

Fall 2013

# STRATEGIES FOR STRENGTHENING THE GREAT PLAINS ORAL HEALTH WORKFORCE

John Reinhardt

*University of Nebraska Medical Center, jreinhardt@unmc.edu*

Kimberly McFarland

*University of Nebraska Medical Center*

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## STRATEGIES FOR STRENGTHENING THE GREAT PLAINS ORAL HEALTH WORKFORCE

**John Reinhardt**

*College of Dentistry  
University of Nebraska Medical Center  
40th and Holdrege Streets  
Box 830740  
Lincoln, NE 68583-0740  
jreinhardt@unmc.edu*

and

**Kimberly McFarland**

*College of Dentistry  
University of Nebraska Medical Center  
40th and Holdrege Streets  
Box 830740  
Lincoln, NE 68583-0740*

**ABSTRACT**—The looming shortage of dentists in rural communities throughout the Great Plains is a well-documented concern. Access to care can be a problem, and the lack of dental care is generally most acute among those with low income, those with complex health issues, and minorities. Studies are finding that there are significant associations between poor oral health and the occurrence of systemic diseases or problems. Examples include cardiovascular disease, stroke, and preterm delivery of low-birth weight infants. The two primary diseases of the oral cavity—dental caries and periodontal disease—are not only treatable but also preventable with adequate care.

The University of Nebraska Medical Center (UNMC) College of Dentistry (COD) is committed to strengthening the rural dental workforce of the Great Plains by focusing upon rural recruitment strategies, service learning educational opportunities in rural communities, and strong support for dentists who practice in remote locations. Working closely with Nebraska and neighboring states, the UNMC College of Dentistry is striving to improve the oral health and economic vitality of small communities throughout the Great Plains region.

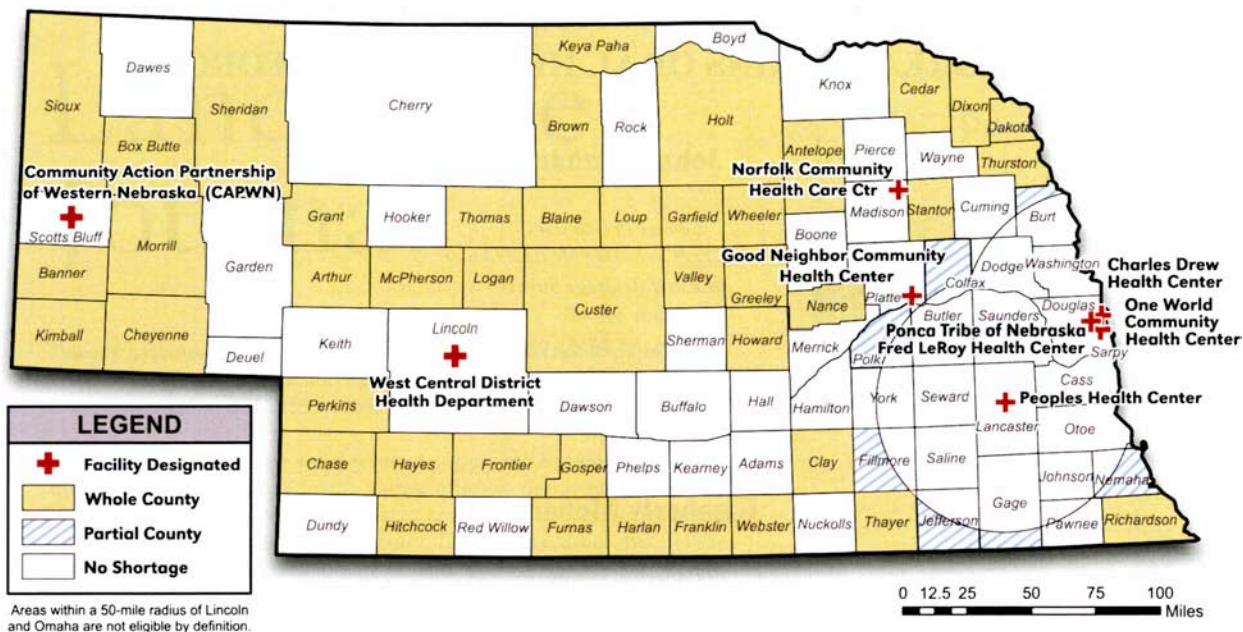
**Key Words:** dental, workforce, oral health, access to care, rural development

### INTRODUCTION

Good oral health is important to overall health. Scientific advances in the understanding, diagnosis, and treatment of oral diseases have made good oral health an asset which should be available to anyone who wishes to have optimum health. Unfortunately, even in the United States, the level of oral health is very uneven among the population. The first Surgeon General's Report devoted to oral health in the United States was published in 2000, and it documented that there are major disparities in the level of oral health among numerous subgroups of the U.S. population, and that access to dental care is a major problem

for many. Among those with the poorest oral health and most difficulty with barriers to care are those of lower socioeconomic status, especially children, elderly, and the disabled; minorities; and people located in remote, sparsely populated geographic areas. The surgeon general's report on oral health estimated that nearly 9% of the U.S. population (25 million people) reside in geographic areas lacking adequate dental care services (U.S. DHHS 2000; Sinkford and Reinhardt 2006).

The challenges related to improving access to dental care throughout rural America are well documented. There are many health policy issues that make uniform and consistent healthcare delivery difficult, and the problem of



Source: Rural Health Advisory Commission  
DHHS - Nebraska Office of Rural Health  
(402) 471-2337, Last Updated: March 2012

Cartography: Rachel Jones, Community Planning Intern, DHHS  
For: Marlene Janssen, Exec. Director, Rural Health Advisory Commission  
marlene.janssen@nebraska.gov

Figure 1. State-designated shortage areas, general dentistry, Nebraska 2012.

rural access to dental care is gaining attention (Bazargan et al. 2010, 336; Chi et al. 2010; Harrison et al. 2007; Krause et al. 2005). In Nebraska, 43 of 93 counties have been designated by the Nebraska Office of Rural Health as shortage areas for general dentists, as shown in Figure 1 (DHHS-NORH 2012). In addition, areas within 5 other counties are considered partial shortage areas (part of a county). The guidelines for dental shortage area designation in Nebraska are established by the governor-appointed Rural Health Advisory Commission. The criteria for that designation include (1) the latest data on an area's number of dentists and population served; (2) inaccessibility of services in that area; (3) particular local health problems; (4) age or incapacity of local practitioners; and (5) demographic trends in that area (Nebraska Legislature 2008).

The pipeline for new dentists begins with dental school student admissions and subsequent class size which, in turn, are driven by the size and quality of the applicant pool as well as federal or state policies affecting financial support. In the 1960s there were serious national concerns about the prevalence of dental disease (decay and periodontal disease) in the U.S. population, and the federal government instituted programs to enlarge dental

school programs. As a result of increased financial support, many dental schools enrolled more students over a 10-year period. The outcome was the greatest number of new dentists joining the workforce in the history of the United States. The largest number of graduates from U.S. dental schools occurred in 1983, when 5,756 dentists graduated. Soon thereafter the applicant pool plunged as the number of dentists had grown to exceed the perceived demand. Over the next 25 years the U.S. population grew by almost one-third, but the number of dental school graduates decreased, falling to 4,700 by 2007 (Collier 2009). In anticipation of the retirement of many dentists who graduated in the larger classes of the 1970s and early 1980s, new dental schools are now opening, and many other dental schools are increasing enrollment. The applicant pool is robust because dentistry is again perceived as a desirable career for which there continues to be a substantial demand.

The basic solutions to the problem of rural access to dental care require a vision that would, if attainable, provide access to quality oral healthcare for the U.S. population throughout the life cycle. That vision, as outlined by the Institute of Medicine (Institute of Medicine 2011)

would lead to an evidence-based oral health system that could (1) eliminate barriers that contribute to oral health disparities; (2) prioritize disease prevention and health promotion; (3) provide oral health services in a variety of settings; (4) rely on a diverse and expanded array of providers who are competent, compensated, and authorized to provide evidence-based care; (5) include collaborative and multidisciplinary teams working across the health-care system; and (6) foster continuous improvement and innovation.

The importance of good oral health is multifaceted. The ability to speak, chew, and swallow are very dependent upon good oral health. The two primary dental diseases, dental caries (cavities) and periodontal (gum) disease, are caused by bacterial infections. Those diseases are preventable through good dietary habits, routine dental examinations and preventive strategies, and adequate home-care procedures. Dentistry is a leader among health science professions in demonstrating the value of strategies that prevent disease. In fact, community water fluoridation (the controlled addition of minute amounts of fluoride to public drinking water supplies, which strengthens the teeth of those who consume the fluoridated water) has been called one of the 10 great public health achievements of the 20th century by the U.S. Centers for Disease Control (CDC 1999).

Lack of good oral health can cause a multitude of problems. Acute dental pain in the form of a toothache can range from an annoyance to excruciating discomfort. Children in the United States miss more than 51 million hours of school per year because of dental problems (US DHHS 2000); and for those who are not so fortunate to have easy access to dental services, ongoing discomfort can make concentration and learning extremely difficult. Untreated dental caries and a resulting abscess led to a brain infection and subsequent death of a 12-year-old child in Maryland (Otto 2007). That child could have been saved with a relatively simple dental extraction costing less than \$100, but unfortunately he did not receive that treatment because he lacked access to care. Others have emphasized that our society is absorbing huge costs for persons with dental pain who wind up in hospital emergency rooms simply because they believe they have nowhere else to go. The cost of treatment in emergency rooms is high, and the care may not resolve the cause of the problem—usually only administration of pain medication and perhaps an antibiotic (Catalanotto 2012). Dental visits to hospital emergency departments totaled \$23 million in Georgia in 2007 and nearly \$88 million in Florida in 2010 (Seu et al. 2012). That report also showed

that dental-related emergency room visit rates were more than twice as frequent in rural areas as in large metropolitan areas.

Dental discomfort or loss of teeth without prosthetic replacement can also lead to poor chewing, bad nutrition, difficulty speaking, and esthetic embarrassment. In young and old alike, but especially in the young, an “ugly” smile with missing, misaligned, or darkened (by cavities) teeth can have a lasting impact on self-image and psychological development. Recent science has also shown that chronic infections of the tooth-supporting periodontal tissues of the mouth are associated with many serious systemic diseases. Although the scientific evidence of a cause-and-effect relationship is not conclusive, studies have indicated there is an association between periodontal disease and the body’s resulting inflammatory response to that disease with multiple systemic conditions such as diabetes, cardiovascular disease, osteoporosis, preterm low-birth weight babies, respiratory diseases, and rheumatoid arthritis (Otomo-Corgel et al. 2012).

Because of the growing awareness of the importance of oral health and the impact of good oral health upon good overall health, interprofessional education and service delivery models are being developed by dental, nursing, medical, pharmacy, public health, allied health, and other professional colleges. Healthcare delivery systems are constantly evolving, but many factors such as cost control, evidence-based practice, rising incidence of chronic diseases, and public policies related to personalized wellness plans (improving health literacy and promoting healthy lifestyles) are driving the U.S. systems of healthcare changes at a rapid rate. At the same time disparities in access to healthcare must be considered and addressed.

The economics of healthcare delivery are complex. By many measures, the U.S. healthcare model is expensive: The United States spends twice as much per capita on healthcare as other developed countries (Hellander 2011). Despite our expensive system, the overall health of U.S. citizens does not measure up to the rest of the world (Bezruchka 2012). When compared to 16 other high-income countries, amenable mortality (premature death from causes that should not occur in the presence of timely and effective healthcare) in the United States ranks highest, nearly twice the rate of amenable mortality in France (Nolte and McKee 2011). One major goal of the Patient Protection and Affordable Care Act, passed by Congress and signed by the president of the United States in 2010, is to begin to address the problems of relatively high cost of and uneven access to services.

Rural residents are well aware of the valuable care that health providers (physicians, dentists, nurses, and so on) bring to their communities. They may be less aware of the actual economic impact of the healthcare providers' presence in the community, and how they contribute to the economic viability of smaller towns. Good rural health and healthcare is an asset to the workforce and an attraction for new businesses. It has been demonstrated that health problems lead to lower earnings among individuals, and that the loss of earning is difficult to overcome even if individuals have regained better health. (Chirikos and Nestel 1985). A study of the total economic effects of the health sector on local economies in Oklahoma measured employment, income, retail sales, and sales tax collection for nine counties and found that the health sector accounted for about 9% of direct and 14% of total employment (Doeksen et al. 2008). A typical critical-access hospital in a rural community has an annual retail sales impact of \$2.5 million (Doeksen et al. 2012). The annual impact of one additional dentist on the economy has been estimated at about \$1.3 million (House et al. 2004). Through the increased economic activity, employment and tax revenues, healthcare providers provide a significant boost to local rural economies.

Academic health centers are well aware of the role they must assume in cooperation with federal, state, and local agencies to improve the health of rural residents (Gazewood et al. 2006). The physical and economic health of the residents is essential to the long-term viability of communities. The purpose of this article is to describe the strategies used by the UNMC College of Dentistry to improve access to care for oral health services in the Great Plains. Those strategies include focused efforts in recruitment, educational experiences, and support of practitioners who choose to practice in remote locations.

## RURAL RECRUITMENT

Recruitment of students from rural Nebraska and surrounding states with large rural populations is a high priority for the University of Nebraska, UNMC, and the UNMC College of Dentistry. There is evidence to support the concept that students who are raised in rural communities and become physicians are more likely to return to rural communities to practice than are students who grow up in urban communities (Daniels et al. 2007; Pepper et al. 2010), and similar evidence for dentists (McFarland et al. 2012). In fact, the dental study found that dental students from rural areas were nearly six times more likely

to practice in rural communities than were students from urban (greater than 50,000 population) areas.

The UNMC Rural Health Opportunities Program (RHOP) is designed to address the special needs of rural Nebraska by encouraging rural residents to pursue a career in the healthcare fields. Students selected are guaranteed admission to the University of Nebraska Medical Center Colleges of Dentistry, Medicine, Nursing, and Pharmacy as long as all stated requirements are met and the preprofessional studies at Chadron State College, Wayne State College, or Peru State College are completed. As of the fall of 2011, 623 students are currently enrolled or have graduated from UNMC through the RHOP. Of the 45 dentists who have graduated through the RHOP program, 67% are practicing in rural locations (56% in Nebraska and 11% in other states).

In 2003 the UNMC College of Dentistry—with the state dental associations of Nebraska, Kansas, South Dakota, and Wyoming—developed a consortium project called Target Access: Great Plains Oral Health, to develop coordinated rural recruitment programs for each of those states. The UNMC College of Dentistry received funding in 2004 through the U.S. Department of Health and Human Services/HRSA to support the project. All four dental associations were aware of and concerned about rural access to dental care, especially replacing the large number of dentists who entered the workforce in the 1970s and 1980s and are now nearing retirement. Kansas, South Dakota, and Wyoming do not have dental schools within their states. Target Access participants developed recruitment materials and strategies and enlisted the respective dental associations to assist in educating high school students about the opportunities of a dental career. Each state enjoyed success with the program, and today the rural dental workforce is remaining relatively strong in those states. Over the past 10 years, more than 50% of the UNMC College of Dentistry entering dental students have come from rural communities (graduated from high schools in communities with populations of 10,000 or fewer).

The number of women accepted nationally into dental school and entering the profession has risen dramatically over the past four decades. Currently about 46% of all U.S. dental students are female (ADA 2012, 36). A recent study showed that over a 20-year period female dental graduates who remained in Nebraska were more likely (59%) than male graduates (48.5%) to practice in a rural community (McFarland et al. 2010). The study also revealed that, of the nonresident dental students who chose to stay in Nebraska to practice following graduation, a

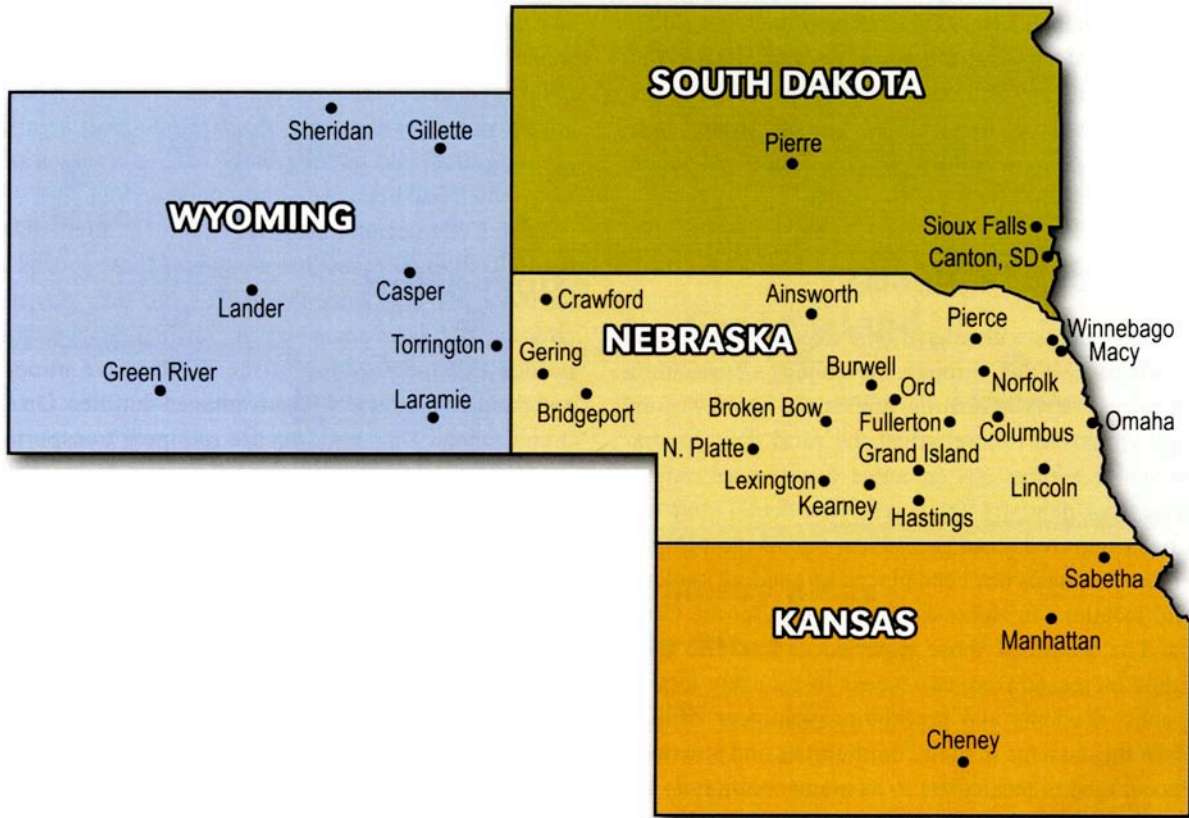


Figure 2. Preceptor locations, 2012-13.

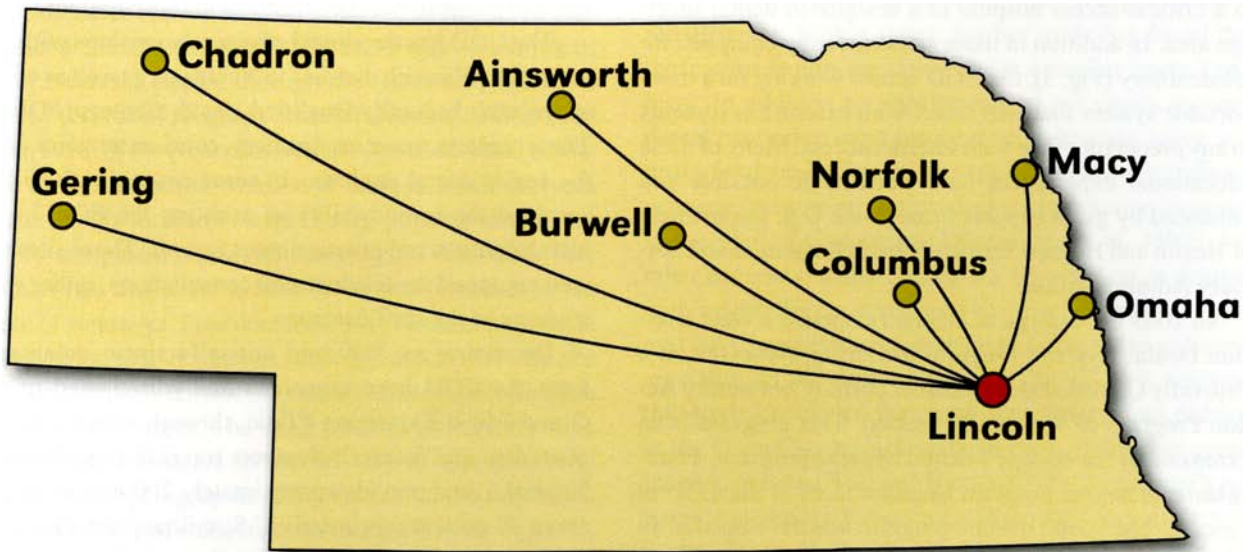


Figure 3. Nebraska teledentistry sites.

higher percentage of those graduates chose rural practice sites (69%) than did Nebraska resident students (51%). The findings of this and other studies help the UNMC College of Dentistry and other dental schools better understand the value of focusing recruitment strategies in an attempt to address rural workforce needs and access to dental care in the Great Plains region.

### EDUCATIONAL EXPERIENCES

Providing students with educational experiences in rural dental practice, either through the college's curriculum or volunteer service-learning activities, is the second strategy employed to strengthen the rural dental workforce. Senior externships (practice experiences outside the college of dentistry for fourth year dental students) have been required since the 1970s, but in the past decade more emphasis has been placed on sending students to rural locations in Nebraska and throughout the Great Plains. The length of those experiences has also been gradually increased from two weeks to a current total of six weeks. Students and preceptors (volunteer dentists who host the students in their communities and practices) are encouraged to participate in as many community activities as possible during their time away from the college. Figure 2 shows the location of externship sites that have been served by dental students in the 2012–13 academic year. The COD has also developed a teledentistry system (two-way video transmission) to assist students and preceptors with consultations between those rural practices and faculty at the COD. One of those is located in a critical-access hospital in a designated dental shortage area. In addition to those sites currently equipped for teledentistry (Fig. 3), the COD is now working on a more portable system that will travel with externship students to any preceptor office with internet access. Many of these educational experiences have been made possible and enhanced by grant support through the U.S. Department of Health and Human Services Health Resources and Services Administration.

In 2003 the College of Dentistry opened a West Division Dental Hygiene Program in Gering, Nebraska, at a Federally Qualified Health Center clinic (Community Action Program of Western Nebraska). This program is an extension of the college's dental hygiene program, a baccalaureate degree program headquartered at the COD in Lincoln. The West Division program was developed in an effort to provide a source of UNMC graduate hygienists for dental practices in western Nebraska. Four students per year have graduated from that program since 2005

(along with 20 per year at the COD in Lincoln), and the vast majority have been employed in rural practices in western Nebraska and surrounding states. As part of their clinical education, the dental hygiene students in Gering are active in providing oral health promotion, dental sealant programs, and nursing home care in a region of the state which had been previously underserved.

The COD began a program called Children's Dental Day (CDD) in 2001, and has conducted these special clinics twice per year since that time. CDD provides at-risk children who have access-to-care difficulties with much-needed treatment. Many of the children are minorities and from economically disadvantaged families. On Children's Dental Day, children are routinely transported to the COD from as far away as Lexington, Nebraska (166 miles one way) to receive free care. Beginning in 2004 the COD has conducted one of the two annual dental days in the Nebraska Panhandle, about 400 miles west of Lincoln, using portable dental equipment set up in community spaces in addition to the dental offices of COD alumni in four communities within that area (Fig. 4). Each year about 50 volunteer students, along with faculty and staff, make that long journey over three days: they are hosted by the local communities and alumni dentists in those communities. Since the inception of dental days, more than 900 students have provided a significant number of services (valued at more than \$2.5 million in treatment) and gained unique experiences through the program. The Panhandle CDD has become a particularly popular event that has opened the eyes of many students to the vastness and beauty of rural Nebraska, as well as to the quality of life and professional opportunities in those regions.

The COD has developed strong relationships with numerous rural health districts in Nebraska, as well as affiliations with Federally Qualified Health Centers (FQHC). These centers serve as primary rural externship sites for senior dental students. In some cases the COD has assumed the responsibility of assisting the FQHC with hiring dentists and practice management. Those sites are well equipped for teledentistry consultations, either with students or the staff dentists.

Beginning in 2010 and annually since, volunteers from the COD have organized and participated in the Grand Island Extraction Clinic, through which a group of student and faculty volunteers travel to Grand Island, Nebraska, and provide approximately 200 extractions to about 70 patients (primarily U.S. military veterans who do not qualify for dental benefits through the U.S. Veterans Administration). This event occurs on a Saturday, in the office of a dental alumnus. So many students volunteer

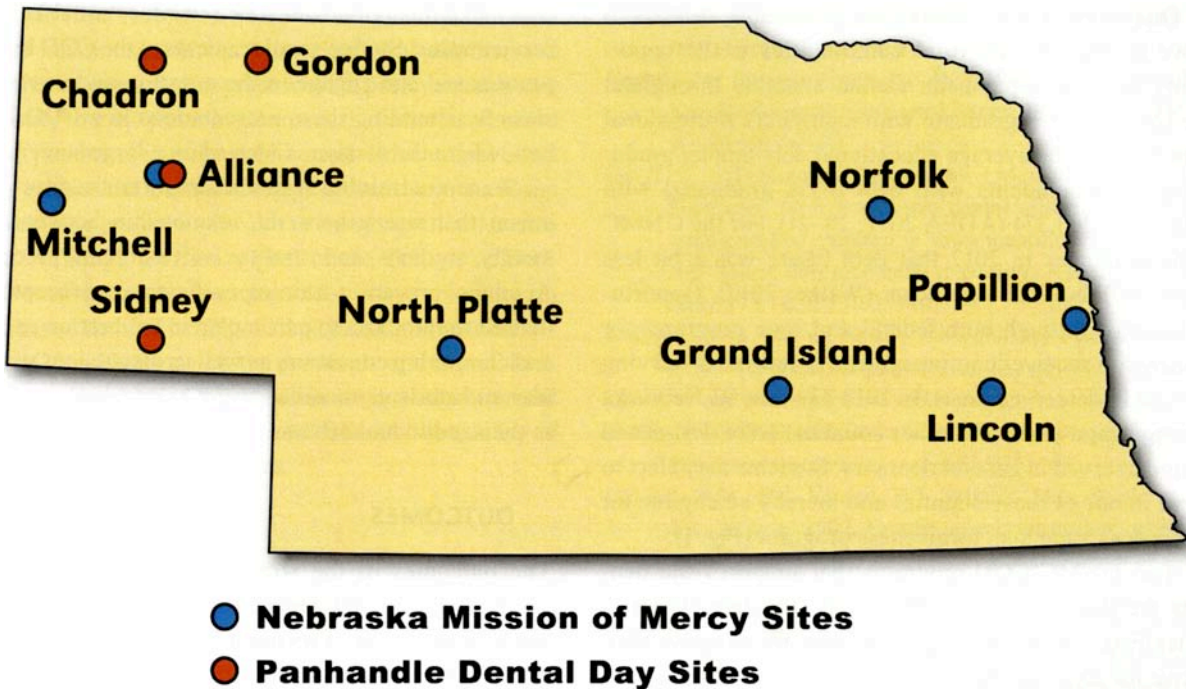


Figure 4. Nebraska Mission of Mercy and Panhandle Dental Day sites.

for participation in this clinic that some students are deferred from participation for a year. The educational and professional experience receives rave reviews from the participants (including patients) and further reinforces the opportunities available for dentists to contribute their services to smaller communities.

One other opportunity for students to engage in professional service-learning while being exposed to life in rural Nebraska occurs through the Nebraska Mission of Mercy (NMOM) program. NMOM was first held in 2005 as an event of the Nebraska Dental Association and is now run by the American Mission of Mercy, which oversees these clinics in many states. Using portable dental delivery equipment and staffed entirely by volunteers, this annual two-day event is held in various locations in the state of Nebraska. Free dental care is provided for anyone who shows up and waits in the long lines. Often the site chosen (Fig. 4) is outside the two urban areas of Nebraska, Omaha and Lincoln. The COD students and faculty have been eager volunteers in the delivery of this free care, sometimes making up as many as half of the providers. Large numbers of students make the most of the opportunity to provide care; at the same time they are exposed to the friendly community life and the spirit of volunteerism in rural Nebraska.

#### SUPPORT FOR RURAL DENTISTS

Historically, studies have found that the major variables in attracting physicians and dentists to particular states in the United States are population and per capita income (Benham et al. 1968). These characteristics are major factors in any business location decision, and healthcare is not different. Within states, further study has found that those same factors are influential at a smaller (more local) level. In addition to population and per capita income, dental care price input (using median housing value as a proxy for dental office leasing costs) was also a significant primary factor in attracting dentists to practice locations in the state of Connecticut (Beazoglou et al. 1992). Another economic study linking the distribution of dentists with market forces confirmed that market forces in general have been effective in driving dentists toward areas according to the demand for care. To no one's surprise, this study concluded that most counties with no dentists in the United States lack sufficient population, per capita income, or both (Wall and Brown 2007). The dentist's potential income is a major factor in the decision of where to locate, due to the significant costs of education and training as well as future costs of operating the business of private practice throughout the dentist's career (Nash 2011).



One of the key attractions for graduating dentists to move to underserved rural communities is the opportunity for loan repayment. Dental students throughout the United States graduate with significant professional debt. In 2011 the average educational debt among graduating dental students with debt (89% graduated with debt) was \$203,374 (ADEA 2012, 20–21). For the UNMC COD graduates in 2012 that debt figure was a bit less (\$154,093), but still significant (Walker 2012). Opportunities exist through both federal and state programs for students to receive loan repayment in return for serving in rural underserved areas. In 2012 43 of the 93 Nebraska counties (and parts of 5 other counties) were designated as underserved in general dentistry. Students may elect to serve in one of those counties and thereby be eligible for Nebraska's state loan forgiveness program (Fig. 1).

Two UNMC COD programs that support rural dentists are the Dental Caravan and the Practice Opportunities Fair. The Dental Caravan program has now been active for 25 years, and is the only program of its type in the United States. Each year, in early May, two faculty from the COD travel more than 400 miles across the state to offer free continuing education (CE) lectures to dental alumni and their staff at four sites. Nebraska dentists are required to attend at least 30 hours of CE every two years in order to qualify for licensure to practice. Over the past 25 years, the Dental Caravan has traveled more than 25,000 miles across the state, providing 350 hours of education to more than 8,000 attendees. The Practice Opportunity Fair was initiated in 2002 to allow dentists, primarily from rural communities, to come to the COD and set up a display about their practice and community in order to meet and recruit students to join their practices. About 300 dentists, community recruiters, and office staff members have taken the opportunity to participate in this annual event.

Teledentistry grand rounds are another support mechanism intended to reduce the feeling of isolation in rural dental practices, which are often located far away from dental specialists. The grand rounds program invites rural practitioners to present patients with complex dental and medical needs to engage in real-time two-way multimedia discussions with specialists at the COD. The practitioners can present the patient, explain the situation, discuss medical complications, and transmit radiographs and intra-oral or extra-oral live video images to the faculty specialists and then engage in conversations about treatment options. Faculty routinely question the patients to gain further information during the session. The use of high-speed internet connections and high-resolution cam-

eras make this opportunity rich in educational as well as service value. Students and residents at the COD learn the process and can engage in the question-and-answer sessions by attending these presentations in a COD lecture hall, where the session is viewed on a large screen.

Preceptor training is another important support mechanism that strengthens the relationship between COD faculty, students, and rural (as well as urban) preceptors. At annual preceptor training conferences, preceptors are invited to the COD to participate in calibration exercises and continuing education, as well as discussions with faculty and students to enhance the externship experiences in their individual offices.

## OUTCOMES

The outcomes of the strategic initiatives designed to strengthen the rural dental workforce in Nebraska have been encouraging. The number of dentists is less of a problem than the distribution. In fact, Nebraska has a dentist-to-population ratio that is slightly above the U.S. average. In 2008 there was one dentist (active private practitioner) for every 1,800 residents in Nebraska, while the overall figure for the United States was one dentist for every 1,814 people (ADA 2010). That source also reported 233 new active private practitioners (those who graduated from dental school within the past 10 years), or 24% of the Nebraska dental workforce. Nationally, the new active private practitioners made up 20% of the total workforce at that time.

The number and location of state designated general dentistry shortage areas in Nebraska (counties) in 2012 as shown in Figure 1 has remained virtually unchanged since 1998, but given the sparse and declining population in many rural areas during that time period the lack of change could be considered positive. Data from a UNMC College of Dentistry study comparing graduates from 1989–98 with those of 1999–2008 found a significant increase (64 versus 99, a 55% increase) in the number of graduates practicing in rural communities in the 1999–2008 period (McFarland et al. 2010).

## CONCLUSIONS

The UNMC College of Dentistry has engaged in efforts to strengthen the oral health workforce in the Great Plains through a strategy of focused rural recruitment, providing rural educational opportunities to students both as part of their regular curriculum and extracurricular professional development, and support for dentists who choose to

practice in rural locations. Since the distribution of dental practice locations is driven primarily by population and per capita income of a geographic area, policy makers can strive only to create an environment that attracts dentists to areas that best serve the public good. Educational institutions such as the UNMC College of Dentistry can assist by developing programs similar to those described in this article. Although a primary goal of the College of Dentistry's rural focus on education and service is to maintain and enhance the oral health of all Nebraskans and citizens of other Great Plains states, the economic and overall benefits of good health and local healthcare providers in rural communities can only enrich and enhance the quality of life throughout the Great Plains.

### ACKNOWLEDGMENTS

We thank Kim Theesen of the UNMC College of Dentistry and Marlene Janssen and Tom Rauner of the Nebraska Rural Health Advisory Commission for the illustrations used in this article.

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