had been treated (fmt divided by dmft) per year was almost constant at about 0.49 during the first 6 years (not shown in Figure 2). The proportion treated increased in the last 5 years, reaching 0.68 in 2008-2009. Thus, during the last decade, not only has the amount of dental caries that has occurred in the first 5 years of life for children in North Carolina decreased, but the amount that is treated has increased, from slightly less than 50% to 64%.

Hypothesized reasons for these trends in dental caries and its treatment must be developed with an abundance of caution. They can be caused by a number of factors. But the downward trend in dmft in 5-year-old children starting with the 2005-2006 school year seems to correspond to the start of the IMB program when this cohort would have been 1 or 2 years of age. Training of dental students in infant and toddler oral health, increases in dentists' participation in the Medicaid program, improved public awareness about the importance of oral health in young children, or natural variation in disease and its measurement are a few of the many factors other than the IMB program that could be contributing to the observed trends. Further research can help determine the most important contributors and inform future policy and interventions.

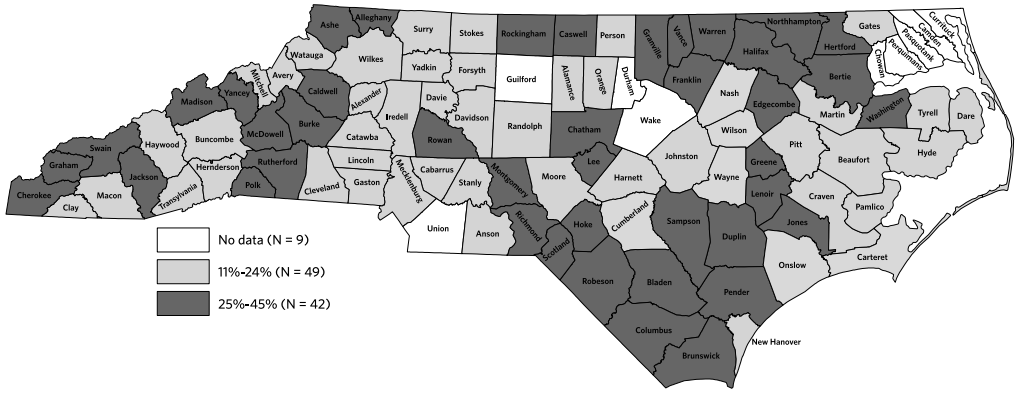
Challenges to Further Progress in Improving Oral Health in North Carolina

Disparities in oral health and access to care. The presence of large and persistent disparities in oral diseases and conditions by geographic areas of the state continues to be a major challenge. Where someone lives has a profound effect on their oral health. A few counties such as Duplin and Robeson still have almost two-thirds of its kindergarten children affected with dental caries In 2003-2004, 25% or more of kindergarten students living in 42 counties (46% of the counties with data) had untreated dental caries (Figure 3A). Although the number had decreased by 2008-2009, 18 counties still had 25% or more of its kindergarten students with untreated dental caries (Figure 3B).

Counties with the most dental disease also are usually the ones that are the least healthy overall [11]. Dental diseases share many risk factors with other chronic diseases, particularly social determinants such as poverty and educational attainment. Substantial progress in preventing dental disease and eliminating oral health disparities will require a change not only in these social determinants, but also in clinical care, individual education and counseling, and the environmental context in which people live and make decisions [12]. The commentary by Lee [13] discusses access to oral health care among children, while other commentaries in the policy forum discuss aspects of access among other populations.

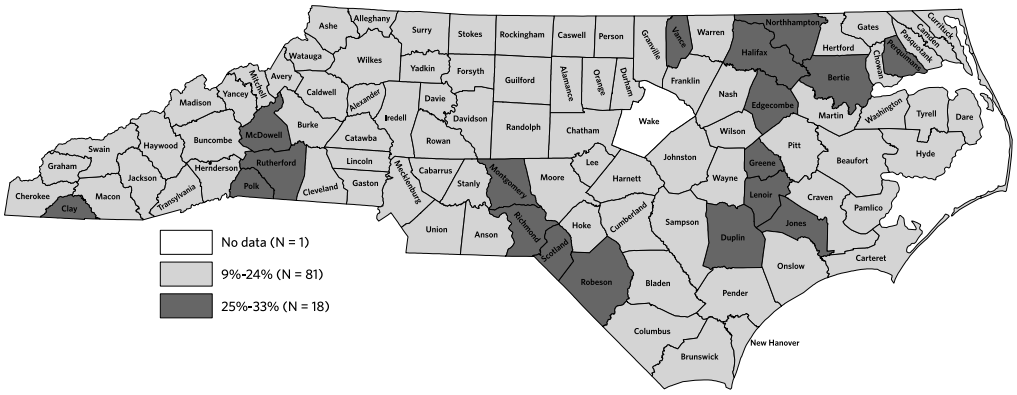
The oral health of underserved and vulnerable adults. The disparities in disease and treatment observed in children of our state also are present in adults. A 2006-2008 survey representative of community-dwelling adults 60 years of age and older in 2 rural counties of southeastern North Carolina found that 35% of the sample had lost all of their teeth [14]. Another publication from this same study found that a large percentage of the sample resorted to self-care behaviors such as the use of salt (50.9%) and over-the-counter dental products (84.0%) to address oral conditions such as pain, bleeding gums, or dry mouth [15]. Statewide, 21% of the population 65 years of age and older have lost all their natural teeth, while the percentage is twice that for those living in households with incomes less than $15,000 [16]. Further,

FIGURE 3A.
Percent of Kindergarten Students with Untreated Dental Caries by County, 2003-2004



Note. Data are from the Oral Health Surveillance System, Division of Public Health, North Carolina Department of Health and Human Services.

FIGURE 3B.
Percent of Kindergarten Students with Untreated Dental Caries by County, 2008-2009



Note. Data are from the Oral Health Surveillance System, Division of Public Health, North Carolina Department of Health and Human Services.

more than two-thirds of adults in the state report they visited a dentist, dental hygienist, or dental clinic in the last year. However, low-income adults are far less likely to report having a dental visit in the last year (44.5%), compared to adults with higher incomes (87.6%) [16].

Medicaid is an important dental insurance benefit for as many as 700,000 adults in North Carolina. Unlike benefits for children, however, services are optional under Title XIX of the Social Security Act. Many states have reduced adult Medicaid benefits to help balance state budgets. In his commentary, Casey [17] provides a compelling rationale for maintaining adult dental benefits at their current level in North Carolina. Not only might the oral health, general health, and quality of life of adult Medicaid beneficiaries suffer if dental benefits are eliminated, but it could also have both short- and long-term negative consequences on the costs and quality of care in primary medical care settings, emergency departments, and safety net clinics.

One specific rationale put forth by Casey for maintaining adult benefits is that adult dental treatment and improved oral health will reduce general medical problems because of the association between oral health and systemic health. This argument can be extended further. People with better oral health seem to live longer. A recent systematic review of tooth loss and mortality found that tooth loss increased the risk of death, particularly mortality from diseases of the heart and vessels [18]. The evidence linking oral health with systemic health has not gone unnoticed by Blue Cross and Blue Shield of North Carolina. Moore's [19] commentary highlights changes being made by Blue Cross and Blue Shield of North Carolina to their management systems for medical and dental claims, as well as their benefits to help integrate medical and dental care and improve both medical and dental health.

Importantly, by highlighting the different vulnerable and underserved groups that benefit from Medicaid, Casey reframes and broadens our perspective on access to dental care from being primarily a problem affecting children to one affecting all age groups. Included among those who would suffer from loss of Medicaid benefits are pregnant women and adults with complicated medical problems such as HIV infection, residents of long-term care facilities, and adults with special health care needs. He argues that children might even be affected if adult benefits were eliminated because of the spillover effects the oral health of pregnant women and mothers might have on children's health.

At the request of the North Carolina General Assembly, the state released a comprehensive report on access to dental care for special needs patients in 2010 [20]. A primary conclusion of that report was that the current dental workforce is not sufficient to meet the oral health needs of the special health care needs population in North Carolina. Buchholtz and King [21] provide an update on progress in meeting the recommendations in this report. One proposal moving forward is to develop a fluoride varnish initiative that would benefit Medicaid recipients residing in long-term care facilities. Innovative strategies to provide preventive dental services in primary care and community settings such as those proposed for North Carolina have been recommended by others at the national level [22].

Dental workforce supply. Planning for future workforce supply to meet the needs of the public is difficult because of the uncertainty associated with existing projection models [23]. In his commentary, Parker [24] points out the impact of one unpredicted event, the great economic recession and its cascading, interrelated effects on the practice of dentistry and evolving new practice models.

Nevertheless, policy must be made even with uncertain information. Workforce policies, however, are often best approached with caution because of their long-term costs, the controversy associated with decisions about workforce, and because implementation of policies and programs often do not adequately resolve population needs that provided the rationale for the actions in the first place. Most of the

commentaries in this issue have implications for the dental workforce in North Carolina.

Fraher and colleagues [25] conclude that North Carolina has had an inadequate supply and geographically maldistributed dental workforce for a number of years and that it is projected to get worse. They estimate that the ratio of dentists per 10,000 population will decline from 4.4 in 2010 to 4.1 by 2020. The state seems to be mired in 47th place among states in its dentist to population ratio. Chadwick's [26] commentary examines the workforce issue by reviewing the mission of the ECU School of Dental Medicine, its philosophy of education, and its potential contributions to improving access to care. The projections by Fraher and colleagues account for ECU graduates.

Contributions in this issue present a substantial amount of evidence in support of the conclusions by Fraher and colleagues. The dentist workforce is getting older with a large percentage approaching retirement age, the retention of University of North Carolina-Chapel Hill graduates in the state is declining, and the Medicaid population is increasing rapidly. The overall population continues to grow more rapidly than the supply of dentists. The latest estimates from the US Census Bureau reveal that some areas of the state are among the fastest growing places of anywhere in the county [27].

The public health infrastructure in the state also is of some concern. The number of safety-net clinics has increased rather dramatically in the United States and in North Carolina over the last decade. Difficulties in recruitment and retention of dentists are major challenges that can reduce productivity in public health clinics for months at a time and reduce access to care in underserved areas.

Fully staffed and funded state oral health programs are essential for the oral health of the public [2]. Yet the capacity of most state programs in the United States is limited. More than half of state dental programs operate on a total annual budget of less than $1 million and 3 or fewer full-time equivalent staff [28]. North Carolina has a long tradition of providing core dental public health services. The paper by King and Spratt [7] provides an update on the services provided by the Oral Health Section in the North Carolina Division of Public Health. Among the cost-effective programs that reach 1,000s of North Carolina citizens each year are community water fluoridation, school-based sealants, and fluoride mouthrinse. As they point out, these programs are recommended because of evidence for their effectiveness and efficiency. The evaluation of a school-based dental sealant program in Ohio found that it eliminated disparities in the number of children with sealants [29].

The number of public health dental hygienists staffing local public health programs operated by the Oral Health Section is decreasing while the size of the school population is increasing dramatically. Currently, 39 public health hygienists are providing these services across the state. The ratio of state-employed public health dental hygienists to the elementary school population has deteriorated from 1:13,500 in the 2006-2007 school year to 1:18,000 in 2011-2012, a decrease of about 33% in the dental public health workforce available to high-need communities. These trends jeopardize the continued ability of North Carolina to meet statewide goals in oral health.

Oral health literacy. The 1999 NCIOM report on dental care access called for programs that would educate the public on the importance of dental care. This recommendation is not considered in any of the commentaries in this issue, and is yet to be addressed comprehensively in North Carolina. Limited oral health literacy is increasingly believed to be a major cause of poor oral health. The central role of health literacy was recently emphasized by Horowitz and Kleinman [30] who concluded that "...efforts to increase primary prevention, improve quality of care, reduce costs, and reduce oral health disparities cannot succeed without simultaneous improvements in oral health literacy of the public, health care providers, and policy makers...".

An estimated 43% of adult Americans have basic or below basic literacy skills that can interfere with their understanding of health information and their ability to successfully navigate the health care system [31]. North Carolina ranks 41st among states in the proportion of its adult population with basic or below basic literacy skills [32]. Studies in dentistry, many done in North Carolina, find that limited oral health literacy is associated with poorer oral health knowledge [33, 34], fewer dental care visits [34, 35], worse oral health status [36, 37], and worse oral health–related quality of life [38-40]. Nationally, only 44% of adults with less than basic health literacy skills had a dental care visit in the preceding year compared with 77% of those with proficient health literacy skills [35].

TABLE 1.
Opinions of North Carolina Parents About Restoration of Primary Teeth: Percent Who "Agree" That Cavities in Primary Teeth Do Not Need to Be Filled or "Don't Know"

Parents of:	Sample size	Overall	Hispanic	Non-Hispanic
Children 6-36 months old in 118 medical offices (2001)	781	52.4%	57.1%	52.0%
School children 5-17 years old statewide (2003-2004)	5,697	47.1%	78.2%	45.6%
Children 3 years old in 20 counties in western North Carolina (2004-2005)	954	36.2%	55.3%	35.2%
Early Head Start children 6-36 months old statewide (2006)	775	36.7%	61.5%	32.4%
Early Head Start children <19 months old in 41 counties (2010-2012)	1,206	40.8%	56.2%	35.5%

Note. Results are from an analysis of data from [42-46].

Health literacy can be a particularly important determinant of children's health. More than 21 million (29%) parents in the United States have limited health literacy skills, which can put their children's health at risk because of their caretaker role [41]. Paradoxically, many parents place a high value on the oral health of their children, but place a low value on the treatment of dental caries, particularly in primary teeth. An analysis, completed for this paper, of information collected in surveys of more than 9,000 parents in North Carolina [42-46], found that approximately one-third to one-half do not believe that primary teeth usually should be filled (Table 1). This negative opinion held by parents is particularly high among Hispanics and disadvantaged populations, and is remarkably consistent across the 5 surveys of parents done in the state.

This problem of limited health literacy has been recast nationally not only as an individual deficit to be addressed through health education of the public, as it appears to have been considered by the NCIOM Task Force on Dental Care Access in 1999, but as a community asset that needs to be improved through community interventions, and as an individual patient risk factor that needs to be considered by health care professions in providing care [47]. Underserved and vulnerable families have multiple contacts with many different types of service professionals who can provide oral health information. A continuing goal should be to integrate accurate and consistent oral health messages into all aspects of families' formal and informal social networks in ways that match their literacy skills. A statewide plan for improving oral health literacy using broad-based, coordinated strategies involving community health workers and health care professionals is needed to help improve access to dental care and oral health. Evidence for effective interventions is beginning to emerge [48, 49], and a few states are beginning statewide oral health literacy initiatives that can be used as models [30, 50].

Conclusions

Many strategies to increase access to dental services proposed by the NCIOM Task Force on Dental Care Access at the beginning of the last decade have been implemented in North Carolina. Evidence of progress toward reducing dental disease and improving access to care, particularly for young, vulnerable children is apparent in the state. Use of dental care for children enrolled in Medicaid has more than doubled, and in 2009 North Carolina ranked among the top tier of state Medicaid programs in this performance measure. Young children also have less disease and improved treatment rates. But persistent and difficult challenges remain in ensuring an adequate workforce for the future, resolving disparities in oral health and access to preventive and treatment services for children and adults, improving oral health literacy, and maintaining existing programs.

Many opportunities exist for North Carolina to continue as a leader in implementing innovative solutions for difficult challenges and to make continued progress toward oral health goals. Authors of papers in this issue of the NCMJ provide commentaries on several areas of dentistry and provide important updates on the status of existing and new strategies to improve oral health. Innovations in dental education, the integration of oral health into medicine, emerging insurance, and dental practice models–among others–are presented. Oral health policy can benefit from continued monitoring and evaluation of outcomes resulting from the state's investment in oral health, as well as planning based on these observations. NCMJ

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The East Carolina University School of Dental Medicine's Approach to Dental Workforce Education and Reaching Underserved Areas

D. Gregory Chadwick

Access to preventive and oral health care services in many areas of our state remains problematic. This paper discusses oral health needs of North Carolinians and how a new model of dental education at East Carolina University addresses these issues by providing care where it is most needed.

Dental caries remains the number one chronic disease of childhood, even though it is entirely preventable. Nearly 40% of North Carolina kindergarteners have caries in primary teeth by the time they start school [1]. Oral health problems also impact many adults in the state. North Carolina's Behavioral Risk Factor Surveillance System (BRFSS) reported that, in 2008, 21.3% of all residents 65 years of age and older had had all of their teeth extracted [2] and about half (47.8%) of all those 18 years and older had had permanent teeth extracted [3]. More than 69,000 visits to North Carolina emergency rooms in 2009 were related to oral health problems, with disorders of the teeth and jaws as the 10th most common reason for all emergency visits [4].

The need for care is great, but access to oral health care services in many areas of the state remains problematic. The growing gap between the oral health needs of the people in our state and the capacity to meet those needs is dependent on many factors; however, the availability of a dentist and the dental team is fundamental. A new model of dental education at East Carolina University (ECU) offers an opportunity to provide care and contribute to the growth of a responsive oral health care workforce.

North Carolina's Dental Workforce

The majority of North Carolinians enjoy good oral health and benefit from a well-prepared private practice workforce that, over the years, has provided excellent care and has successfully improved oral health in the state. Historically, however, a significant portion of the population has not been able to access adequate care. Dental education can play a significant role in addressing this need.

North Carolina ranks 47th nationally in dentists per capita, with the lowest ratios in rural areas of the state [5]. According to Census data, North Carolina is the fifth fastest growing and the 10th largest state in the country [6]. It is projected that it will be the seventh largest state in the country with a population over 12 million people by 2030 [7]. Maintaining a dental workforce that can meet these rising demands is paramount to the oral health of the state's population.

In the 10-year period ending in 2007, the number of dentists in 44 counties did not keep pace with the growth of the population [8]. The Cecil G. Sheps Center for Health Services Research at the University of North Carolina (UNC)-Chapel Hill reports that the dentist to population ratio for the state was 4.4/10,000 in 2009 compared to the national average of 6.0/10,000. Even with increased enrollment in the UNC-Chapel Hill School of Dentistry and the addition of the ECU School of Dental Medicine graduates in 2015, the Sheps Center projects a decline in the number of dentists in the state to 4.2/10,000 by 2015; this ratio is expected to remain until 2020 [9].

The state's population is almost evenly divided between 15 urban and 85 rural counties [10], but the dentists are concentrated (5.7/10,000) in the urban counties (Katie Gaul, North Carolina Health Professions Data System, written communication, May 10, 2012). The rural counties lag far behind with only 3 dentists for every 10,000 people, a ratio that has been virtually the same since 1979. There are 28 counties where 2 or fewer dentists serve as many as 10,000 people (ie, the dentist to population ratio is ≤2/10,000 population). Four counties including Tyrell, Camden, Hyde, and Gates[1], all in the eastern part of the state, have no dentist at all [8]. In rural and underserved areas, primary care dentists

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[1]According to the North Carolina Health Professions Data System, preliminary 2011 data and local correspondence indicate that there is now a dentist actively practicing in Gates County. The information referred to in this article refers to licensure data effective through October 2010.

(general and pediatric) who accept Medicaid patients are the most needed.

In addition to existing shortages in rural areas and the challenges of a rapidly growing population, there are also challenges inherit in the makeup of the current dental health workforce in North Carolina. While over three-fourths (78%) of all dentists in the state are general dentists, only 4% are pediatric dentists. Additionally, the dental workforce lacks diversity, when compared with the state population. Minorities comprise 33% of the state population, while minority dentists comprise only 15.8% of the dental workforce [9]. The need for pediatric dentists and dentists who reflect the diversity of the state is significant. Furthermore, the dental workforce in North Carolina is aging, with almost one-third (31%) of the dentists 55 years of age or older. Dentists in rural areas are, on average, 3 years older than their counterparts in the urban counties [8]. The workforce shortage and maldistribution of dentists will likely worsen if these and other challenges are not addressed.

The East Carolina University School of Dental Medicine

In 2007, the North Carolina General Assembly appropriated funds for ECU to develop a School of Dental Medicine with a pre-doctoral class size of approximately 50 students per year. The dental school will also be starting an Advanced Education in General Dentistry Residency Program in the summer of 2012 and further plans to add a Pediatric Dental Residency Program in 2013. The school's primary objectives are to improve the health and quality of life of all North Carolinians by educating well-qualified primary care dentists who will also be leaders. These individuals will meet the chronic and growing oral health needs of the state and will lead the nation in community-based oral health education. The school will address current dental workforce issues in 2 complementary ways—by educating primary care dentists and providing care in rural and underserved areas across the state. Blending the education of dentists with the provision of oral health care across the state in dental school facilities is unique in dental education and is at the core of how the School of Dental Medicine intends to achieve its goals.

During the first 3 years of the curriculum, students at the School of Dental Medicine engage in traditional curricular elements in the basic and dental sciences, along with laboratory and clinical experiences. The integrated curriculum focuses on developing students' problem-solving and critical thinking skills—with an emphasis in public health—to prepare them for the fourth-year extramural exposure.

Although there are similarities to traditional schools in the first 3 years, there are subtle yet distinctive underlying differences that are fundamental to the School of Dental Medicine's unique senior year and rural primary care focus. An important prerequisite is recruiting and selecting students who value the school's mission of service in underserved areas of the state. A basic assumption is that the individual most likely to practice in an underserved area is someone who is returning home to that area to provide care for the people they have known all their lives. Another important aspect of recruiting and selecting students is ensuring that the applicant pool reflects the diversity of the state.

At the heart of ECU's approach is a model supporting opportunities for graduates to practice in rural or underserved areas. Since large educational debt burdens can limit practice options, lower tuition (due to being a state-supported school), scholarships, and loan repayment programs are all vital if graduates are to have the freedom to practice in areas of need.

Community Service Learning Centers

Community Service Learning Centers (CSLCs) are community-based, economically sustainable dental practices of the School of Dental Medicine where students and residents provide care and advance their skills and knowledge under the supervision of dental faculty. Students, residents, and faculty live within the communities they serve. These centers are integral to the school in achieving its mission.

Selection of the CSLC sites is contingent on a number of criteria including educational requirements, the need for enhanced access to dental care, and sustainability to ensure long-term success. Ultimately there will be 10 CSLCs, all collaborating with primary care partners and serving rural and underserved regions. For example, Ahoskie, the site of the first CSLC, is being developed in collaboration with Roanoke Chowan Community Health Center and Vidant Roanoke-Chowan Hospital and serves a 4-county region (Hertford, Northampton, Bertie, and Gates). Five CSLC sites have been selected to date, with Ahoskie opening in May 2012, followed by Elizabeth City opening in the fall of 2012. Additional sites include Sylva and Spruce Pine in the western part of the state, and Lillington, which is south of Raleigh.

The CSLCs will be similar in size and configuration and will closely resemble a large (16-chair) dental practice. In addition to dental operatories, a sterilization area, a business office, and a reception area, they will have an operatory equipped with a wheelchair lift, telecommunications capabilities, a seminar room, and a student study area. In addition, the 10 CSLCs will comprise a network of practices across the state, each monitored by a comprehensive management system that will track financial, patient, and student data. The network will be professionally monitored and managed centrally in Greenville for overall performance.

Workforce Education

The CSLCs physically extend ECU's dental school beyond the traditional campus to give students and residents the benefits of the Greenville campus with the added advantages of a unique expanded educational experience in a real dental practice environment. Further, by having students live in rural areas, the program intends to expose students to the challenges of obtaining health care, as well as to enhance

their cultural sensitivities as they learn to appreciate the rich diversity in the state. Senior students will have 3 rotations, each lasting 9 weeks at 3 different CSLCs. The CSLC faculty will be full-time School of Dental Medicine faculty who are comprehensive general dentists, and who are fully immersed in all aspects of the school's 4-year curriculum. A favorable student to faculty ratio will encourage quality mentoring. The curriculum for the senior year will emphasize current literature, patient experiences, and critical thinking in focused seminars. Delivering these focused seminars will depend heavily on the use of electronic technology and video conferencing to bridge educational environments across the state.

Access to Oral Health Care

The ECU School of Dental Medicine will have a positive impact on access to oral health care by delivering a full range of preventive and restorative care in CSLCs and by graduating dentists with the desire and expertise to practice in underserved areas. The CSLC patient population will consist of indigent, Medicaid, sliding-fee scale, and privately insured patients, with Medicaid patients being the predominant insured population. Because the educational needs of senior students include a full range of clinical dental experiences (eg, bridges, placement, and restoration of implants, etc.), the service mix must include some procedures for patients who have the ability to pay for procedures that are not covered for indigent or Medicaid-eligible patients. Leveraging technology through tele-dentistry will enhance the level of services available at the CSLCs by connecting specialists in Greenville with patients at the CSLCs.

Sustainability

Long-term sustainability is critically important to the success of the CSLCs. North Carolinians will depend on the CSLCs as dental safety net providers, thus making community/patient support vital for their success. Financial sustainability will depend on adequate revenues generated by the faculty, residents, students, and dental hygienists from an adequate mix of adult and child Medicaid, sliding-fee scale, self-pay, and privately insured patients. Faculty will provide patient care while supervising and mentoring students and residents. In addition to the continuation of adult Medicaid, key factors for sustainability include the ability to recruit and retain outstanding faculty and staff, community outreach and education, the state's support of facility costs and faculty salaries, and federal Graduate Medical Education support.

Educating the dental workforce and addressing growing oral health care needs in North Carolina are complex issues with multifaceted solutions. Leadership from all communities and sectors of interest will be required. It is clear that the dental profession, including the dental education community, must engage with our policymakers and the public to develop long-term solutions. The ECU School of Dental Medicine offers one solution that can make a difference in ensuring more North Carolinians receive needed oral health care services. NCMJ

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We're Not Keeping Up With the Joneses:
North Carolina Has Fewer Dentists per Capita Than Neighboring (and Most Other) States

Erin Fraher, Victoria McGee, Jacqueline Hom, Jessica Lyons, Katie Gaul

This commentary provides a data-driven analysis that shows that North Carolina faces a geographically maldistributed dentist workforce that is inadequate in supply. Not only has North Carolina consistently lagged behind other states in dentists per capita for over 10 years, but projections of future workforce supply do not show improvement.

In the face of rapid population growth, an aging population, and expansions in insurance coverage, there are many questions as to whether or not North Carolina will have enough doctors and nurses to meet the increased demand for health care services. Much less frequently asked is the question of whether or not the state will have enough dentists.

Many factors influence oral health including insurance coverage, access to fluoridated water, nutrition, genetics, personal oral hygiene, and tobacco use; but access to dental providers, especially dentists, is a critical element that contributes to the population's oral health [1]. This commentary provides a data-driven analysis of the supply, distribution, and practice patterns of dentists in the state. It shows that one of the most persistent and pressing health workforce issues facing North Carolina is that dentist supply is both inadequate and geographically maldistributed. (Unless otherwise noted, the data in this commentary are from the North Carolina Health Professions Data System and are derived from licensure data from the North Carolina State Board of Dental Examiners.)

Supply

In 2010, there were 4,178 dentists in active practice in North Carolina, or 4.4 dentists per 10,000 population. North Carolina has consistently ranked 47th out of the 50 states in dentists per capita for over 10 years [2] (Table 1). The state has not only consistently lagged behind the US average of 6.0 dentists per 10,000 population, but has also had fewer dentists per capita than neighboring states of Georgia, South Carolina, Tennessee, and Virginia (4.5-5.9).

In recent years, North Carolina has become a net importer of dentists. More of the state's newly licensed dentists have trained in or moved from other states. An important factor contributing to this trend is that a decreasing number of North Carolina educated dentists are staying in state after graduation. Although there has been some volatility in retention rates between individual years, retention of University of North Carolina-Chapel Hill (UNC-Chapel Hill) graduates declined approximately 20 percentage points between 2003 and 2009. This decline is likely due to the increasing number of UNC-Chapel Hill graduates pursuing residency training in other states and remaining out of state after completing their residency. Unlike the practice of medicine, dentistry does not require residency training, but it is increasingly popular among dental school graduates who wish to gain additional training or specialized skills. An exit survey of the UNC-Chapel Hill class of 2007 found that 42% of all graduates planned to explore advanced dental education after graduation (A. Wilder, personal communication). Given that UNC-Chapel Hill graduates account for more than half of the dental workforce in North Carolina, if the number of graduates pursuing dental residencies continues to increase, it will become increasingly important to create more residency opportunities in North Carolina or create incentive programs to bring dentists back to the state after completing residency training. Although retention of North Carolina-trained dentists has been on the decline, a 63% retention rate is relatively high compared to physicians. On average between the 4 medical schools in the state, North Carolina retains about 40% of its medical school graduates; among public schools, the retention rate is 53% at East Carolina University (ECU) and 45% at UNC-Chapel Hill[3].

Of the 234 new dentists who joined the North Carolina workforce between 2009 and 2010, 19% were new graduates from UNC-Chapel Hill, 16% were new graduates from an educational program in another state, 42% previously held a North Carolina license and were not practicing in the state in 2009, and the remaining 23% were licensed by cre-

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TABLE 1.
Active Dentists per 10,000 Civilian Population

	1996		2000		2003		2007	
State	Rank	Ratio	Rank	Ratio	Rank	Ratio	Rank	Ratio
United States		6.1		6.1		6.0		6.0
Top ranked states								
Massachusetts	4	8.1	2	8.1	2	8.2	1	8.2
Hawaii	1	8.9	1	8.2	1	8.2	2	8.1
New Jersey	5	8.1	4	7.9	3	7.9	3	8.1
New York	2	8.2	3	8.0	4	7.9	4	7.9
North Carolina's neighboring states								
Virginia	22	5.8	21	5.7	21	5.7	19	5.9
Tennessee	28	5.3	28	5.3	29	5.2	37	5.0
South Carolina	45	4.5	43	4.5	42	4.6	44	4.6
Georgia	42	4.7	44	4.4	46	4.4	46	4.5
Bottom ranked states								
North Carolina	47	4.4	47	4.2	47	4.4	47	4.5
Alabama	46	4.4	46	4.3	45	4.4	48	4.4
Arkansas	48	4.1	48	4.0	48	4.1	49	4.1
Mississippi	49	4.0	49	3.9	50	4.0	50	4.1

dential. Licensure by credential began in 2003 and allows dentists who have held a license and practiced in another state for at least 5 years to obtain a North Carolina license without retaking an exam.

Distribution

The maldistribution of the state's dental workforce has been a persistent problem and it is not improving. Figure 1 shows the ratio of dentists per population in metropolitan and nonmetropolitan counties from 1979-2010. The per capita supply of dentists in metropolitan areas has grown slowly over time, but supply in nonmetropolitan areas has held nearly constant. The result has been a slowly widening gap in supply between metropolitan and nonmetropolitan counties since 1993.

Figure 2 shows the change in the ratio of dentists per 10,000 population by county between 2005 and 2010—a measure of whether the supply of dentists in a county has kept pace with population growth. More than half (51) of North Carolina counties experienced a decline in the ratio of dentists per 10,000 population during the 5-year period. Of these 51 counties, 10 showed an increase in the number of dentists, but that increase did not keep pace with population growth. Thirteen counties had no change in the number of dentists, but experienced a population increase. Twenty-eight counties lost dentists. Tyrrell and Camden Counties have not had an active dentist since data collection began in 1979, Hyde County has had no dentists since 1989, and Gates County lost its only dentist in 2005.[1] Figure 2 also shows that there are multiple contiguous counties in the state in which dental supply has declined in recent years. If access to dentists is not currently a problem in these areas, it may become a problem in the near future.

To address the state's limited dentist supply and persistent maldistribution, the North Carolina General Assembly appropriated funds for the new School of Dental Medicine at ECU, which opened in 2011. ECU's dental school is the result of UNC General Administration system-level and multi-stakeholder planning to improve North Carolina's supply of dentists, particularly in rural areas of the state. ECU's plan to provide care and educate students in community-based settings around the state may also play an important role in improving distribution in rural counties.

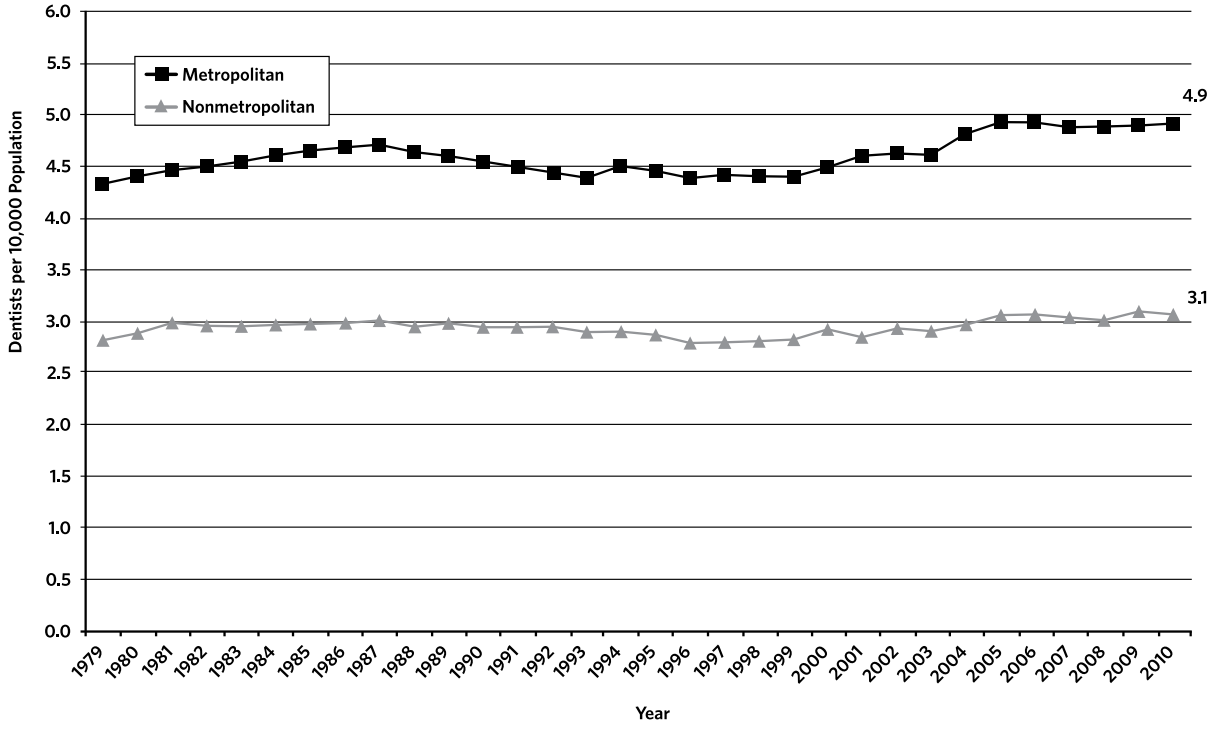
Demographic and Practice Characteristics of North Carolina's Dentists

The average age of North Carolina dentists is 48. One in five (21%) dentists is 60 years of age or older. In 6 counties in North Carolina, the average age of dentists is 60 years or older; 5 of these 6 counties are in the eastern part of the state. This region is at risk of losing even more dentists if providers are unable to find a replacement willing to move to their county and buy their practice or start a new practice before they retire.

Compared to 2007 and 2008, fewer dentists left the workforce in 2010. This is likely due to more dentists postponing retirement due to the recession. If more dentists are, in fact, delaying retirement due to the recession, existing

[1]Preliminary 2011 data and local correspondence indicate that there is now a dentist actively practicing in Gates County. The analyses described in this paper are based on licensure data effective through October 2010.

FIGURE 1.
Dentists per 10,000 Population by Metropolitan and Nonmetropolitan Counties, North Carolina, 1979-2010



Sources. North Carolina Health Professions Data System, 1979-2010. North Carolina Office of State Planning. Figures include all licensed, active, in-state dentists. North Carolina population data are smoothed figures based on 1980, 1990 and 2000 Censuses. Source for Metropolitan-Nonmetropolitan definition. Office of Management and Budget, 2006.

supply and distribution issues will be exacerbated when the economy recovers and these dentists exit the workforce.

About 1 in 4 (24%) North Carolina dentists were female in 2010. The percentage of female dentists in the workforce has increased by 8 percentage points in the last 10 years. While much ado has been made about the adverse effects that feminization of the workforce will have on hours worked, female dentists reported working nearly the same average number of hours as men in 2010: 35 and 36 hours per week, respectively. Since the average age of female dentists (41 years old) is approximately 10 years younger than their male counterparts (51 years old), the influx of female dentists has helped, and will continue to help, to offset losses due to retirement. Compared to male dentists, female dentists are more likely to practice in metropolitan counties (85% versus 78%, respectively). Therefore, the increasing proportion of female dentists may exacerbate the existing geographic maldistribution of the workforce.

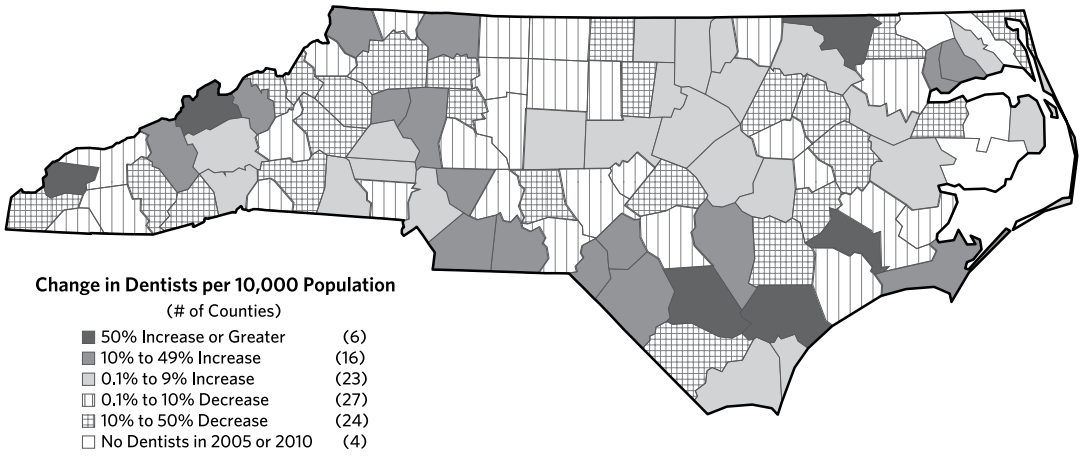
Diversity among dentists in North Carolina has improved, but has not yet achieved parity with the demographic make-up of the state. In 2010, approximately 16% of North Carolina's dentists were nonwhite, compared to 35% of the state's population. The number of nonwhite dentists has increased slowly over the last 20 years but the representation of nonwhite dentists relative to North Carolina's population differs greatly between different racial/ethnic subgroups. For example, the percentage of dentists who are Asian/Pacific Islander has increased at a faster pace than North Carolina's population of Asian/Pacific Islanders, and the percentage of Hispanic dentists has increased at a much slower rate than the number of Hispanics in North Carolina.

In 2010, approximately 4 out of every 5 (79%) dentists practiced general dentistry. The most common dental specialties were orthodontics (250 dentists, 6% of workforce), pediatric dentistry (152, 4%) and oral surgery (156, 4%). Between 2000 and 2010, the state added 39 public health dentists, an increase of 144%, making it the fastest growing dental specialty. The next fastest growing specialty was pediatric dentistry, with an increase of 103% or 77 dentists. The increase in the number of pediatric dentists is partly attributable to implementation of recommendations made by the North Carolina Institute of Medicine Dental Task Force to increase the number of pediatric dentistry residents offered by the UNC-Chapel Hill School of Dentistry [4, 5]. It should be noted that these gains in pediatric and public health dentists have been mostly limited to metropolitan areas.

Looking Forward: Dentist Workforce Projections

The future dentist supply in North Carolina was estimated with a projection model that uses licensure data on past flows of dentists into and out of practice by age

FIGURE 2.
Change in Dentists per 10,000 Population, North Carolina, 2005-2010



Note. Data include all active, in-state dentists. Source. North Carolina Health Professions Data System, with data derived from the North Carolina State Board of Dental Examiners, 2005 and 2010. Produced by. North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina-Chapel Hill.

cohort to forecast future supply. The projections estimate that the ratio of dentists per 10,000 population will drop from 4.4 per 10,000 population in 2010 to 4.1 in 2020. The forecast accounts for the additional graduates from ECU's dental school, without which the projected ratio of dentists per 10,000 population would be 3.9. It does not, however, include the increased enrollment at UNC-Chapel Hill since that expansion has been delayed. The most significant contributors to the projected decrease in dentist supply are the decreasing retention of UNC-Chapel Hill dental graduates, the increasing number of dentists retiring, and the fast-paced growth of North Carolina's population.

Conclusion

In 2009, North Carolinians made 69,000 trips to emergency rooms for dental care [6]. Dental conditions were the 10th most common reason for emergency room visits in the state [6]. These data reflect a very costly symptom of North Carolina's limited dentist workforce. Improving the supply of North Carolina dentists will not only lower health care costs, but also improve health outcomes of citizens who currently cannot reach a dentist. North Carolina can do better than 47th out of 50 states and it must to meet the needs of its citizens. NCMJ

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Access to Dental Health Care for Children in North Carolina

Jessica Y. Lee

A significant number of children experience dental caries and have low dental care utilization rates. This article examines trends in oral health care access in the nation, as well as potential barriers, and finally, methods to increase access in North Carolina.

Oral health is an essential part of overall health and commonly affects nutrition and overall quality of life. In general, the oral health of most Americans and utilization of dental services for the general population has improved over past decades, yet considerable disparities in access to dental care services remain [1,2].

Despite this promising trend, a significant number of children experience dental caries and have low dental care utilization rates. Children from low-income families experience higher rates of dental disease, have a higher percentage of unmet dental needs, and have significantly lower utilization of dental services than children not living in poverty [3]. Inadequate access to dental care is common among populations living in poverty and has been documented by numerous national and state reports including the US Government Accountability Office [4] and the Surgeon General [1].

In addition to lower socioeconomic status, minority race has also consistently been identified as an independent risk factor for children to not visit the dentist [5]. Identifying and reaching out to low-income populations and other at-risk populations to address oral health problems early is important for both ensuring overall health and controlling the cost associated with treating severe dental disease.

Since the early 1990s, low-income parents and racial and ethnic minorities have identified access to oral health services as their number one child health concern [6]. This concern is substantiated by research. In the late 1980s, a national study found that 66% of children living in poverty between the ages of 2 and 4 had not had a dental visit during the preceding year [7]. Results from the 2003-2004 National Survey of Children's Health indicated that only 4.8% of white children aged 0-17 did not have a preventive dental visit in the previous year compared to 11.8% of Latino children and 11.3% of African American children [8].

The major barrier low-income parents face in obtaining needed dental care for their children is lack of financial resources [7]. Other barriers include low numbers of dentists accepting Medicaid patients, long waiting periods for appointments, extensive travel time to appointments in rural areas, and lack of awareness about dental care needs [6, 9].

Factors found to significantly affect dental utilization for children 5-18 years of age include race of the child, household income, parental education, parental employment, insurance status of the parents, preventive behaviors of the parents, and access to dental care for the parents [10]. Edelstein and colleagues [9] analyzed data from the 1996 federal Medical Expenditures Panel Survey to determine the percentage of children that obtained a dental visit and the number of visits children experienced by age, sex, ethnic/racial background, family income, and parental education. They concluded that, overall, just 43% of all children ages 0-18 years obtained at least 1 dental visit in 1996. Among the children who saw a dentist, the average number of visits was 2.7. Low income, low education, and minority status were all associated with lower numbers of visits per child.

Addressing Access to Care Barriers in North Carolina

Access to dental care in North Carolina is largely dependent on workforce availability, insurance coverage, and socioeconomic factors. Therefore, dental education, proper distribution of the dental workforce, expansion of insurance coverage, and outreach are critical to ensuring access to care for North Carolina citizens.

The Medicaid Early Periodic Screening, Diagnosis, and Treatment (EPSDT) program recommends screening and referral for oral health care for all eligible children by age 3. Regrettably, the EPSDT program has fallen short of this goal. Nationwide, less than one one-third of eligible children under age 5 received dental services in fiscal year 2007 [11]. While oral health care services are a required service for most Medicaid-eligible children as a required component of

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the EPSDT guidelines, it is an optional service for the adult population.

Despite falling short of this goal, North Carolina has made great progress toward improving dental coverage for underserved populations through improved Medicaid reimbursement. Medicaid reimbursement rates for dental services steadily increased about 31% per unit of dental service between 2002 and 2005 [12]. During this same timeframe, dentist participation in the Medicaid program has also increased. Educating families about how to enroll in and access the Medicaid system, streamlining Medicaid administrative procedures, and adjusting provider reimbursement could facilitate broader access to dental care.

As noted by Fraher and colleagues in this issue of the NCMJ, North Carolina's dentist to population ratio is 4.4 dentists per 10,000 population compared to the national average of 6.0 dentists per 10,000 population, and 4 counties currently report no dentist practicing within their borders [13]. The University of North Carolina at Chapel Hill trains an estimated 75-80 students per year with plans to increase the class size to 100. For years, North Carolina had just 1 dental school; however, in 2012, the East Carolina University School of Dental Medicine opened its doors, welcoming an inaugural class of 50 dental students. This collective effort to train more dentists in North Carolina has the potential to nearly double the number of dentists trained yearly within the borders of the state.

With water fluoridation and increased use of sealants, the overall dental health of North Carolina's population has improved significantly, but several barriers to access to care remain. Although North Carolina has made clear strides in addressing issues that hinder access to care, there is still significant room for improvement. Dental service utilization for the Medicaid population still lags behind some national averages for higher income populations. While it is encouraging that North Carolina continues to educate and train more dentists, and in fact, is enhancing these efforts, steps must be taken to retain and adequately distribute dentists in order to ensure improved access for North Carolina's youngest citizens. NCMJ

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New Practice Models and Trends in the Practice of Oral Health

M. Alec Parker

Various internal and external factors are beginning to influence the delivery of dental care in North Carolina. This article reviews some of the current trends that have led to a shift toward new practice models—some of which are in stark contrast to solo private practice.

In recent years, the practice of dentistry has undergone a series of changes that have led to the discussion of new practice models. This discussion has not been without controversy since the practice of dentistry is the last cottage industry remaining in health care. And while the vast majority of dental practices in North Carolina are general dentists in solo private practice, various marketplace and socioeconomic factors have begun to cause some people to question whether this practice mode will remain viable in the foreseeable future.

Trends

Among the many drivers of change has been the increasing amount of research supporting the connection between oral health and systemic health. This connection has generated an interest in closer collaboration between the medical and dental communities. It has also led to greater interest in the dental profession by organizations outside of the traditional health care community, some of which have proposed what they perceive to be possible solutions to the uneven availability of dental care in North Carolina. Another important factor is the recent economic downturn, which was the genesis of a cascade of the following events and circumstances that have affected the dental profession:

Rise in unemployment. As workers became unemployed, they also became uninsured, losing their dental benefits. Lack of insurance coupled with a significant loss in income resulted in people delaying dental care, which had a dramatic impact on the number of patients seeking care in dental practices.

Decrease in state revenue. Budget woes have triggered a reduction in state funding for dental education, which translates into a rise in tuition costs for dental students. A rise in dental school tuition suggests that most dental students will have a greater debt load upon graduation. The pressure of repaying this increased education debt vastly narrows a dental student's career choices as they begin to enter the dental workforce. Those interested in locating a practice in a rural or underserved area of the state find it difficult due to the economic pressures of starting a practice and servicing their educational debt.

Difficulty in obtaining credit. The credit crisis that precipitated the economic downturn also had a chilling effect on entrepreneurial dental graduates who aspired to open their own practice. Changes in the qualifications and credit history necessary to obtain adequate funding to open a dental practice made this dream unattainable for most new dentists.

Stock market woes. The decline in the value of the stock market, along with the drop in demand for dental services, caused many practitioners to delay plans for retirement. The traditional transition plan for most senior doctors is to employ new dental school graduates as associates with the hope that the junior doctor will eventually purchase the practice. This strategy has had to be temporarily delayed or abandoned since the senior doctor can no longer justify adding another provider to the practice.

Regulatory burdens. The escalating number of regulatory burdens placed on health care practitioners has significantly added to the complexity of managing a dental practice. This not only requires more time of the dentist/owner, it also involves more expense, which makes it more difficult for a solo practitioner to be competitive in the current marketplace.

Third party payers. The economic downturn triggered a dramatic increase in the number of dentists in the larger urban areas of North Carolina who may consider participating in Preferred Provider Organizations (PPOs). Dentists who elect to become a member of a PPO agree to accept a fee that is typically 10%-20% lower than their usual and customary fee in an effort to fill empty chair time.

Socioeconomic/generational changes. While this trend may not be directly due to the recent economic downturn, it is important to note that many of the new graduates don't seem to be as interested in learning the business skills that

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are necessary to manage a successful dental practice. For this segment of dentists, working as an employee or an associate rather than opening a solo practice allows them more free time and greater balance in their personal life and also decreases the time spent on administrative and business tasks.

New Models of Care

Group practices. Due to the complex nature of operating a small business in today's regulatory and business climate, many dentists are considering joining a multi-doctor practice. Some of the multi-doctor practices include both general dentists and dental specialists. Many patients perceive this as an advantage since specialty services are available in the same location where they receive their routine care. With an in-house referral, there is no concern regarding the availability of the patient's records, and the likelihood of gaps in communication between the referring general dentist and the specialist is reduced.

Other group practices are a conglomeration of general dentists who have expertise in different areas of general dentistry. For example, it is becoming more and more common to see restorative general dentists associating with general dentists who have completed post-graduate education in the surgical placement of dental implants or another specialized area of general dentistry such as temporomandibular joint dysfunction.

Some group practice owners elect to expand their business model into multiple locations. As the overall success of this concept grows, a point is reached where these groups have several economic advantages over a dentist who is in solo practice. For example, some larger group practices are able to negotiate a better price for goods and services provided by dental suppliers and dental laboratories. If the practice elects to participate in various dental insurance plans, they may be able negotiate a more favorable reimbursement rate with insurance carriers.

The modern practice of dentistry requires the availability of highly specialized equipment. Most of this equipment, such as Cone Beam Imaging and CAD/CAM machines, is extremely expensive and can be cost prohibitive for solo practitioners. However, multi-doctor offices may find that investing in this type of high-tech equipment is a sound business decision.

In addition to administrative efficiencies, there are also potential personal and professional benefits. These include the opportunity to share the frequency of emergency and after-hour calls, as well as the availability of colleagues to discuss complex cases and offer second opinions.

Since there are multiple dentists, a group practice has the potential to be open non-traditional hours, which may allow each practitioner to practice hours that are convenient to their personal schedule.

Corporate practice. Although the current number of dental practices in North Carolina affiliated with dental management corporations is relatively low, the number of dental management corporations is increasing rapidly across the country. A series of circumstances has transpired over the past several years that have energized the corporate practice model. Some of the factors influencing the growth of corporate practice include an expanding supply of practices for sale due to the pending retirement of baby boomers, a growing supply of low-cost professionals in the workforce (dentists and dental auxiliaries), a large pool of venture capitalists interested in investing in a health care space that provides the potential of greater returns than can be gained in the current stock market, growth in expanded function staff which allows various procedures to be performed by non-dentists, and the increased market penetration of managed care.

The Dental Group Practice Association is a non-profit trade group composed of members of dental management corporations. According to the Web site, dental management corporations are affiliated with more than 3,500 dental practice locations in 46 states in the US, Canada, Australia, and New Zealand with more than 6,500 owner/affiliated dentists [1]. Industry experts estimated that these corporations generated more than $3 billion in revenue in 2010. It important to note that not all dental management corporations are members of the Dental Group Practice Association. In fact, a significant number are not. It is estimated that the total number of dental practices run by publicly traded or privately held dental management corporations now exceeds 4,000 and is growing rapidly.

Where allowed by law, dental management corporations offer many of the same economies of scale as a large group practice. However, corporate ownership of a dental practice is not allowed in North Carolina. Current statutes state that only a licensed dentist is permitted to own, manage, supervise, control, or conduct a dental practice. Similar statutes also exist for the practice of law and medicine. These statutes were put in place due to the divergence of philosophy, culture, and outcomes inherent in corporations versus those of the health and legal professions. By definition, the first responsibility of a corporation is to bring profits to its shareholders, whereas the fundamental focus of a health professional is on the well-being of the patient.

Although it is illegal for corporations to own dental practices in North Carolina, corporations are allowed to provide various business support services, similar to other vendors, as long as the net effect of that relationship does not influence so many facets of the practice that it gains control over policies and procedures that have the possibility of affecting patient care.

Dental workforce. The recent focus on access to care has led to heated debates over the dental workforce. In order to address one of the major obstacles to care, there is a need for an adequate dental workforce that is located where it is needed and is sufficiently funded to carry out its mission. This includes having sufficient numbers and types of allied

personnel available to support the dentists who ultimately are responsible for diagnosing, planning treatment, and delivering those services that only dentists are adequately educated and trained to perform.

Proponents of adding another member to the dental team—sometimes referred to as a mid-level provider or dental therapist—claim this new type of non-dentist provider will solve the uneven availability of dental care in some parts of North Carolina.

The logic behind this notion seems to be based upon the medical model wherein physician's assistants and nurse practitioners provide mostly diagnostic and non-invasive medical treatment without the supervision of a physician. However, there is a significant and poorly understood difference among these models. Physician's assistants and nurse practitioners require up to 6 years of post-high school education, not the 2 years or less currently mandated by many dental therapist models.

There are serious concerns about placing someone with far less training and education than a dentist in a rural environment without the supervision of a licensed dentist where dental therapists are expected to provide irreversible surgical procedures (fillings and extractions) under local anesthesia on patients, some of whom may have complex medical histories or may be taking several prescription medications.

With funding made available from national foundations, several states have elected to begin educating and deploying dental therapists. Upon graduation, dental therapists are afforded a very similar scope of practice to that of a licensed dentist who has graduated from college and has obtained a 4-year post-graduate degree from an accredited dental school. It will be interesting to determine if the dental therapist model will truly be a remedy to the concerns regarding the utilization of and access to dental care. Questions remain regarding the economic viability of the dental therapist model due to the high costs of setting up and maintaining a dental practice. There are also questions regarding sources of funding to pay for the treatment provided to patients from lower socioeconomic groups.

The American Dental Association is piloting a new dental auxiliary called the community dental health coordinator (CDHC). Modeled on the community health worker, which has proven extraordinarily successful on the medical side, CDHCs will function as oral health educators and providers of limited, mainly preventive, dental services. They help patients navigate the system, including locating a dentist, arranging appointments, and helping provide critical logistical support such as securing childcare, transportation, and obtaining excused absences from work to receive treatment. While workforce has an impact on access, a myriad of other factors such as transportation, childcare, cultural/language preferences, and oral health literacy, also have a major influence on an individual's ability to utilize and access the dental care they need.

As economic, practice, and generational trends evolve, so too will the practice of dentistry. And while stakeholders may disagree on how best to adapt to the changing economic and social environment, the dental profession must maintain its focus on how to best serve the oral health needs of the people in North Carolina. NCMJ

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Medicaid Coverage for Adults in North Carolina: What Would a Reduction in Funding Mean?

Mark W. Casey

States can achieve short-term cost savings through a reduction in Medicaid adult dental benefits. This article presents an overview of the long-term consequences of a population of disadvantaged adults faced with a greater oral disease burden and the effect of poorer oral health on systemic health and quality of life.

The former US Surgeon General C. Everett Koop once said, "You are not healthy unless you have good oral health" [1]. Despite this sage advice of almost 2 decades ago from one of the leading authorities on health care in the United States, there continues to be growing concern that many disadvantaged citizens in the country lack access to basic oral health care services that can prevent more serious systemic disease. Many research studies have demonstrated links between oral health disease and other chronic medical problems [2-5]. Yet, in the face of this emerging evidence about the importance of oral health, the scope of services offered to the adult Medicaid population in many states continues to shrink. With the economic adversity that some states are facing, a growing number of adult Medicaid beneficiaries in the US who are at risk for oral disease for a variety of reasons (eg, low income, chronic medical co-morbidities, or special health care needs) have emergency only or no coverage whatsoever to prevent minor oral health care problems from becoming major systemic health concerns. Adult Medicaid dental benefits are considered optional services under Title XIX of the Social Security Act [6]. In the last few years, many states have elected to reduce adult Medicaid dental benefits in an effort to achieve short-term cost savings. Oral health policy experts question whether this is a short-sighted approach to balancing state budgets that ignores the long-term costs of state funds spent for emergency room visits and hospitalizations of Medicaid adult recipients secondary to a medical problem of dental origin.

Background

In North Carolina, approximately 750,000 adults who are 21 years of age or older are eligible each year for Medicaid benefits [7]. Of this population, about 45,000 of these adults are "dual eligibles," meaning they are eligible for both Medicare and Medicaid public insurance benefits [8]. Unfortunately, the dual eligible population receives only the minimal dental benefits that are covered under Medicare. The scope of dental services for Medicare recipients is limited to oral surgery services such as extractions in preparation for radiation therapy, reduction of jaw fractures, and removal of tumors of the jaws. [9]. The remainder of the adult population, with few exceptions, has fairly comprehensive coverage which includes basic oral health services including exams; radiographs; cleanings; fillings; root canals on anterior teeth; periodontal procedures like scaling and root planing (deep cleaning) and some limited periodontal surgery procedures; dentures; acrylic partial dentures; extractions of erupted and impacted teeth; and many other oral surgery services, as well as adjunctive services like general anesthesia and intravenous conscious sedation [9].

While the benefit package for adult recipients is not as generous as the amount and type of covered services available to Medicaid eligible children in our state, it is substantially more comprehensive than the scope of services offered by other state Medicaid agencies to adult beneficiaries. This is particularly true when comparisons are made to our neighbors in the other southeastern states [10]. North Carolina has a proud tradition of dental public health dating back to the first state government dental public health program established in 1918 [11]. For decades, the state Medicaid agency, the Division of Medical Assistance, has administered a dental program with a wide range of basic dental services to ensure that the oral health needs of at-risk citizens of North Carolina would not be ignored to the detriment of their systemic health. The North Carolina Medicaid adult dental benefit plan continues to set our state apart from other states, demonstrating the charitable nature of North Carolinians toward underserved individuals in our state. Today's North Carolina dental public health professionals have upheld the proud heritage of their pioneering program by consistently striving to make the public aware that optimal oral health is essential to achieving overall systemic health.

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Most North Carolinians realize that Medicaid is a public insurance program aimed at providing quality health care to low-income adults and children. But beyond the knowledge that the program seeks to meet the health care needs of citizens with low socioeconomic status, it is imperative that the state's taxpayers and policymakers be aware of the other types of individuals in the state's Medicaid population. The adult Medicaid population also includes many individuals with complicated medical problems including diabetes, cancer, HIV, heart disease, and other chronic medical conditions. Nursing home, group home, and other long-term care facility residents make up a substantial proportion of the North Carolina Medicaid beneficiary population. Adults with intellectual, developmental, and physical disabilities are represented in numbers far greater in the Medicaid program than in other private health care insurance plans operating in the state. Over one half of the births in the state are to Medicaid eligible women, [12] the vast majority of whom are in the adult population over age 20. More than 140,000 North Carolinians over age 64 have full Medicaid benefits including the current covered dental services [13]. Clearly, any change to the North Carolina Medicaid adult dental benefit will impact many citizens who are less likely to have the resources to access and pay for timely oral health care and who are much more susceptible to oral disease and its impact on systemic illnesses than other citizens of the state. Thus, it is not difficult to envision how devastating a reduction in adult Medicaid dental services would be to a population of individuals that can least afford to be without basic oral health care services.

The Importance of Maintaining the North Carolina Medicaid Adult Dental Benefit

There are a number of reasons why the North Carolina Medicaid adult dental benefit should be maintained at its current level of services.

Dental care is primary care. Unlike other health care services, oral health care has not historically been a service that has been rendered in a primary care medical practice. Nor have primary care medical providers (PCPs) shown the inclination to expand the oral health care services they offer beyond preventive services to young children. Elimination of or a sharp reduction in North Carolina Medicaid adult dental services may thrust North Carolina physicians into a role with which are they are unfamiliar. A good indication of PCPs' lack of understanding of oral health diagnoses is the level of oral health care services that are delivered in hospital emergency departments (EDs). The scope of services in EDs is typically limited to palliative care. Likewise, the diagnostic codes used by hospital staff for dental problems treated in the ED show some evidence that medical staff lack fundamental understanding of oral diagnoses. Many codes used in ED visits for oral health diagnoses are not specific codes, that is, they do not provide detailed descriptions of the problem. This suggests that ED clinicians may be having difficulty making a diagnostic decision regarding the true nature of oral health problems. In recent legislation, including the Patient Protection and Affordable Care Act (PPACA), great efforts have been made to promote and preserve primary medical care as the means to better health outcomes and cost savings. Primary oral health care deserves the same sort of protection from potential budget cuts as states formulate strategic plans to pay for the full implementation of PPACA in 2014.

Oral health care rendered in the hospital emergency department This type of care is not only limited, it is also expensive, inefficient, and rarely results in a definitive resolution of the problem. An examination of claims submitted by hospitals for medical problems with a dental diagnosis demonstrates that many times the patient receives an evaluation, diagnostic testing like an enhanced imaging technique (e.g.—radiograph, MRI, CT scan), and prescriptions for an analgesic and an antibiotic. Lack of treatment aimed at removing the root cause of the patient's problem could very likely result in a return visit to the ED if the patient is unable to access care in a dental office. A recent Pew Center on the States study, using primarily Medicaid data, found that publicly insured beneficiaries are turning to hospital emergency rooms for routine dental problems — a choice that can often cost up to 10 times more than preventive care and offers far fewer treatment options than a dentist's office [13]. If the services that general dentists usually perform are no longer covered (routine exams, radiographs, cleanings, and fillings), more dental disease in the reparable stages will go undetected until the pathology becomes an urgent or emergent care problem. A dental abscess can lead to more systemic infections of the adjacent tissues of the head and neck, the bloodstream, and, in a worst-case scenario, may result in death. Preventive and restorative dentistry procedures are a far more cost-efficient means of avoiding more expensive care in the hospital setting. An increase in the number of visits to hospitals by Medicaid recipients with oral health problems will place ED physicians in the unusual position of being forced to render more accurate diagnoses and triage to ensure that larger numbers of Medicaid recipients seeking emergent care for oral health problems in EDs are referred to the appropriate provider.

The effect on safety net dental clinics. Publicly and privately supported clinics like federally qualified health centers, local health departments, and free and reduced-fee dental clinics treat many uninsured North Carolinians. When another estimated 700,000 Medicaid recipients without dental benefits are added to the large number of underserved North Carolinians without dental insurance, it is highly unlikely that the infrastructure currently exists or can be added quickly enough to the safety net provider network to provide even basic oral health needs to the increased uninsured population. Almost certainly, this large influx of patients without dental insurance will dramatically change the practice patterns of public and private safety net providers toward more

urgent/emergent care services. A reduction in, or elimination of, the Medicaid adult dental benefit will likely have a profound effect on another high profile institutional safety net provider—the East Carolina University (ECU) School of Dental Medicine. The state's new dental school plans to open 10 Community Service Learning Centers in underserved areas throughout the state [14]. ECU officials have indicated that the financial health of the dental school depends heavily on maintaining the current comprehensive dental coverage for North Carolina Medicaid adult recipients. The dental school administration's innovative and exhaustively researched strategic plan to improve dental access in North Carolina merits continued support from the legislative and executive branches of state government.

Oral disease and linkages to systemic disease. There is a growing body of research that points to linkages between untreated oral disease, particularly periodontal (gum) disease, and exacerbation of chronic conditions such as diabetes, heart disease, respiratory disease, and stroke. Individuals with these chronic medical conditions have been found to be at higher risk of developing more severe morbidity if they also have been diagnosed with oral inflammatory diseases. For example, a study of Aetna administrative claims data found that privately insured people with advanced gum disease had higher 2-year costs for diabetes, stroke, and heart disease than people with less severe dental conditions. This study found that those with diabetes experienced a 21% lower health risk and 9% lower health care costs with early dental care; those with coronary artery disease experienced a 19% lower risk and 16% lower costs; and those with other cardiovascular diseases experienced 17% lower risk and 11% lower costs [15]. As a result of this study, Aetna extended enhanced dental coverage to pregnant women and people with heart disease. Another study by the Blue Cross Blue Shield of Michigan Foundation investigated whether there is an association between the use of periodontal services and medical care costs for diabetes. It found that adults with diabetes who receive non-surgical periodontal procedures had significantly lower medical care costs than those who did not receive these procedures [16]. These studies provide encouraging evidence that the provision of dental services to adults with some of the most common chronic diseases can not only ameliorate these conditions, but can also save money in the process. Since some oral diseases, such as periodontal disease, are more prevalent in adults, it stands to reason that eliminating or reducing dental benefits in the adult population may lead to a substantial increase in the severity of chronic medical conditions in an insured population that includes a large number of at-risk individuals.

Maternity and newborn care. Several studies have reported finding an association between untreated periodontal disease and the increased risk for preterm delivery and low birth weight babies. Thus, a mother's oral health status is thought to be critical to the health of the most vulnerable among the Medicaid population—newborns. There is also convincing evidence that dental caries is an infectious disease that is transmitted from caregivers, most often mothers, to infants and toddlers, and that comprehensive oral hygiene measures and preventive care in mothers can significantly reduce the levels of decay-causing bacteria in their children [17].

Adults with special needs. Individuals with intellectual and developmental disabilities and the elderly may have physical, cognitive, or behavioral limitations that impair oral care at home. The chronic and complex health conditions with which adults with special health care needs present with may be adversely affected by oral disease. Many of these special care patients take medication that reduces saliva flow, which is a natural defense against cavity-causing bacteria. Additionally, poor oral health may impair their ability to maintain proper nutrition. As noted previously, the North Carolina Medicaid population has a large number of adults with medical diagnoses, which place them in the special needs category. Without Medicaid dental benefits, a population that already faces significant barriers to accessing care in dental offices will have even more difficulty obtaining oral health care. It is unclear where these individuals will turn for care if they lose their dental benefits.

Disease detection and prevention. Access to regular dental care is not only critical for optimal oral health, it also provides windows of opportunity to detect and diagnose early manifestations of osteoporosis, certain cancers, eating disorders, substance abuse, HIV infection and progression to AIDS, and other systemic health problems. Early detection of these problems by dental professionals results in better health outcomes for Medicaid recipients and lower costs to the Medicaid program.

Quality of life issues. Better oral health enhances Medicaid recipients' ability to obtain and retain jobs. An estimated 164 million work hours are lost each year in the US due to oral health problems [18]. The psychosocial concerns regarding better oral health should not be underestimated. For example, a partially edentulous or edentulous individual seeking a new job will be much more confident during the interview process if their missing teeth are replaced with an aesthetically pleasing and functional prosthesis. Adult Medicaid recipients should have the opportunity for optimal oral health to improve functional capacity—including the ability to speak, chew, maintain proper oral hygiene, and be free of pain, infection, and conditions that cause trauma to oral hard and soft tissues.

Conclusion

There is little doubt that short-term cost savings can be realized by reducing the North Carolina Medicaid adult benefit to emergency services or by eliminating all covered dental services. The more important question is this: what long-term cost are policymakers willing to pay for an action that will undoubtedly lead to increased morbidity among the most vulnerable members of society? All stakeholders

should carefully consider what the future implications will be to the disadvantaged and how these individuals with fewer resources will be able to fill the void that is left when primary oral health care is taken away from them. NCMJ

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Policy and Proposals That Will Help Improve Access to Oral Care Services for Individuals With Special Health Care Needs

Kevin J. Buchholtz, Rebecca S. King

Historically, access to oral care for individuals with disabilities has been a challenge. This commentary provides an overview of this issue and discusses a recent policy and several proposals that will help improve outcomes and access to oral care for individuals who require special care dentistry services.

The US Surgeon General's Report on Oral Health (2000) highlighted the relationship between oral health and overall health and the importance of optimal oral health for all ages [1]. The report acknowledged that while significant gains in oral health have been made, they have not been shared equally. Oral health disparities exist, and 2 groups particularly affected by these disparities are people with disabilities and the elderly.

Despite legislation enacted over the past decade in North Carolina to improve dental workforce capacity and access to care issues, oral health disparities continue to exist for some of our most vulnerable citizens who disproportionately suffer the consequences poor oral health has on quality of life.

Children and adults with disabilities exhibit a wide range of conditions and levels of impairment. Some have developmental disabilities or physical limitations that hinder their ability to provide effective oral hygiene to themselves, while others have multiple medical diagnoses requiring medications that adversely affect oral health. Although many children and adults with disabilities are able to receive routine oral care in traditional office settings without the need for special accommodations, others require an enhanced level of care—a practice referred to as special care dentistry. Special care dentistry provides oral health care services for people with physical, medical, developmental, or cognitive conditions that limit their ability to receive routine dental care [2]. Although the number of North Carolinians requiring these services is difficult to ascertain, it likely comprises a fairly large segment of the population. Currently an estimated 100,000 North Carolinians have an intellectual and/or other developmental disability (I/DD), [3] and more than 170,000 older adults (age 65+) in North Carolina are living with Alzheimer's disease or other types of dementia, a number which is expected to increase to 210,000 by 2030 [4].

Children with Special Health Care Needs

It is estimated that 15.4% of North Carolina children have special health care needs (CSHCN), compared to 13.9% of children nationwide[5]. Recent studies of national survey data indicate that CSHCN visit the dentist with at least the same frequency as children without special health care needs and that total expenditures for dental care do not significantly differ [6, 7]. However, CSHCN who have more significant health issues have more unmet dental needs and are less likely to receive preventive services [7].

Adults with Special Health Care Needs

Adults with special health care needs face significant barriers accessing oral health care services in North Carolina. In 2010, it was reported that only 59% of disabled adults visited a dentist, dental hygienist, or dental clinic within the past year compared to 73% of adults with no disability [8]. Access to care is a particular concern for those who reside in assisted living facilities, nursing homes, and other long-term care facilities. It is well established in the literature that residents in nursing homes exhibit poor oral health, which can have serious systemic consequences, such as increased risk of stroke, cardiovascular disease, and pulmonary infection [9].

North Carolina Special Care Dentistry Advisory Group Report

In 2009, in response to established concerns about the oral health of individuals with special health care needs, the North Carolina General Assembly charged the North Carolina Department of Health and Human Services (NCDHHS), Oral Health Section (OHS) of the Division of Public Health, with examining the current dental care options for special care populations and releasing a report

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providing recommendations for ways to improve the quality of services. In response, the OHS formed a Special Care Dentistry Advisory Group consisting of key stakeholders that undertook the study and released the report, Special Care Oral Health Services, A North Carolina Commitment, in March 2010 [10]. The report acknowledged the challenges in providing oral care for patients with special health care needs, as well as the many barriers that individuals with special needs face when trying to access care. The report observed that due to the committed efforts of caregivers and dental professionals, there are many individuals with disabilities in North Carolina who are receiving outstanding, comprehensive oral care. Nevertheless, the advisory group concluded that the current dental workforce capacity is insufficient to address the growing need to care for North Carolina's special care population. Two main reasons cited were the lack of dental providers trained in the complexities of treating patients with more severe special health care needs and inadequate compensation from third-party payers who don't address the additional time and management often required for treatment [11]. The report included a comprehensive set of 16 recommendations, divided into categories of advocacy, professional development, reimbursement, clinic program expansion, and health service research that, if implemented, would improve access to care and oral health outcomes significantly for this population. Many of the recommendations require new appropriations from the North Carolina General Assembly. Due in large measure to the challenging economic climate, very few of the report's recommendations have been addressed; however, incremental progress has been made, some of which is discussed below.

A Recent Policy and Proposals

Dental care has been cited as the most significant unmet health need for children with special health care needs [12]. Recommendation #3 in the report requested that a dentist be appointed to the North Carolina Commission on Children with Special Health Care Needs (CCSHCN). The CCSHCN is an 8-member Governor-appointed commission whose purpose is to monitor and evaluate the availability and provision of health services to children with special health care needs in the state. Dr. Donna Spears, endorsed by both the North Carolina Dental Society and the University of North Carolina-Chapel Hill (UNC-Chapel Hill) School of Dentistry, was appointed to serve on the CCSHCN in September 2010. Dr. Spears brings a wealth of experience as a clinician, providing oral care to residents of the Murdoch Developmental Center, as well as an educator at the UNC-Chapel Hill School of Dentistry.

In response to recommendations specific to preventive dental services for Medicaid eligible adults (recommendation #11) and reimbursement models for those who provide care in long-term care facilities (recommendation #12), the North Carolina General Assembly directed the NCDHHS Divisions of Medical Assistance (DMA) and Public Health, to initiate a study to address two issues: 1) the feasibility and anticipated impact of expanding Medicaid dental services to include reimbursement for evidenced based topical fluoride treatment and other chemotherapeutic agents used to prevent periodontal disease in high risk adults with special health care needs, and 2) the feasibility and anticipated impact of implementing facility code policies that would allow certified providers to bill for each patient seen in a long term care facility or group home on the date of service.

In early 2012, a draft of the study was completed and will soon be submitted to the North Carolina General Assembly. The study plans to propose innovative new initiatives from DMA, which are described below.

Fluoride Varnish Coverage Proposed for Older Adults

After reviewing the evidence and conducting a financial analysis, DMA plans to propose covering fluoride varnish for adult Medicaid recipients over age 65 who are not dually eligible for both Medicaid and Medicare. Dually eligible beneficiaries do not qualify for North Carolina Medicaid dental benefits under the current eligibility rules.

Fluoride varnish has been proven to prevent dental caries (cavities) in children and adults, and as a result, leading national dental organizations support its use for all patients at high risk for dental caries. DMA's proposed policy change will benefit older Medicaid recipients residing in long-term care facilities. These recipients are less likely to be able to access oral care in a traditional dental office.

A recent modification to the North Carolina Dental Hygiene Practice Act could also help increase access. North Carolina Administrative Code 16Z .0101-.0103 allows dental hygienists who have met the legal requirements of the code—following an exam and written treatment plan by a supervising dentist—to perform certain dental hygiene activities, such as fluoride varnish placement outside the direct supervision of that dentist in long-term care settings.

Changes in Reimbursement for Dental Providers who Serve Residents in Long-Term Care Facilities

After consulting with providers who deliver comprehensive dental services to residents in long-term care facilities, DMA believes that amending the current reimbursement model will help enable the expansion of existing dental practices that treat this population, as well as provide a financial incentive for new qualified dentists to deliver care in those settings.

DMA currently reimburses those who provide dental care to residents in long-term care facilities through what is commonly referred to as the facility code [13]. The current limitation for the service is that providers can be paid for only one facility code per date of service per facility, regardless of the number of recipients treated on that day. In other words, a dentist's reimbursement for the facility code is the same regardless of whether 1 patient or 20 patients are treated. The service is currently reimbursed at $72.86 [14].

There are very few North Carolina dental practices that provide comprehensive care (ie, preventive, restorative, surgical, and partial or full dentures) to residents in long-term care facilities. They are typically able to serve up to 18 patients a day, but incur a financial loss for certain procedures such as partial- and full-denture appliances and appliance repairs (B. White, personal communication). DMA believes that a facility code reimbursement at a per-patient fee of $32.52 is feasible and will be more financially equitable to the providers. According to DMA, the proposal will need to be budget-neutral. To ensure this, DMA will consider implementing a policy that will prohibit use of the code by providers who render and bill Medicaid for diagnostic care only (eg, dental screenings) and restrict use of the code to providers who have met certain credentialing or continuing education requirements that have yet to be developed.

At the state level, there are several initiatives that are being coordinated by the North Carolina Office on Disability and Health. Educational programs targeting community college dental assistant and hygiene students, which focus on the importance of providing optimal oral care for patients with special health care needs, have begun. Site-specific training to dentists regarding how they can make their offices more accessible to patients with special needs has been provided and is currently available. Several different checklists for both professionals and families/consumers to assess the accessibility of dental practices are also being developed.

The East Carolina University (ECU) School of Dental Medicine, whose first class of 50 dental students began in the fall of 2011, intends to provide training to increase students' abilities to provide care to patients with special health care needs. They are building a dedicated special care patient clinic in their facility in Greenville. After coursework in the management of patients with special needs, all students will rotate through that clinic during their third year. Students will then take that knowledge and experience with them to the Community Service Learning Centers currently being developed across the state. These students will provide care to patients with special needs alongside faculty and ECU School of Dental Medicine graduate students (J. Hupp, personal communication).

Conclusion

DMA's proposals represent a concerted effort and commitment to improving the oral health of older adult Medicaid recipients, as well as a commitment to help the providers who deliver comprehensive oral care to residents of long-term care facilities. As highlighted in the 2010 Special Care Dentistry report, there are a number of practices and facilities that provide outstanding, comprehensive dental care to patients of all ages with disabilities [10]. However, with the dramatic population growth expected over the next 2 decades, and the 40% increase in the very old (age 85+) that occurred from 2000-2010 [15], the number of dentists qualified to provide special care dentistry services will need to increase significantly. Awareness at the federal and state level concerning these issues has never been greater. It is the hope that once the current economic situation improves, additional meaningful action addressing the care for patients with special health care needs will occur, which will help ensure that all North Carolinians achieve and maintain optimal oral health. NCMJ

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Opportunities in Preventive Oral Health Care for Children in North Carolina

Rebecca S. King, C. Jean Spratt

Tooth decay affects more children than any other chronic infectious disease, yet it is almost entirely preventable [1]. The Oral Health Section of the North Carolina Division of Public Health stresses the importance of prevention and promotes opportunities for citizens to achieve good oral health as part of total health.

Although the overall oral health of the nation has improved dramatically in the last 60 years, a segment of society has been left behind. People with low incomes, minorities, immigrants, those with special health care needs, and people living in rural areas have difficulty accessing care and maintaining good oral health [1]. Oral diseases and conditions can be prevented and controlled at reasonable cost through personal and population-based preventive interventions. Only through prevention—not treatment—can the burden of dental disease, especially among North Carolina's most vulnerable populations, be reduced.

Need for Additional Prevention

Tooth decay (cavities) starts as a reversible white spot on the tooth. At this early-stage, tooth decay can remineralize (repair itself) under the right conditions. These early-stage cavities respond best to preventive dental interventions such as preventive dental sealants and fluorides (eg, community water fluoridation, fluoride varnish and other topical treatments such as fluoride toothpaste, and fluoride mouthrinse). Without preventive intervention, white spots progress to visible irreversible tooth decay that can lead to tooth loss, pain, and suffering. The 2003-2004 Statewide Dental Survey of North Carolina School Children, conducted by the Oral Health Section (OHS) of the North Carolina Division of Public Health, looked at both obvious tooth decay and early-stage tooth decay. Results showed that 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. Non-cavitated lesions are responsive to fluoride therapy and other preventive interventions, which reinforces the need to enhance preventive strategies so these early cavities do not progress and require treatment [2].

Despite dramatic improvements in decay rates in permanent teeth, we have not seen such improvements in primary (baby) teeth. When North Carolina's children enter kindergarten, 37% of them have already been affected by tooth decay in their primary teeth [3], which is a strong predictor of tooth decay in permanent teeth. Emerging evidence demonstrates that early preventive dental services are effective and significantly reduce the need for expensive dental treatment services later in life [4].

North Carolina's Interventions

The OHS provides or facilitates a variety of community-based preventive interventions and educational services across the state that are targeted to high-risk children. Most services are aimed at reducing preventable dental disease, as spelled out in both the national Healthy People 2020 [5] and the state-level Healthy North Carolina 2020 [6] oral health promotion and disease prevention objectives. In addition, the OHS works toward eliminating disparities in oral health by using community water fluoridation and school-based dental sealant programs. These are promoted by the Association of State and Territorial Dental Directors, the Centers for Disease Control and Prevention, and the Community Preventive Services Task Force as two very effective public health measures [7-9].

The OHS has a staff of 52, including 4 public health dentists and 39 public health dental hygienists, plus health educators and support staff. Most reside in the communities they serve, work in cooperation with local health departments, and provide community-based services, reaching an estimated 220,000 children during state FY 2010-2011.

In the effort to reduce the amount of dental disease, the OHS and some local health departments provide the services listed below. Smart Start and the Blue Cross and Blue Shield of North Carolina Foundation also provide local funding for some early intervention dental services targeting young children.

Prevention. Community water fluoridation continues to be the most cost-effective method of preventing tooth

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decay. It also is an equitable method of disease prevention, meaning all people benefit regardless of their income, educational level, age, or ability to get dental treatment. The CDC reports that in larger communities, for every $1 spent on community water fluoridation, at least $38 is saved in treatment costs for tooth decay [10]. Eighty-six percent of North Carolina citizens served by municipal water supplies now receive fluoridated water [11]. The OHS provides technical assistance and uses federal grant funds to provide financial assistance to fluoridate water systems.

School-based dental sealant programs help students without a source of dental care receive preventive dental services. Sealants are effective at preventing dental decay when delivered to populations at high risk for tooth decay, such as children in low-income households [12]. The OHS promotes the use of dental sealants through dental health education and health promotion. OHS staff also conduct sealant placement projects in elementary schools or other suitable locations, targeting children at high risk for developing tooth decay and assisting with sealant projects performed by our community partners.

In addition, the OHS conducts a weekly fluoride mouthrinse (FMR) program for almost 52,000 children in targeted high-risk elementary schools. Data from the OHS's most recent statewide children's dental survey indicate that children in high-risk schools may experience substantial caries-preventive benefits from long-term (3 or more years) FMR participation. This, in turn, reduces the disparity between the amount of tooth decay experienced by children of high-income families compared with children of low-income families. Each participating child uses the fluoride rinse once a week during the school year. Decay reduction benefits increase each year the child participates, and supplies for the program cost less than $5 per child per year.

Prevention for very young children. Trends in primary tooth decay emphasize the need for expanding dental prevention programs for high-risk preschool children and prompted the OHS to collaborate with the University of North Carolina (UNC)-Chapel Hill Gillings School of Global Public Health, the UNC-Chapel Hill School of Dentistry, the North Carolina Division of Medical Assistance, the North Carolina Pediatric Society, the North Carolina Academy of Family Physicians, the North Carolina Dental Society, and other partners to address this problem by creating the Into the Mouths of Babes (IMB) program. This Medicaid-reimbursed program addresses early childhood tooth decay in very young children. Because visits by infants and 1-year olds to physicians outnumber those to the dentist by 250 to 1 [13], the OHS provides training and support for physician-based practices and local health departments serving young children. The providers are trained to provide preventive dental services (ie, counseling for the parent on how to care for their child's teeth, fluoride varnish application, and oral evaluation and risk assessment with referral for dental treatment if necessary) for Medicaid-covered infants and toddlers in a medical setting. Medicaid reimburses the medical providers up to 6 times before the child reaches age three and one-half years of age. Last year, almost 134,400 preventive dental encounters were provided to high-risk children in medical settings. Recent North Carolina Medicaid data show that 43% of Medicaid-covered children who have a well-child visit receive at least 1 IMB service package during a given year. Analysis by the Gillings School of Global Public Health shows that the program works. Children who had 4 to 6 IMB visits while they were 6 to 72 months of age show a 17% reduction in caries-related treatment needs [4].

The Priority Oral Health Risk Assessment Tool (PORRT) is an extension of IMB that is aimed at helping to ensure that children who need to see a dentist are appropriately referred. This provider-friendly risk assessment tool was developed jointly by the Gillings School of Global Public Health, UNC-Chapel Hill School of Dentistry, Division of Medical Assistance, OHS, and privately practicing pediatricians and dentists who tested the tool. Based on a systematic literature review, the assessment identifies risk factors that place infants and toddlers at high risk for tooth decay. Medical providers are assisting with further evaluation to identify and refer the youngest high-risk children to dental homes.

The OHS also partners with the Gillings School of Global Public Health in the Zero Out Early Childhood Tooth Decay Project (ZOE) by providing oral health education to Early Head Start staff in 25 programs across North Carolina.

Because of the extensive collaborations in our state, North Carolina is considered a national leader in innovative collaborations between medicine and dentistry to address the challenges of tooth decay and accessing dental care for the preschool population.

Access to dental care. The OHS also works to improve access to dental care for underserved populations through referral and follow-up to dental screenings. These services are targeted primarily toward children in kindergarten and fifth grades (and other selected grades as needs and resources permit). Follow-up and referral to local oral health care providers is given to children identified during assessments as needing dental care. Last year, more than 145,000 children were screened; over 15,000 were found to be in need of dental care, and staff were able to find care for almost 6,000 children. In addition, OHS staff support and assist with the annual Give Kids a Smile! promotion sponsored by the American Dental Association and the North Carolina Dental Society. During this promotion, dental professionals volunteer to provide free dental services for at-risk children.

The past decade has seen substantial growth across the state in non-profit safety net dental clinics. There have also been improvements in Medicaid reimbursement rates for services primarily affecting children, so access for children has improved. However, access to dental care for indigent adults continues to be a challenge.

Health promotion/education. Education about tooth decay, prevention, and oral health is a critical component of all OHS activities. Last year, the OHS provided educational services for more than 131,000 children and 10,600 adults who influence the health of children, including health care providers. To support educational efforts, there are OHS dental health exhibits on 9 topics. The OHS also has printed educational materials, some of which are available on the Web site at http://www.oralhealth.ncdhhs.gov.

Also as part of its education efforts, the OHS provides a Dental Public Health Residency program accredited by the American Dental Association. The residency trains dentists to practice the specialty of dental public health in an array of health care settings.

Monitoring the public's oral health. North Carolina has one of the most comprehensive oral health surveillance systems in the nation. OHS has a standardized screening technique, which is conducted annually as part of the kindergarten and fifth grade screening program. This standardized technique allows for a simple but accurate and reliable measurement of decayed and filled teeth. This gives an indication of both the oral health status and treatment needs of public school children in kindergarten and fifth grades statewide, as well as the level of dental disease within each county. In 2008-2009, 17% of kindergarten children and 4% of fifth graders had untreated decay. Forty-four percent of fifth graders had dental sealants [3].

North Carolina is the only state with a series of statewide oral epidemiological surveys dating back to the early 1960s; the OHS conducts these detailed statewide dental surveys approximately every 15 years, subject to the availability of outside funding.

Conclusion

Although the last 60 years have seen dramatic reductions in the prevalence of tooth decay, oral health disparities and difficulties in accessing dental care still exist in North Carolina. Too many citizens, particularly children from low-income families and minorities, continue to experience preventable oral diseases. Unfortunately, service numbers and counties served by the OHS are declining due to budget cuts and position eliminations. Budget challenges continue and vacant positions remain unfilled. For example, as a result, the ratio of public health dental hygienists to the elementary school population has decreased from 1:13,500 in 2006-2007 to 1:18,000 in 2011-2012.

Addressing the oral health of North Carolina's children is paramount to child development and lifetime health. Children experiencing pain from infected teeth and gums cannot eat well or sleep well at night, and they suffer from reduced self-esteem and perform poorly in school. The OHS's preventive dental efforts to reduce tooth decay help ensure that all North Carolina citizens achieve oral health as part of total health, resulting in an enhanced quality of life. NCMJ

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Innovations in Oral Health Insurance

Linda Moore

Dental disease can impact a person's ability to eat and speak, and increases absenteeism at work and school. Dental insurance plays an important role in the oral health care of North Carolinians as children and adults with dental insurance are more likely to get routine dental care, which can prevent dental disease.

Blue Cross and Blue Shield of North Carolina (BCBSNC) has offered dental insurance to its clients for over 20 years, offering a variety of plan designs to meet the demands of our customers. We are proud to cover dental insurance needs for over 4,000 employer groups in North Carolina and for our 380,000 members. We process over 1.5 million dental service claims annually but, with the current economic climate, we've seen a decline in utilization. People are putting off going to the dentist now more than ever. Many North Carolinians are making tough decisions about where they spend their disposable income and are choosing to forgo dental care.

Medical professionals and insurance companies recognize that oral health is an important part of a person's overall health and well-being. However, the insurance industry and employer groups have been slow to consider dental insurance beyond an ancillary benefit. In the end, it all comes down to cost.

The Cost Problem

"Cost" is often too narrowly defined. We need to recognize that the cost of dental insurance not only covers dental services, but also has downstream impacts on costs that can relate to a person's overall health status. As indicated in a National Association of Dental Plans survey [1], people without dental insurance are more likely to forgo routine care and potentially neglect dental problems until they end up at the emergency room. Costs for a single emergency room visit are 10 times more costly than the cost of preventive dental treatment for a year [2]. Due to economic concerns and rising costs of health plan premiums, employers struggle to continue offering dental and other ancillary benefits. Some employers are moving toward voluntary benefits offered through the employer, but the employee pays all of the cost. Some are eliminating ancillary benefits altogether.

In general, the insurance industry has yet to connect all of the dots in terms of costs, partly due to the disparate systems used for claims processing. Often, employer groups use a different carrier for health and dental insurance coverage. Even when both health and dental insurance are with the same carrier, the carrier may use different systems for processing the claims. This is the case with BCBSNC.

BCBSNC is taking steps to further integrate information from its two claims processing systems to deliver a more complete solution for our clients. For members with certain diseases that link to oral disease, dental care history is embedded into our case management system and captured as a part of their background information. This allows BCBSNC to better manage the care of our members. For example, when a case manager identifies a member with diabetes, the case manager asks the member about the date of their last dental visit, how regularly they visit the dentist, and their home care regimen.

We want to encourage our members to take advantage of their dental preventive care visits. If a member with both health and dental coverage hasn't visited the dentist during the past year, we now send reminders to them to do so. To further encourage visits, employer groups have the option to include additional cleaning visits in their dental policy for employees with qualifying conditions such as diabetes, heart conditions, and pregnancy.

Until recently, dental insurance benefits have been very static. The typical employer plan included 100% coverage for preventive and diagnostic services, 80% for minor restorative services, and 50% for major services with an annual maximum benefit of $1,000. While costs have risen due to normal inflation, dental insurance plan maximums have not risen. A few new options have hit the market in the last several years. BCBSNC now offers rollover plans that reward members by rolling over a portion of their unused benefits if they have had a preventive visit and low utilization. This rollover benefit will accumulate from year to year (limits do apply depending on the benefit plan) and is available for the member to use to help offset the costs of expensive dental services at a later date. We also offer a plan where preventive and diagnostic costs do not count toward

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the annual maximum. Other plan options are available with higher annual maximums.

The Road Ahead

Preventive oral health care is important to lifelong oral health, and oral health care should begin early. Studies have shown that every $1 of preventive dental care results in a savings of $8 in medical costs downstream [3], not to mention dividends in healthy living. The old adage of an ounce of prevention is worth a pound of cure certainly is true for oral health. However, access to care continues to be a roadblock for those who live rurally and for many children statewide. Many rural areas lack a sufficient number of dentists, and pediatric dentists can only be found in the more urban areas of our state. Dental schools in North Carolina are at capacity and cannot meet the growing demands of an increasing population. Furthermore, by not allowing reciprocity for dental licenses from other states, it can be difficult for dental professionals to relocate to North Carolina. Recently there has been a push in other states to allow a mid-level dental professional license. By addressing these issues, there is potential to significantly improve access to affordable preventive dental services.

In addition, the Affordable Care Act may have a considerable impact on access to dental providers. As currently written, the "essential benefits" includes pediatric oral health care. However, what this means has yet to be defined. What is the age range for pediatric? What does the oral health benefit include? How do we incorporate this benefit into the health contract and keep health benefits as affordable as possible? Are the pediatric oral health benefits administered by the health carrier or a separate dental carrier? If routine preventive care (exam, cleanings, x-rays, fluoride treatments, sealants) is now covered for all children below the age of 18, will there be enough dentists in our state to meet the increased demand? This could lead to an increase in costs as demand exceeds supply, further stretching the affordability band.

BCBSNC recognizes that good oral health is an essential component of an individual's overall health and self-esteem, and also plays a key role in managing total health care costs. We will continue to look for innovative ways to control costs and provide excellent coverage so that we can see healthy smiles on the faces of as many North Carolinians as possible. NCMJ

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Some warning labels are tough to swallow.

If you're taking a medication, there's a good chance that you're *not* doing anything about the dry mouth you experience. And you should!

Dry mouth (xerostomia) can lead to sudden development of extensive tooth decay, as well as contribute to gum disease and serious oral infections. In addition, dry mouth reduces saliva, making it difficult to swallow and speak.

For more information, visit **www.agd.org** or call 1-877-2X-A-YEAR (1-877-292-9327) for a general dentist near you.

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Academy
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Spotlight on the Safety Net

A Community Collaboration

Cabarrus Health Alliance

The Cabarrus Health Alliance (CHA) has a reputation for collaborative innovation in medical care, and for oral health care as well. Its Oral Health Program has grown over the years from a single mobile dental unit to include 2 clinic locations with a wide array of services and partnerships across the state. Kimberly Dehler, CHA dental director, notes that "the most impressive part [of CHA] is the collaboration in the community," which has allowed so much to be accomplished in such a short time.

The CHA Oral Health Program began in 1977 as a mobile unit with a grant from the Cannon Foundation. A community needs assessment in 1998 identified access to dental care as a priority public health issue. As a result, a dental task force was formed in 1999 through Healthy Cabarrus, which is the local Healthy Carolinians partnership. The task force has representation from the local private-practice dentist community, the CHA dental program, city and county school administration, the CHA school nurse program, CHA clinical services, the local hospital, and the Cabarrus Partnership for Children, as well as other community partners.

Due to the work of the dental task force, the CHA was able to expand dental services in the county. One of the first accomplishments was hiring a public health hygienist with funding from the Cabarrus Partnership for Children. The hygienist was then trained by the Oral Health Section of the North Carolina Division of Public Health to perform screening and surveillance in the community. With assistance from volunteer private-practice dentists, many children in the community were screened.

Providing oral health care to children was the foundation for a strong collaboration between Smart Start and the CHA, which led to the establishment of screenings in child care centers and financial assistance for preschoolers who were in need of dental care services. The hygienist and community dentists began to receive referrals from teachers as well as from hygienists performing the screenings for children with early childhood caries. The increased outreach demonstrated that there was a greater need for oral health services for children than first thought, and particularly for children receiving Medicaid or those with no dental insurance. To meet this need and other community needs, the CHA opened its first 3-chair clinic in Kannapolis with the help of Smart Start, the Cabarrus Partnership for Children, and the Cannon Foundation. The demand for pediatric oral health services also created a need for a pediatric dentist in the community. In 2003, through the work of dental task force partners, a pediatric dentist was recruited into the community. The demand for services continued, and in 2004, the CHA opened a 6-chair clinic in Concord with plans for future expansion. In 2006, the CHA expanded the 6-chair clinic to 12-chairs. Concord First Assembly Church donated the space, while the Cannon Foundation, Sisters of Mercy, the Kate B. Reynolds Charitable Trust, local dentists, local charities, Carolinas Medical Center-NE Hospital, Cabarrus Partnership for Children, and Community Care of Southern Piedmont (formerly known as Southern Piedmont Community Care Plan) were all integral to these expansions. In April 2012, the CHA Oral Health Program further expanded by opening a 6-chair clinic on the North Carolina Research Campus in Kannapolis under the same roof as the CHA's medical services.

In 2005, the CHA began working with Community Care of Southern Piedmont to treat medically complex patients. Rather than continuing to treat these patients in the hospital emergency department, Community Care of Southern Piedmont provided funding to the CHA dental clinic to treat them. The staff of CHA found that they were comfortable treating medically compromised adults and continued to treat the population—even after the 3 years of funding ended. CHA currently receives referrals from a variety of medical specialists for people with complex medical needs, which is a growing population.

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The CHA Oral Health Program has grown over time to become a leader and frequent collaborator on regional oral health projects. For example, it participates in the North Carolina Public Health Incubator Collaboratives. The collaborative that CHA is part of is the Southern Piedmont Partnership for Public Health. The dental workgroup in this collaborative convenes all 11 counties in the region to discuss barriers to efficiency in dental practices and innovative ways to approach them. The coordinator of the collaborative's dental workgroup engages between 5 and 7 counties at a time in monthly meetings to share resources and tools, and to develop new tools to share. The work of the incubator group grew into a study on oral health efficiency, which actually showed improvements in access to care, provider productivity, and client satisfaction. One need indentified from this study was the need to train public health dentists in special techniques for treating children with severe dental needs. The training was conducted by the chair of Pediatric Dentistry at the University of North Carolina-Chapel Hill and was attended by pediatric dentists involved in the public health incubator project, as well as those from the private sector. The lecture was followed by a hands-on workshop. In addition to providing education to dental professionals, the training also provided much-needed services for individuals. The study's success led to funding from the Blue Cross and Blue Shield of North Carolina Foundation to support another phase of the project. The Blue Cross and Blue Shield Foundation of North Carolina and the CHA also funded an additional project focusing on outreach dental case management for children with special health care needs.

Collaboration and sustainability have been the keys to the success of the CHA Oral Health Program. The partners review resources and then share them with others, look for ways to give back, share best practices, participate locally, and invite other partners into the fold. The program, which started locally, has grown and now leverages resources statewide. NCMJ

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Running the Numbers

A Periodic Feature to Inform North Carolina Health Care Professionals About Current Topics in Health Statistics

Utilization of Dental Health Care Services Among Pregnant Women in North Carolina

Approximately 1 in 5 adults in the US suffer from periodontal disease, which is a chronic, destructive infection of the gums and supporting tooth structures [1]. Due to normal physiologic changes like hormone fluctuations, pregnancy places women at even higher risk for diseases of the oral cavity including periodontal disease, dental caries, and gingivitis [2]. For example, gingivitis, an inflammatory response to increased intraoral plaque that can develop into more severe periodontitis, has been shown to affect up to 100% of pregnant women. In addition, up to 10% of pregnant women may experience pyogenic granulomas, which are painless "pregnancy tumors" along the gum line [2].

Maternal oral health has significant health implications for both mothers and their infants. Oral disease in women is associated with other adverse health conditions like cardiovascular disease and diabetes, and may interfere with adequate nutritional intake during pregnancy. A growing body of epidemiologic research has also demonstrated an association between maternal periodontal disease and adverse birth outcomes including preeclampsia, low infant birth weight, and preterm birth [3, 4]. Recent evidence suggests that periodontal disease triggers a systemic inflammatory response, as measured by increased C-reactive protein levels in maternal plasma, which may induce preterm labor [5]. Further, bacteria from the maternal oral cavity have been found to cross the placental barrier and impact placental function as well as the fetal lungs, brain, and circulation [5].

Because of the importance of maintaining good oral health before and during pregnancy, monitoring the utilization of dental health care among pregnant women provides data needed by public health dental programs to plan, implement, and evaluate services and interventions. This article presents data on oral health from the 2009 North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS).

Methods

The PRAMS survey is an ongoing, population-based surveillance system funded by the Centers for Disease Control and Prevention (CDC) and maintained by the North Carolina State Center for Health Statistics (SCHS). Its purpose is to monitor health behaviors and risk factors among pregnant women living in North Carolina. Each year, a random sample of resident women who had a live birth are selected from birth certificate records and asked to complete the survey. The North Carolina PRAMS survey added questions related to oral health beginning in 2004, and the questions were revised slightly in 2009. More information about North Carolina PRAMS, including quantitative survey results, can be accessed at www.schs.state.nc.us/SCHS/prams.

Results

According to the survey, 50% of women who delivered a baby in 2009 had their teeth cleaned by a dentist or dental hygienist sometime during the 12 months before they became pregnant (Table 1). The percentage of women who reported having had their teeth cleaned increased with increasing age and level of education. There was little difference between racial groups, although Hispanic women had a significantly lower rate of dental cleanings compared to non-Hispanic women (23.4% vs. 67.5%). Women who were married were more

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TABLE 1.
Oral Health Care Services Received By Women in the Year Before and During Pregnancy, North Carolina Pregnancy Risk Assessment Monitoring System, 2009

	Had teeth cleaned by dentist or hygienist within 12 months prior to becoming pregnant (N = 1,159)		Went to dentist or dental clinic sometime during most recent pregnancy (N = 1,151)	
	N[a] (%[b])	95% CI	N[a] (%[b])	95% CI
Total	580 (50.0)	46.6, 53.3	511 (44.4)	41.2, 47.8
Age (years)				
< 20	39 (34.1)	24.6, 45.1	35 (32.6)	23.2, 43.7
20-24	99 (36.8)	30.3, 43.8	89 (31.1)	24.9, 37.9
25-34	317 (54.5)	49.8, 59.0	279 (49.1)	44.5, 53.7
≥ 35	125 (70.7)	62.2, 77.9	108 (61.5)	52.9, 69.4
Race				
White	433 (49.6)	45.8, 53.5	387 (45.2)	41.4, 49.0
Black	118 (50.1)	42.6, 57.6	99 (40.7)	33.5, 48.4
Other	29 (54.6)	38.8, 69.6	25 (53.4)	38.0, 68.2
Hispanic				
Yes	34 (23.4)	16.6, 32.0	37 (26.4)	19.1, 35.2
No	546 (54.8)	51.1, 58.4	474 (47.7)	44.1, 51.3
Education				
< High School	45 (22.6)	16.4, 30.5	47 (26.1)	19.3, 34.3
High School	114 (38.4)	32.3, 44.8	111 (34.4)	28.5, 40.7
> High School	418 (67.5)	63.2, 71.5	350 (57.3)	52.9, 61.6
Marital status				
Married	430 (59.2)	55.0, 63.3	369 (51.8)	47.6, 55.9
Not Married	150 (37.4)	32.2, 43.0	142 (34.4)	29.3, 40.0
Family income				
< $15,000	73 (37.1)	29.5, 45.4	65 (32.9)	25.7, 41.1
$15,000-$24,999	81 (31.4)	25.4, 38.0	80 (31.2)	25.2, 37.9
$25,000-$49,999	110 (47.7)	40.3, 55.2	99 (41.6)	34.4, 49.1
≥ $50,000	287 (77.5)	72.5, 81.9	245 (67.2)	61.7, 72.3
WIC recipient				
No	393 (64.7)	60.2, 68.9	336 (56.1)	51.6, 60.5
Yes	186 (35.6)	30.9, 40.5	175 (33.0)	28.4, 37.9
Medicaid recipient				
No	396 (69.4)	64.9, 73.5	335 (60.1)	55.5, 64.5
Yes	184 (33.3)	28.9, 38.1	176 (30.8)	26.4, 35.5
Infant's birth weight				
< 2,500 grams	173 (40.9)	36.2, 45.7	150 (36.6)	32.0, 41.4
2,500+ grams	407 (50.8)	47.1, 54.4	361 (45.2)	41.6, 48.8
Infant's gestational age				
≤32 weeks	51 (45.3)	36.3, 54.6	41 (36.6)	28.2, 46.0
33-36 weeks	86 (49.5)	39.7, 59.4	74 (39.7)	30.4, 49.8
≥ 37 weeks	443 (50.1)	46.5, 53.7	396 (45.0)	41.5, 48.7

95% CI = 95% Confidence Interval.
[a]Column totals may not add to 580 women due to missing values for demographic or clinical characteristics.
[b]Percentages are weighted to reflect the entire population of North Carolina women who had a live birth in 2009.

likely to receive a dental cleaning, as were women with family incomes of $50,000 or more, and who were not receiving WIC or Medicaid. Women who delivered a normal weight infant (≥2,500 grams) were more like to have had their teeth cleaned in the year prior to pregnancy, but there was no appreciable difference by gestational age.

An estimated 44.5% of women went to a dentist or dental clinic during pregnancy, and the demographic patterns were generally similar to those who had a dental cleaning in the year before pregnancy. Women with one or more of the following characteristics were less likely (than women with none of these characteristics) to have been to the dentist during pregnancy: Hispanic ethnicity, less than a high school education, non-married, family income less than $50,000, or receiving WIC or Medicaid.

Discussion

These results suggest that utilization of dental health services among North Carolina women before and during pregnancy is a concern, particularly among disadvantaged mothers. Women with lower family incomes, who were younger, had less education, were unmarried, or received WIC or Medicaid were each less likely to receive dental care compared to other women. These findings are consistent with national PRAMS data. Data from 10 PRAMS states (excluding North Carolina) between 2004 and 2006 found that, although 95% of the study population had ever had a teeth cleaning, only 40% had a cleaning sometime during pregnancy [6]. Of the women who reported having a specific problem with their teeth during pregnancy (26%), less than half (44%) sought dental care for the problem. In this study, mothers who did not receive dental care or did not have a teeth cleaning during pregnancy were about 20% more likely to have a preterm delivery.

As with many other health conditions, poor oral health and inadequate access to dental care disproportionately affect minority racial/ethnic groups and women with lower socioeconomic status. In the 10-state PRAMS study, black women were more likely to have a dental problem and less likely to seek dental care for it during pregnancy than non-Hispanic white women [7]. Similarly, black and Hispanic women were less likely to have a teeth cleaning before or during pregnancy than non-Hispanic white women. Mothers with late entry into prenatal care and those with Medicaid were also less likely to seek care for dental problems experienced during pregnancy [8].

Unfortunately, numerous barriers to obtaining proper dental care during pregnancy persist [4-6]. Access to providers and payment is an issue; many private health insurance plans do not cover dental care, and coverage of dental services by Medicaid varies by state. In a recent study of barriers to receiving dental care during pregnancy, women with low income or of a minority race/ethnicity reported the following reasons for not seeking care: employment situation, time constraints, ability to pay for care, personal perception of dental experience, and perceived attitudes of dental providers and office staff toward clients from minority populations [9]. Pregnancy symptoms such as nausea and vomiting, gum sensitivity, and odor/taste aversions, can also both increase the risk of oral problems and discourage women from seeking dental care due to discomfort.

Among the most critical barriers is a gap in general knowledge and practice among both pregnant women and their prenatal care providers regarding oral health during pregnancy. A series of research surveys was recently conducted in North Carolina to further evaluate such gaps in knowledge and practice in the state [10-12]. Half of the surveyed pregnant women did not know it was safe to receive routine dental care like check-ups and cleanings during pregnancy [10]. Many women also believed that tooth loss is a normal occurrence during pregnancy. Misconceptions about oral health during pregnancy were more common among black and Hispanic women, as well as women with fewer years of education. Though obstetricians surveyed recommended childbirth classes (100%), breastfeeding consultations (89%), and genetic screening (69%) to their patients, only 51% recommended any dental exams [11]. Only half of obstetricians reported ever looking into their patients' mouths during routine prenatal exams. Among the surveyed nurse practitioners and certified nurse midwives, the majority (87%) agreed that periodontal disease is a risk factor for adverse pregnancy outcomes [12]. However, less than half of these providers reported ever being trained to provide an oral health exam, and 20% indicated that providing an oral exam was the responsibility of dental professionals. These

studies and others suggest that primary care providers do not routinely address the importance of oral care during pregnancy. In a collaborative effort to promote the importance and safety of dental care during pregnancy, and in an effort to assist health professionals in providing oral health services to pregnant women and their children, the California Dental Association Foundation and District IX of the American College of Obstetricians and Gynecologists (ACOG) recently developed comprehensive, evidence-based guidelines for practitioners [13]. These guidelines can be found online at http://www.cdafoundation.org/Portals/0/pdfs/poh_guidelines.pdf.

Fortunately, most of the barriers to improving the oral health of women during pregnancy can be addressed with coordinated effort from public health professionals, dental health practitioners, and prenatal care providers. Oral health promotion should incorporate education for women and health care providers alike about the particular importance of seeking dental care and treatment during pregnancy. In fact, pregnancy may be an optimal time to encourage oral hygiene and regular dental care, since expectant mothers may be more receptive to making positive long-term changes in their health behaviors. This effort presents a real opportunity to improve oral health, perinatal outcomes, and the overall health of both mothers and children in North Carolina. NCMJ

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Philanthropy Profile

Strengthening the Oral Health Safety Net: Increasing Access and Improving Financial Sustainability

The Blue Cross and Blue Shield of North Carolina (BCBSNC) Foundation has invested more than $2 million in grants over the last 3 years to increase North Carolinians' access to oral health care. One of the most promising strategies we have identified to improve access for low-income communities across the state is to build capacity at existing clinics that make it their mission to provide care to underserved populations.

While these safety net clinics provide a great deal of care to both Medicaid-covered and uninsured patients, many have struggled to keep their doors open and provide adequate access to meet the need in their local communities. Historically, these clinics have operated at large deficits, putting them at great risk during lean economic times, and many have not maximized capacity of their staff and infrastructure.

Improving Access by Improving Operations

In 2009, to help provide existing clinics with support to increase access, the BCBSNC Foundation made a 3-year investment in Safety Net Solutions, a program of the DentaQuest Institute, to provide practice management consulting to safety net dental practices across the state. Since then, Safety Net Solutions and a national team of expert advisors, including 2 based in North Carolina, have provided support to 21 clinics that sought to both improve their bottom line and increase access to care. These clinics, shown in Table 1, have varied by type (federally qualified health centers, health departments, and hospital-based programs), size, geography, and patient mix (serving only children or a mix of children and adults). Safety Net Solutions and its advisors are grounded in a community-based approach, and their mission-driven philosophy has been critical to the success of this program and to participants' engagement in the work.

TABLE 1.
Participating Clinics

Public Health Departments
Cabarrus County
Clay County
Columbus County
Dare County
Durham County
Guilford County
Haywood County
Richmond County
Surry County
Wake County
Federally Qualified Health Centers
Carolina Family Health Centers
CommWell Health
Gaston Family Health Services
Greene County Health Care
Kinston Community Health Center
Lincoln Community Health Center
Rural Health Group
Wake Health Services
Other Safety Net Clinics
Blue Ridge Regional Hospital (Toe River Dental)
Mission Medical
UNC Hospital

Results

In evaluating the impact of this work, Safety Net Solutions and the BCBSNC Foundation consider several aspects—financial improvement (charges, revenue, and bottom line), improvement in access to care (number of unduplicated patients, visits, and procedures) and operational improvement (change in no-show rates). Sample results are shown in Table 2. The 21 participating clinics are at different stages in their work and each faces unique

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TABLE 2.
Sample Results: Guilford County Health Department

Measure	Baseline	+12 Months	Result
Gross charges	$1,583,718	$1,769,251	Increased gross charges by $185,533
Net revenue	$794,073	$906,907	Increased net revenue by $112,834
Bottom line	($351,734)	($156,963)	Increased bottom line by $194,771
Visits	5,202	5,697	Increased visits by 495
No show rate	38%	28%	Decreased no-show rate 10 points

challenges in their daily operations; as a result they have experienced varying levels of success. Likewise, it is important to recognize that some individual patients have benefited from the resulting changes, while others have not—as clinics have increased their fees, for example, some patients have had to pay more for services. However, based on the first full year of operational improvements in 10 clinics, we have noted that even modest changes to fee schedules, patient mix, and scheduling practices have a substantial impact on both solvency and access to care.

In the first cohort of 10 participating clinics, the net bottom line improved from an aggregate deficit of just under $3.5 million to under $2.5 million over the course of a year, with the bulk of this change occurring in the last 6 months of the time period. Each of the clinics engaged in this process started in the red, with deficits ranging from $80,000 to $1 million. Today, many are inching toward the black while increasing access to care for more North Carolinians—the unduplicated patient count among them went up by 5,000 and the number of procedures went up by 25,000 in the same timeframe.

Practice Changes

To achieve these gains, clinics made specific policy changes and operational improvements recommended by Safety Net Solutions. These included increasing integration of medical and dental practices and improving cooperation with prenatal and WIC providers to bring more patients into care; reducing no-shows and improving continuity by scheduling out no more than 45 days; maximizing treatment provided at each visit; and improving patient flow and scheduling practices to reduce chaos in the office. Additional changes included increasing the top range of sliding fee schedules to the 80th percentile of usual and customary, documenting Medicaid eligibility prior to service, monitoring billing performance, establishing productivity goals (and accountability to them), and initiating quality improvement both in billing and in the practice of dentistry. Several participating clinics have been supported by subsequent grants from the BCBSNC Foundation and others to secure digital radiography and practice management software, further increasing their efficiency and ability to monitor and deliver quality care.

Participating clinics have been very positive about their engagement in this work. Several have described the change in their clinic as going from an anecdotal understanding of need, no-shows, and productivity, to a more data-driven approach. But at the root of any change is altering the culture of the organization—from the way the front desk interacts with patients, to the way providers are compensated for their work, to the collection and dissemination of data, to the level of integration with other services at the agency. Perhaps most important is the empowerment of all staff to suggest and make changes that improve access and care. The critical lessons of this work for the BCBSNC Foundation and other participating organizations are the critical lessons of the changes going on across the health care sector. Among these lessons: buy in from executive leadership (CEOs, CFOs, and health directors) is critical as is an organizational culture that embraces change.

Barriers to Success

While the BCBSNC Foundation marks this project as a success, some clinics have achieved at a higher level than others. Predictably, clinics that changed the way they do business and deliver care achieved at the highest levels. A persistent challenge for many clinics, even those that have embraced change, has been recruitment and retention of dentists. Some clinics, despite imple-

menting significant and positive changes, did not improve their bottom line or access to care because they struggled over periods of months to fill vacant positions. This has proven to be a critical limiting factor and one we fear will continue to impact access to care for vulnerable populations across the state over the long term. At one participating health department, it took 8 months to fill a position vacated by a retiring dentist. While large clinics can keep their doors open despite isolated staff vacancies, clinics with only one dentist may be forced to cease operations while they recruit and hire.

To support safety net clinics in the work they do to recruit and hire dental professionals, and to provide more consistent access to a consultant specializing in the dental safety net, the BCBSNC Foundation recently provided grant support to the North Carolina Office of Rural Health and Community Care for a full-time staff person to provide technical assistance relating to practice management in the dental practice and recruitment and retention of dentists in the safety net. We believe that more functional, productive, and financially stable safety net practices will be more conducive to retaining skilled and caring dental professionals and that we can support many more clinics through this local resource.

A second challenge in this work has been shifting scope of practice to focus on a quality measure, namely completion of the phase one treatment plan including diagnosis, prevention, elimination of disease; addressing non-surgical periodontal disease; and extraction of hopeless teeth. Completing the treatment plan not only eliminates disease, but also allows for new patients to enter the practice as others move into a more routine schedule of dental hygiene appointments. Only one clinic in the first cohort of 10 was tracking completion of treatment prior to their work with Safety Net Solutions. A year later, 8 clinics were tracking this data, but as a group, they were completing treatment plans on only 19% of patients. This speaks to both the administrative challenges of getting patients into care in a timely manner and the social and economic factors that inhibit patients from returning for follow-up care. However, we are confident that with continued improvements in clinic efficiency and patient education, the number will rise over the next year.

Making a Difference

Through our engagement in this project we have met many local heroes—dental professionals who are providing compassionate quality care, and practice managers and other administrators who are able to sustain their programs in an unforgiving fiscal environment. These individuals recognize that there is a productive balance between their mission to provide care and their financial stability. They provide daily proof that safety net clinics can deliver quality care across a broad scope of practice and within the framework of a Medicaid and sliding scale fee structure without sacrificing access. Dr. Rob Doherty of Greene County Health Care, who is profiled in the Tar Heel Footprint of this issue, is one such hero.

The oral health care Greene County Health Care clinic and other safety net clinics deliver to North Carolinians from all walks of life is making a difference in oral health and ultimately overall health. Going forward, we believe that safety net clinics have a tremendous and unique opportunity not only to demonstrate and improve quality of care, but also to further integrate oral health care delivery with other primary care. Their IT infrastructure and the co-location of dental and medical services provide opportunities that aren't as accessible to private providers, opportunities that are increasingly valued in an era where care is integrated more broadly. At the BCBSNC Foundation, where our mission is to improve the health and well-being of all North Carolinians, we salute the dental and administrative leadership at all of the participating clinics who opened their doors, and their books, to Safety Net Solutions as part of this process and then took bold steps within their own practices to improve local access to care. NCMJ

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Editor's Note: *Soon after the publication of the July/August 2011 issue of the NCMJ dedicated to the future of nursing in North Carolina, we received correspondence from Dr. Matthew Kanaan, who responded to the issues and proposed solutions that were raised in that issue of the NCMJ. We felt his remarks merited a response and invited Drs. Debra Barksdale and Kristen Swanson to, in turn, respond to Dr. Kanaan. We subsequently received a letter from Drs. Brian Forrest, Robert Monteiro, Karen Breach, and Edward Treadwell that also commented on that issue of the NCMJ. We are publishing these three responses together as they touch on similar themes and controversies.*

Encouraging Collaboration Between Physicians and Advanced Practice Registered Nurses in North Carolina

Matthew Kanaan

To the Editor—In the July/August 2011 issue of the NCMJ there were several articles that discussed the topic of advanced practice registered nurses (APRNs) and their ability to practice medicine independently. Reading articles in the issue such as, Removal of Legal Barriers to the Practice of Advanced Practice Registered Nurses, it seemed that there were key elements of the discussion that were not directly addressed. There is still debate as to whether expanding APRN scope of practice would significantly increase the primary care workforce, or decrease the projected primary care shortages in the underserved areas of our state. When considering any increase in the scope of practice of a previously supervised profession, there must be a thorough and adequate discussion of potential risks to the health of the public. Additionally, one cannot overlook the outcomes and cost savings achieved when health care providers work collaboratively in a patient-centered medical home as opposed to working independently in separate silos. I would argue that APRN autonomy, which may further increase fragmentation, is not the best solution. I would suggest that physicians and all of our nursing colleagues across the state focus their efforts more on population heath and collaborative health care models to improve the health of North Carolinians.

The Primary Care Workforce

While the articles on APRN autonomy, without physician oversight, suggested improvement in primary care access, this concept is much more complex and the comparisons may not be direct. A graduating family medicine resident can be expected to spend his/her whole career in primary care, while APRNs can more easily leave primary care for other interests or specialty practices. Additionally, APRNs tend to practice in the same areas of North Carolina as physicians. To suggest that independently practicing nurse practitioners would choose to relocate to rural parts of our state is more theoretical than fact [1, 2]. If you examine practice distribution maps from states such as Idaho, Oregon, Arizona, and Utah, which have granted APRNs independent practice and feature metropolitan areas and large, rural areas similar to North Carolina, the actual distribution suggests that autonomy does not significantly change APRN practice location preferences [3].

Why Do We Have Supervision Requirements?

Physicians are subjected to the most heavily regulated certification and credentialing processes of any of the health professions. After completing 4 years of medical school, all family medicine residency graduates will complete around 20,000 hours of supervised training, including over 1,650 patient encounters before they can practice independently. While becoming an advanced practice nurse is also a very rigorous process, most APRN organizations do not require any significant clinical patient interaction beyond the minimum 500 clinical hours required within their graduate programs [4]. APRNs do not have the equivalent academic preparation or supervised training experiences as physicians. The current system of supervision serves to protect public safety and health, particularly when dealing with complex patients with multiple co-morbidities.

Inadequate Research

The NCMJ articles on APRN autonomy often cited flawed research studies. The research involved too few subjects and most followed patients for short timeframes (1 year or less), when true outcomes of chronic disease are measured over decades. Some studies were actually set in collaborative environments with physician oversight. Others were self-funded by various APRN groups. These flaws make the

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external validity and application of the concepts to the entire state of North Carolina challenging.

Collaboration, Not Further Fragmentation

To make important improvements the health of the public, North Carolina health policy must focus on more collaborative models of care such as patient-centered medical homes (PCMH), not more independent providers. The PCMH model, as coordinated locally by Community Care of North Carolina (CCNC), has been proven to yield lower rates of emergency department visits and hospital admissions, and improved management of chronic disease when compared to the traditional model of independent care delivery [5, 6]. North Carolina was one of only 3 states in the nation to reduce total Medicaid spending between fiscal years 2008 and 2009. While total Medicaid spending decreased by 2.5% in North Carolina, it increased by 7.8% nationwide [7, 8]. With the upcoming influx of uninsured North Carolinians into the health care system, several aspects of primary care delivery must be optimized.

Health care providers must reexamine the way patients receive care. The professions must collectively acknowledge that an organized, team-based approach is superior to a disorganized, fragmented network of individual providers. The future of primary care in the state is at stake and we will only succeed through collaboration, not further fragmentation. NCMJ

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Response:
Encouraging Collaboration Between Physicians and Advanced Practice Registered Nurses in North Carolina

Debra Barksdale, Kristen M. Swanson

To the Editor—We wholeheartedly agree with Dr. Kanaan's point in his letter to the editor that the focus of all health care professionals should be on enhancing population health and developing innovative collaborative care models that increase access and improve the health of all North Carolinians.

However, we disagree with 2 lurking assumptions that lie behind Dr. Kanaan's central thesis, namely that (1) care delivered by "unsupervised" nurse practitioners (NPs) will endanger interprofessional collaboration; and (2) allowing North Carolina's advanced practice registered nurses (APRNs) to practice autonomously (in his words "practicing medicine independently") would constitute a risk to the public.

The nursing profession has its own educational standards, skills, competencies, licensure requirements, certification mechanisms, code of ethics, and legal accountability for safe practice. It is not the intent, claim, or expectation of nurses that APRNs have the full breadth of medical knowledge across all content areas in which physicians are educated to practice. APRNs build upon baccalaureate education with 2 to 3 years of intensive graduate education that prepares them to sit for a national certification exam (above and beyond the National Council Licensure Examination for Registered Nurses) and to apply for state licensure to practice as an APRN. Whether they reside in a state that allows autonomy or one that requires supervision, driven by their own professional code of ethics, advanced practice nurses provide the highest quality of care that falls within their scope of practice.

Supervisory language assumes that only one profession has both the preparation and moral obligation to safeguard the care of the public. There are no studies that provide evidence that physician supervision of APRNs results in better care, better health outcomes, or greater protection of the public. There is, however, a growing body of evidence that APRNs provide high-quality care. Indeed, as Dr. Kanaan noted, the 2009 Cochrane report [1] concluded, with a caveat, that having found only one study with sufficient power to assess equivalency of care between NPs and physicians, the report's findings should be interpreted with caution. That one powered study, however, did not stand alone in finding that NPs and physicians provide equivalent care. Also cited in the Cochrane review were multiple smaller studies that offered corroborating evidence. Moreover, using very strict criteria to grade the weight of cumulative evidence, the Newhouse et al review [2] provides strong substantiation for the veracity of the 2010 Institute of Medicine/Robert Wood Johnson Foundation [3] assertion that APRNs, whether practicing autonomously or supervised, provide safe, effective, and high quality patient care.

A major recommendation of the IOM / RWJF report is that nurses should be able to practice to the full extent of their education and training. The report urged the Federal Trade Commission and the Antitrust Division of the Department of Justice to "review existing and proposed state regulations concerning advanced practice registered nurses to identify those that have anticompetitive effects without contributing to the health and safety of the public. States with unduly restrictive regulations should be urged to amend them to allow advanced practice registered nurses to provide care to patients in all circumstances in which they are qualified to do so" [3].

Recently, investigators from Department of Family Medicine at the University of Washington [4] examined whether NPs from states allowing autonomous practice were more likely to practice in a rural setting. They used National Provider Identifiers to approximate where certified registered nurse anesthetists (CRNAs) (N = 35,973) and NPs (N = 106,113) practiced [4]. Compared to states in which CRNAs were denied prescriptive authority, CRNAs in states allowing greater autonomy were more likely to practice in a rural location (RR 2.0, P < .001). A similar trend towards NPs practicing in a rural setting (RR 1.5, P = .075) was discovered when comparing states allowing autonomous practice to those requiring greater supervision. It is puzzling to us why Dr. Kanaan would claim that advanced

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practice nurses are unlikely to care for underserved populations, remain in primary care, or practice in rural settings. In a recent review of 4 years of data from 6 North Carolina state-supported graduate programs that prepare nurses for entry into advanced practice, we discovered that more than 50% of newly graduated APRNs provide care to underserved North Carolina populations and/or work in an area where there is a health professional shortage. Nationally, approximately 140,000+ NPs, (70%-80%) work in primary care including pediatrics, adult and family health, and care of women including midwifery [5].

Supervision does not assure good health outcomes. Safe care relies on respectful collaboration between providers who willingly focus their knowledge and skills on the patient before them. The capacity of all professions to practice to the full extent of their education and training enhances access to comprehensive care that includes health promotion, illness management, care coordination, and stronger health sustaining partnerships with patients, families, and communities.

The Association of American Medical Colleges projects that by 2020 there will be 45,000 fewer primary care physicians than needed to meet the care needs of the American public [6]. A logical solution to this shortage is deployment of other health care providers who have demonstrated capacity to deliver safe, affordable, high-quality care. The number of nurse practitioners entering the workforce is projected to increase by at least 9% annually [7]. Nurse practitioners are a logical, safe, cost-effective workforce to deploy in meeting the health care needs of our state and nation. NCMJ

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Physicians and Advanced Practice Registered Nurses:
Working Together As a Team

Brian R. Forrest, Robert W. Monteiro, Karen E. Breach, Edward L. Treadwell

To the Editor—After reading the July/August 2011 issue of the NCMJ, it was clear that only one side of this discussion was being presented for the readers regarding the independent practice of advanced practice registered nurses (APRNs). We at the North Carolina Medical Society, the North Carolina Academy of Family Physicians, the North Carolina Pediatric Society, and the Old North State Medical Society wanted to use this opportunity to present another side of the conversation.

Some advocates of nurse autonomy have suggested advanced nurses will bolster primary care shortage areas of North Carolina. Our research has found that APRNs tend to practice in the same areas of North Carolina as physicians. In addition, we have not been able to find any evidence that granting independent practice to nurse practitioners changes their preference for practice location. In fact, if one looks at other states that have granted autonomous practice, it has not changed much at all. We also cannot rely on nurse practitioner independence to improve access to primary care under the current economic and payment environment.

The demand for nursing autonomy is only coming from a minority of advanced nurses. In fact, advance nurses today are increasingly entering hospital-based positions where physician supervision is a nonissue. Many advanced nurses now serve as hospitalists or as additional health care personnel for physician specialists. Hospitals are gradually replacing inpatient providers with advanced practice nurses under the supervision of a specialty physician. In this manner, the specialist can perform more procedures while the APRNs manage floor patients and consults. Thus, hospitals can afford to pay these nurses more than what they would earn in primary care. This salary difference creates a personnel vacuum, pulling more and more advanced nurses away from primary care. Like their medical student counterparts, APRNs are lured away by better reimbursement in specialty fields and in metropolitan areas.

In addition, APRN training does not come close to the amount of training of a primary care physician or other physician. For example, a family medicine graduate will complete 20,000+ hours of total training, compared with around 2,000-5,000 total hours for a nurse practitioner. Physicians are required to complete annual Continuing Medical Education training, and sit for Board recertification every 7-10 years, regardless of their level of professional practice. In contrast, about 20% of APRNs use alternate pathways available in their state to achieve licensure without advanced collegiate education. How can the public know how much experience their nurse practitioner has had without standardized training programs, mandatory recertification, and physician oversight?

APRNs can and do play a vital role in any primary care team, but are not equivalent to or a substitute for a physician. We value the role APRNs play and look forward to continuing to work with nurses to offer the highest quality of care possible for the citizens of North Carolina.

Rather than arguing over who can take care of patients better, we should all acknowledge that the best care we can provide is by working together as a team, making arguments about scope and independence meaningless. NCMJ

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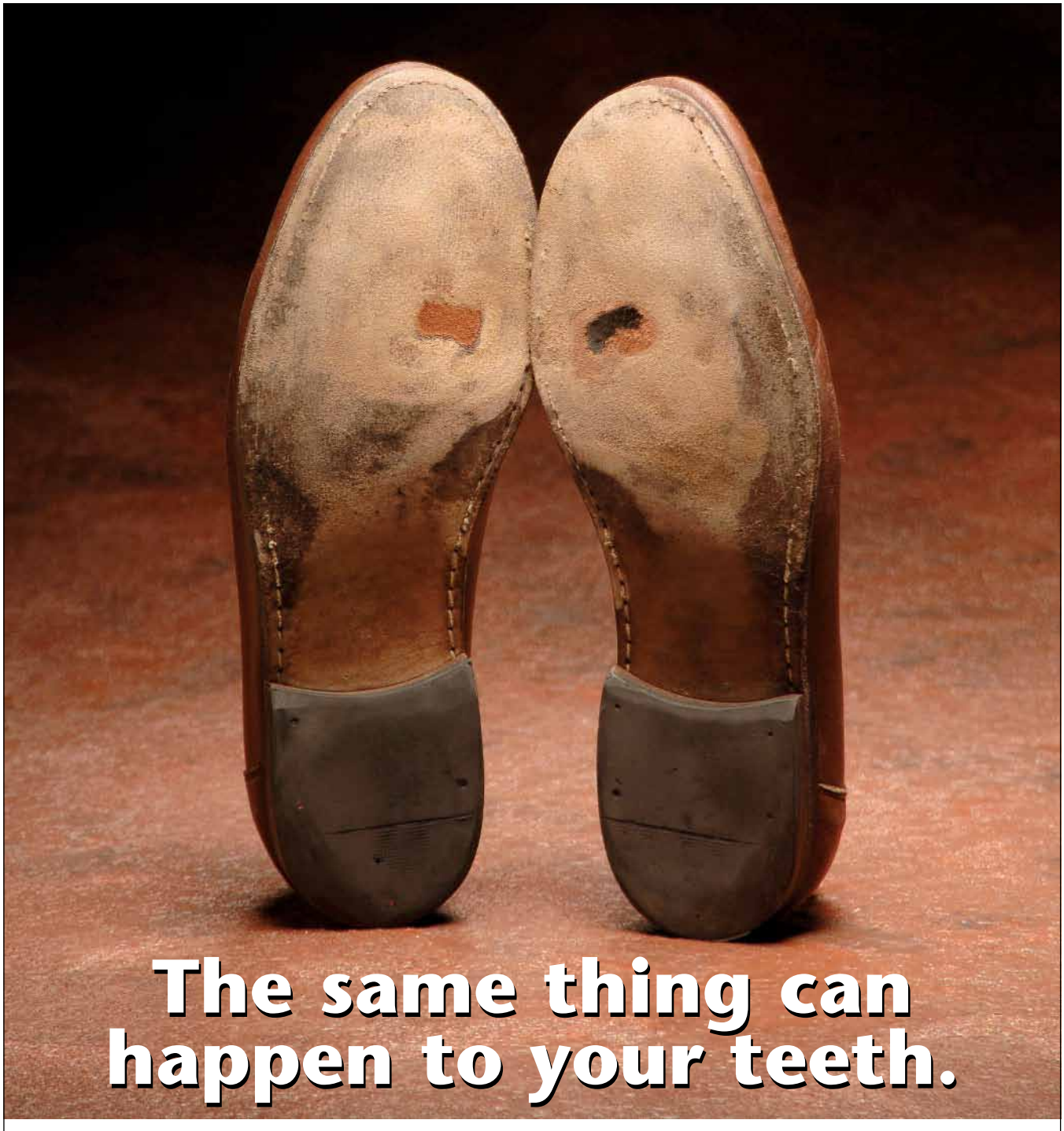

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Facing Down Diabetes:
Are We Putting Our Best Foot Forward?

Allen J. Smart

To the Editor—The September/October 2011 issue of the NCMJ, Confronting the Diabetes Epidemic, was full of some wonderfully promising work as well as some daunting descriptions of the barriers and burdens of the disease. There is clearly a high degree of interest in the issue in North Carolina and a lot of very talented people working toward better outcomes.

So now it's time to issue the challenge. Who is going to align the best of this work and drive the state towards a fundamental decrease in diabetes morbidity and mortality?

What we hear from our grantees in the field is that there is no affordable and widely accessible program of diabetic care and follow-through that is embraced by the intended user and their community. The corollary to this that we hear is a version of the following: "We have a great program, but x number of factors prevent us from recruiting/retaining participants and sustaining impact."

So a broader question remains. Can we program our way out of the diabetes crisis? If we think so, than we have got to go at it much more vigorously than our current promising but scattershot approaches allow. If we don't have hope that these types of programs can really gain us traction, we need to change the entire paradigm of the discussion and start looking at how we got into this mess in the first place. NCMJ

Allen J. Smart, director, Health Care Division, Kate B. Reynolds Charitable Trust, Winston-Salem, North Carolina.

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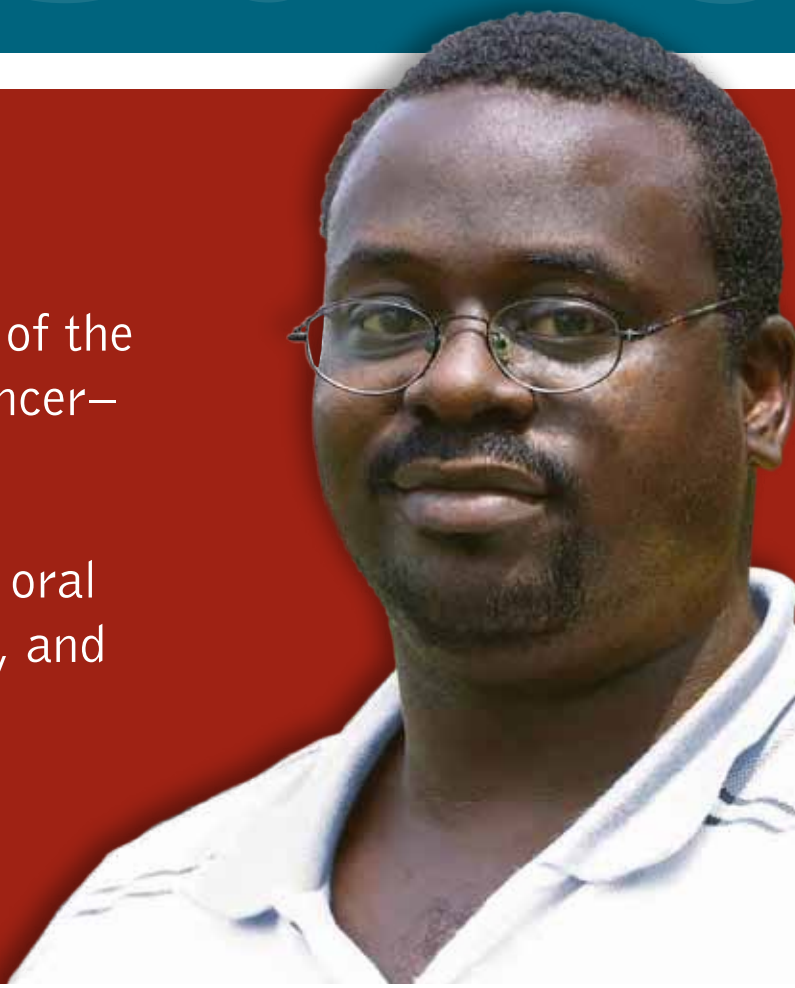
Oral Cancer

What African American men need to know



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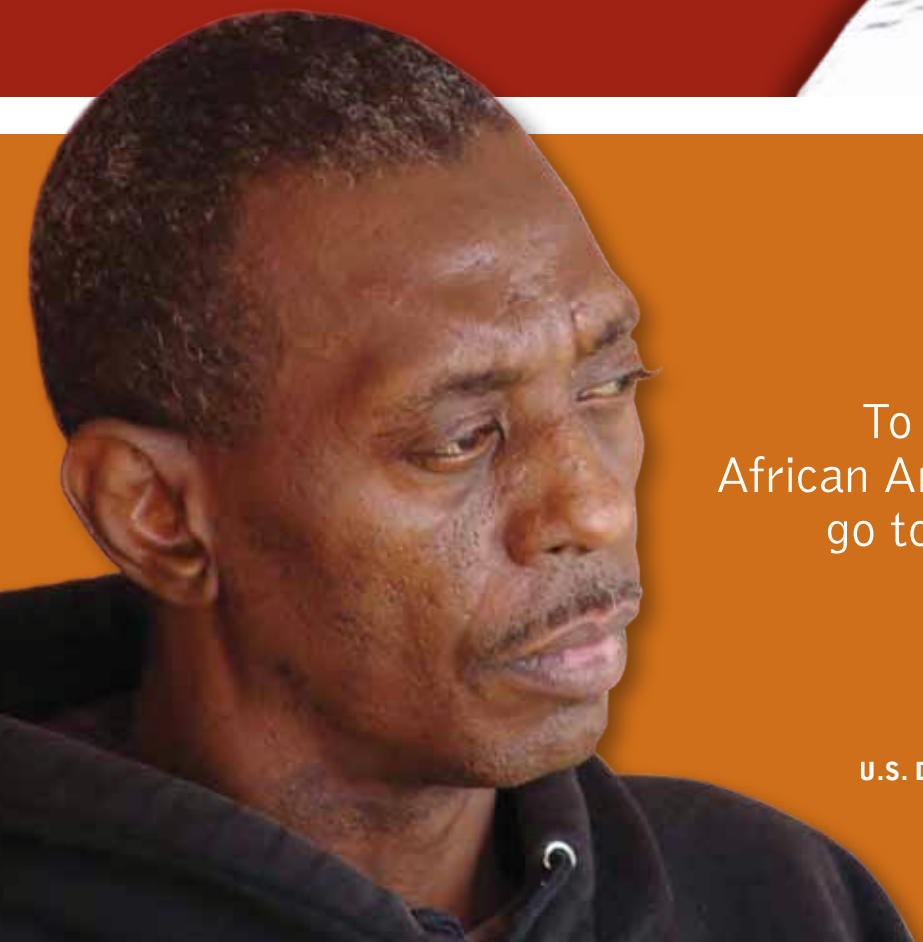

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