Review of Dental Care Management Workforce Models in the United States and Recommendations for the State of North Carolina

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Executive Summary

Dental care management workforce models currently employed across the United States include general dental navigator models, the ADA-formalized Community Dental Health Coordinator model, and community oral health worker models. These models seek to increase access to oral health care services through care coordination, especially for vulnerable populations who may face multiple barriers to care. Workers employed are often culturally competent individuals from the communities served, who often focus on connecting people with a dental home and the many things they need to obtain oral health care and good oral health. These things may include but are not limited to reliable transportation, comprehensive oral health insurance, preventative education, healthy foods, and improved health literacy. Models expanding access to oral health care should be considered for their potential to address health determinants and improve patient oral health outcomes. The purpose of this brief is to review current care management workforce models across the United States, including general dental navigator models, the ADA-formalized Community Dental Health Coordinator model, and care management models within medicine. It highlights how they expand access to health care services through care coordination, as well as other anticipated positive consequences and challenges. Upon review of dental care management models and similar models within medicine, advice for how the state of North Carolina (NC) should proceed with establishment of dental care management models is offered. In NC, dental navigator models are already employed and expanding access to care. CDHC programs were also implemented in the last couple of years and are preparing a dental care management workforce. Ultimately, the state of North Carolina should consider population-by-population needs and barriers to accessing care when choosing a type of dental care management workforce model and determining how to offer education and training. Additionally, it is important to consider employing these models in varied settings and training individuals who may not have oral health care experience. Thereafter, NC must engage stakeholders early on and continually monitor and evaluate programs to ensure their long-term success. In combination with these models, it is recommended to expand Medicaid and make appropriate code changes to fund programs, as well as employ a large scale oral health literacy campaign. With careful implementation and continued support, these models can succeed in NC and expand access to oral health care for disportionately affected populations in our state.

Introduction to Dental Care Management Workforce Models

Over the last century America has made significant advances in oral health, lowering prevalence of dental caries and periodontal disease. These improvements can be attributed to disease prevention, including oral health education and higher utilization of preventive and restorative oral health care services, as well as public health measures including water fluoridation (U.S. DHHS, 2000). Despite progress, America faces a major dental crisis. For the past 20 years, dental caries have been spotlighted as the most prevalent chronic disease among children (U.S. DHHS, 2000). Further, the two most common oral diseases, caries and periodontal disease, are among the most prevalent chronic diseases among all people, even though they are largely preventable (U.S. DHHS, 2000). Challenges resulting from high financial barriers to dental care, uneven distribution and shortage of oral health professionals, complex state and federal oral health policy, independent dental care delivery models, the separation of dentistry from the rest of health care, low oral health literacy, and lack of cultural competence for all patients among providers fuel this crisis (ADA, 2020a; Mertz, 2016; Vujicic, Buchmueller, & Klein, 2016).

While many Americans suffer from dental disease, significant oral health disparities exist by socioeconomic status and race/ethnicity. Those from low-income families, members of racial and ethnic minority groups, children, and older Americans are at a particularly high risk (CDC, 2011; U.S. DHHS, 2000). Low-income adults live with an untreated cavity two times more than middle and higher-income adults (ADA, 2013). Aside from not receiving the care they need, economic inequalities are clear. Across higher and middle-income classes, people use dental insurance to pay all or some of dental costs 1.6 times more than those in lower-income classes, who might pay out-of-pocket (ADA, 2013). Notwithstanding, 75% of middle and higher-income adults and their families have a family dentist, while only 47% of lower-income families have a family dentist (ADA, 2013). Disparities also exist across racial and ethnic groups as earlier mentioned. For example, 40% of Mexican American children aged 6-8 have untreated tooth decay, as compared to 25% of non-Hispanic white children (CDC, 2011). Further, American Indian and Alaskan Native children ages 1 to 5 have more than 4 times the rates of dental decay of white non-Hispanic children (Phipps, & Ricks, 2015).

Consequences of poor oral health last throughout a lifetime and affect multiple aspects of a person's life (U.S. DHHS, 2000). The many physical, social, and economic consequences and their disproportionate burden on certain populations is why we should care about the prevalence of poor oral health and an inadequate or lack of access to oral health care. To address unmet oral health needs and oral health

disparities, allied dental health professionals are becoming increasingly more important.

Dental care management refers to activities intended to improve patient care and health outcomes by enhancing coordination of care, eliminating duplication, and helping patients more effectively manage their oral health conditions (Goodell, Berry-Millet, & Bodenheimer, 2009). Dental care management workforce models are part of a comprehensive approach to provide immediate care to people suffering with untreated disease, strengthen and enhance the public-private safety net, and bring disease prevention and dental health education into underserved communities (ADA, 2020a). Target populations include low-income families, people in remote rural areas, Native American territories, inner cities, the vulnerable elderly, and others (ADA, 2020a).

Dental care management workforce models focus on expanding access to dental care through care coordination, which involves connecting people with a dental home or an "ongoing relationship between a dentist and a patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family-centered way" (AAPD, 2015). Care coordination also connects people with the tools they need to access a dental home, including reliable transportation, comprehensive health insurance and a provider who accepts the insurance, a provider that speaks the same language as patients, and oral health education ("Care", 2018). Integrated dental care management workforce models offer a way to address social determinants of health that often stand in the way of desired oral health outcomes, including economic, geographic, and cultural barriers to accessing dental care (Braveman, & Gottlieb, 2014; Lantz, 2019; Lantz, Lichtenstein, & Pollack, 2007; McGovern, 2014). By connecting patients with access to dental care, oral health outcomes may be improved. These models will also improve quality of care by connecting people with the care they need or effective care, facilitating more timely care, ensuring care is patient centered, and advancing equitable delivery of care for all populations (Maddox, & McClellan, 2019; Shrank, Rogstad, & Parekh, 2019).

Types of dental care management models include dental navigator models and the Community Dental Health Coordinator (CDHC) model. Both of these employ care coordination to address the social determinants of health, including barriers to accessing dental care, and thereby expand access to dental care (ADA, 2020b; ADA, 2020c; ADA, 2020d; IOM, 2009; U.S. CMS). Efforts within medicine show expanding access to care produces better clinical outcomes, and similar positive outcomes are expected within dentistry (Ruggiero, Pratt, & Antonelli, 2019).

Dental navigators include general dental care management models that are variable, on-site programs and specific to their own target population. These models have no formalized curriculum, training, or requirements. Dental navigators may be employed and trained on the job, without prior education (Murray-Schoenecker, & Kimball, 2016; U.S. CMS).

The CDHC model is an ADA-formalized model, that involves specific curriculum, training, and internship requirements before employment. Specifically, a CDHC must be a Dental Assistant II, Child Development Associate, or Registered Dental Hygienist before enrollment in the program or obtain one of those degrees alongside the CDHC certification for certain programs (ADA, 2020b; ADA, 2020c; ADA, 2020d; IOM, 2009). The typical duration of a CDHC program is 1.5 years, with two semesters of education and a 6 month internship (The Pew Charitable Trusts, 2009). The national curriculum is not geared towards target populations, but a CDHC model may be adjusted for communities served as long as CDHC model requirements are met. While it takes longer for a CDHC to be able to be employed given the formalized criteria that needs to be met first, once employed, a CDHC is already equipped with education and training (ADA, 2020b; ADA, 2020c; ADA, 2020d; IOM, 2009).

These models both often employ culturally competent individuals from the communities served, who are able to better understand the needs of vulnerable target populations and connect them with the resources necessary to access optimal oral health (ADA, 2020b; ADA, 2020c; ADA, 2020d; IOM, 2009). These individuals may speak the same language(s) as the communities they serve, which often helps the people in those communities feel more comfortable (ADA, 2020b; ADA, 2020c; ADA, 2020d; IOM, 2009).

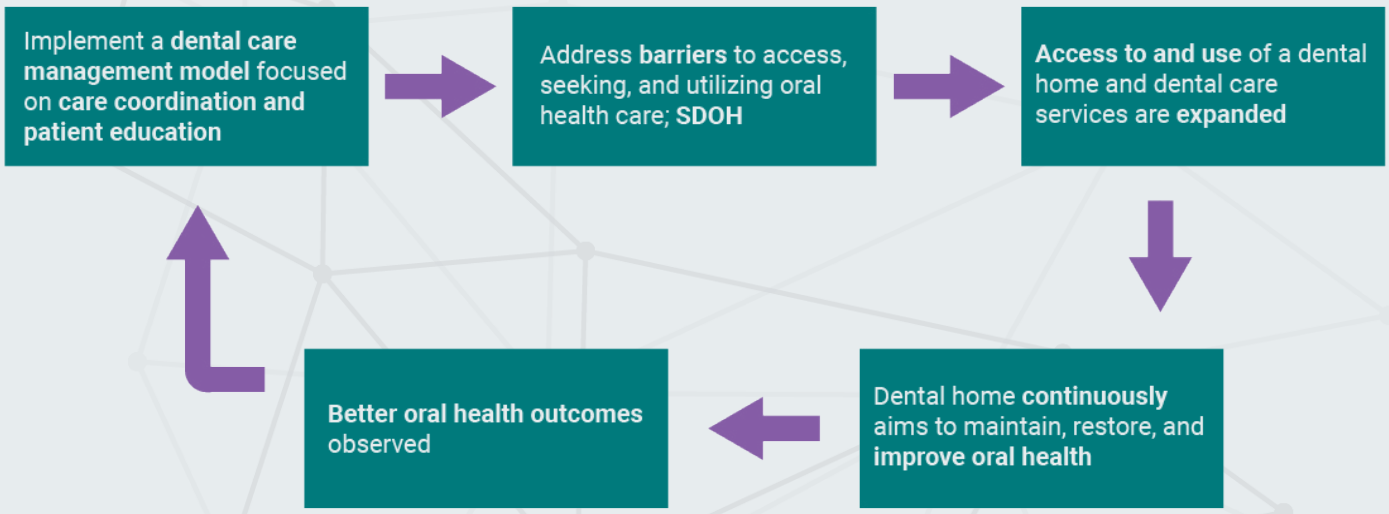
Dental navigators and CDHCs also have the opportunity to greatly improve oral health literacy of target populations through oral health education delivered in a patient's native language, with consideration of cultural diversities affecting patient perceptions. The importance of good oral health for overall health and well-being cannot be overstated. Unfortunately, the American public remains largely unaware of the importance of good oral health and lacks understanding of how the most prevalent dental diseases are entirely preventable ("Removing"; Mertz, 2016). These models markedly offer an opportunity to improve oral health literacy.

With an understanding of the importance of good oral health, people are more likely to seek and utilize oral health care. For example, a person may face no barriers to accessing oral health care services, but because they do not understand the importance of good oral health they choose not to go to the dentist. Thereby, these models not only improve access to oral health care but promote the utilization of oral health care services. Notwithstanding, improved oral health literacy alone does not always directly translate into seeking and using oral health care services. A patient with oral health literacy might understand the importance of oral health care services but face other barriers to accessing or utilizing care, such as transportation ("Removing"; Mertz, 2016). Along with improving oral health literacy, by connecting the patient to transportation, access to and use of care is expanded. Improving oral health literacy and expanding access to care go hand in hand.

Dental navigators and CDHCs focus on addressing multiple barriers to accessing

dental care services in order to improve access to care. Without addressing all barriers to care, a patient may never access the care they need to maintain or restore good oral health.

The following logic model shows the inputs, outputs, and overall impacts of these oral health workforce models.



Overall, by introducing new, innovative oral health workforce models focused on care coordination and patient education, social determinants of health, including barriers to accessing and utilizing dental care, can be addressed. Thereby, without barriers to care, access to and use of dental care is expanded. Through expanding access to and use of dental care, people will be able to access a dental home that continuously aims to maintain, restore, and improve oral health. Ultimately, through maintaining, restoring, and improving oral health, better oral health outcomes will be observed. Consideration of these models and how they improve oral health outcomes for vulnerable populations is extremely important as America faces a major dental crisis, in which many people have unmet dental needs and a variety of large oral health disparities exist.

The remainder of this brief aims to review current care management models across the United States and inform employment of new dental health professional workforce models in North Carolina, in order to improve oral health for all North Carolinians. Current care management approaches across the United States, including general dental navigator models, the ADA-formalized CDHC model, and care management models within medicine will be discussed. Thereafter, the state of dental care management in North Carolina is outlined. Discussion of current approaches, including strengths and limitations, is given to learn and apply findings to current and future models in North Carolina. Based on current approaches and the state of dentistry in North Carolina, recommendations are made for how the state of North Carolina should proceed with establishing dental care management workforce models.

Current Care Management Approaches

Dramatic Health Care Workforce Change Overall

Dramatic changes are shaping the entire health care industry. Landmark studies show how the medicalization of health is limited. Social determinants often stand in the way of desired outcomes and without addressing these determinants, good overall health cannot be achieved (Braveman, & Gottlieb, 2014; Lantz, 2019; Lantz et al., 2007; McGovern, 2014). With increased focus on the social determinants of health, a shift toward value-based care within medicine has occurred. Care is thereby more patient-centered and provider payment based on quality metrics, including addressing social determinants of health, is used to improve health outcomes (Braveman, & Gottlieb, 2014; Lantz, 2019; Lantz et al., 2007; McGovern, 2014).

Social determinants of health standing in the way of desired outcomes include factors that affect a patient's ability to access care, including accessing effective care and accessing it in an efficient or timely manner. Barriers to accessing care may be economic, geographic, and cultural, among others ("Access", 2020). Oral health care, in fact, has the highest financial barriers to care among all areas of health care for all people, regardless of age, family income level, sex, race, ethnicity, and other demographics (Vujicic et al., 2016). However, while care management is widely known and used within medicine to address barriers and expand access to care, it is often unknown within the dental profession (Grover, 2017). Therefore, opportunities exist to use care management to address barriers to accessing care, like the high financial barriers to care, within dentistry. Further, employing culturally competent individuals in these models can address cultural barriers to care ("Access", 2020).

A research article published in the North Carolina Medical Journal during 2016 highlighted how to build a value-based workforce in NC. It concluded to make the workforce effective, we need to broaden our definition of who is in the workforce; focus on retooling and retraining the existing workforce; shift from training workers in acute settings to training them in community-based settings; and increase accountability in the system so that public funds spent on the health progressions produce the workforce needed to meet the state's health care needs (Fraher, & Ricketts, 2016). Dental care management workforce models not only redefine who is in the existing workforce, but also offer an opportunity for the existing workforce to be retrained and enter a new role. Additionally, with the focus of these models in community-based settings, this research suggests these types of models would make the oral health care workforce in NC more effective.

Another article described the importance of reconfiguring health workforce policy so that education, training, and actual delivery of care are closely connected. Education and training should be connected more closely to the actual delivery of care. Students should be educated about the rapidly changing delivery system they will work within and gain experience in this system through their training. Regulatory policies should also be amended to allow for this education and training (Ricketts, & Fraher, 2013). Dental care management workforce models focus on utilizing education and training to prepare oral health care professionals for care delivery in community-based settings like those they will work within.

Review of Dental Navigator Models Across the US

Dental navigator models are already employed around the United States and are successfully expanding access to care. These models are used in various settings and targeting different vulnerable populations.

Dental navigator models expanding access to care for Medicaid beneficiaries. In New York, a dental case management program focuses on linking patients to dental offices and recruits dentists to participate in the Medicaid Program. As a result of this program, the percentage of dentists accepting new Medicaid patients increased from 2% to 28% from 2000 to 2004 (Silverman, Douglass, & Graham, 2013). Additionally, clients averaged three dental visits a year and kept greater than 98% of their appointments. This is compared to national averages of only half of adults visiting the dentist twice per year, and one in five adults reporting not visiting the dentist for a few years (ADA Health Policy Institute, 2020). Specifically, the percent of Medicaid clients receiving dental care increased from 8.7% in 2000 to 41% in 2004, almost a five-fold increase (Silverman et al., 2013).

A dental care coordinator intervention in Kentucky increased dental care utilization among Medicaid-eligible children as well. This model employed an intervention focusing on educating children, as well as parents; assisting the parents with finding their child a dentist if the child did not have one; and providing additional assistance and support in scheduling and keeping dental appointments (Binkley, Garrett, & Johnson, 2010). Outcomes of this model were compared with a control group, including all children who continued to receive routine Medicaid member services from the dental plan administrator, including newsletters and benefit updates. Dental utilization was significantly higher in the intervention groups as compared to the control groups, 43% and 26%, respectively (Binkley et al., 2010). This model suggests actively educating children and parents on the importance of oral health and assisting them with appointments through a care coordinator goes farther than simply making information about oral health literacy and how to obtain care available.

Dental navigator interventions in long term care settings. Not only are low-income children and their families at higher risk of poor oral health status, but poor oral health

status of residents in long term care settings has been repeatedly identified nationally and internationally in both dental and medical literature (Pronych, Brown, Horsch, & Mercer, 2010). Thereby, dental navigator models have also been employed conveniently in the long term care settings where residents reside. In New Hampshire, oral health coordinators educate patients at long-term care facilities about the importance of good oral health and how to adopt good oral hygiene techniques (Pronych et al., 2010). This model realized how the nursing staff are responsible for the daily care of the residents, and thereafter provided resources and education to nursing staff in addition to the residents. The result of this model was improvement of oral hygiene in all three facilities where the oral health coordinator was implemented (Pronych et al., 2010).

Dental navigator models in emergency departments. Another place to meet vulnerable populations where they are is in our nation's emergency departments. "Smiles for Life" is an emergency room (ER) referral program in West Virginia that employs a dental navigator in the ER. The dental navigator connects patients who come to the ER for a dental-related visit with 22 dental providers and 19 hygienists. Thereby this model connects vulnerable populations, mostly low income adults, with access to oral health care (ADA, 2015a). Additionally, it makes sure they utilize the care. About 300 patients per year are referred, with only a 2% no show rate to appointments. This extremely low no show rate can be attributed to how the dental navigator independently confirms appointments with patients. Further, there is a $25 medical screening fee collected before a referral is made and this fee acts as an incentive for patients to keep their appointments (ADA, 2015a). This model results in a 14% reduction in ER visits for dental pain (ADA, 2015a). This effect should not be undermined as emergency department (ED) overuse for preventable or non-urgent conditions is a growing public health concern, and many dental-related ED visits can be diverted to dental offices. Savings from diverting dental ED visits in the US are estimated to be up to $1.7 billion per year (Wall, Nasseh, Vujicic, 2014). This can be used to fund Medicaid premiums, preventative dental visits, and other more cost-effective interventions like dental care management workforce models (Wall et al., 2014).

Dental navigator models in tribal communities. Minority groups are unserved populations, and dental navigators are being employed around the US to give these populations access to care. In South Dakota, preschool children within the Great Plains Indian Health Service have one of the highest rates of tooth decay of any group in the country (ADA, 2014). "Circle of Smiles" was created to improve the oral health of American Indian children throughout the state by connecting tribal communities with culturally competent care (ADA, 2014). To maintain cultural competency, annual training is required of all staff. Under the supervision of a dentist, hygienists and oral health coordinators provide preventive care on tribal lands for children ages nine and younger, pregnant women and people with diabetes. Oral health coordinators also ensure children receive follow-up treatment, assist with scheduling appointments, and help families apply for Medicaid.This program provided services to over 6,400 people in its first year (ADA, 2014).

Using the current workforce for dental navigator models. In Pennsylvania, the current oral health care workforce is being trained differently in order to effectively coordinate patient care. A possible career path for Public Health Dental Hygienists (PHDH) in PA is to serve as a dental navigator. This workforce model has proven to be successful. One PHDH visited a large, urban pediatric office weekly over an eight week period and met for at least 5 but no more than 15 minutes with each patient. This intervention resulted in a 7% increase in the number of annual dental visits and 5% increase in the identification of caries for children at the pediatric office (Murray-Schoenecker, & Kimball, 2016). While these percentages seem small, they were gathered over a short 8 week time frame. In this same amount of time, there was also a 34% increase in the number of fluoride varnish applications for children ages 6 months to 5 years (Murray-Schoenecker, & Kimball, 2016). Dental navigators have the opportunity to connect patients with care and also give them care themselves.

Review of ADA-Formalized CDHC Models Across the US

In all 50 states, CDHC education and training can be received, and 45 states have CDHC graduates, trainees, or schools. There are more than 460 program graduates, as well as 200 students enrolled in programs collectively.

CDHCs provide clinical care. In Arizona, one CDHC began working with a single-dentist practice in a remote, rural location. Increased billable procedures and increased total care value of services provided highlighted how the CDHC was improving access to care (Manchir, 2018a). In this case, the CDHC was providing some oral health care services in addition to coordinating care (Manchir, 2018a). It is important to note how CDHCs can be trained in as little as six months, faster than other dental health professionals, and can contribute to care delivery (Manchir, 2018a). Thereafter, outcomes of the CDHC program speak to increased billable procedures or increased revenue.

CDHCs in tribal communities. In Arizona and Oklahoma, CDHCs are employed in tribal communities. One CDHC provided services in a rural tribal community health center's diabetes clinic one day per week and served 114 patients over a nine month period (ADA, 2012). This resulted in a 0% rate of missed appointments, while the overall rate of missed appointments center-wide was 18% (ADA, 2012). However, it is important to note this study is isolated and only considers the employment of a CDHC and not if these patients needed help with addressing other social determinants before accessing care.

CDHCs at safety net clinics. At a 2 day clinic in New Jersey during 2018, nearly 200 veterans received dental care and 78% established a dental home with the help of CDHCs (Manchir, 2018b). This clinic was held by a community health center, with whom patients could establish a dental home (Manchir, 2018b). In addition to utilizing CDHCs to coordinate care, employing a safety net clinic in the place of a dental home

should be considered for more convenient, comfortable connections to a dental home for patients.

Motivational interviewing training and cultural competence gives CDHCs an edge. Part of the CDHC curriculum and training is motivational interviewing, a collaborative, person-centered form of guiding to elicit and strengthen motivation for change. This training allows CDHCs to effectively communicate with people in their communities and mitigates cultural barriers that may reduce their effectiveness (ADA, 2015b; ADA, 2015c; Williams, 2019). In Pennsylvania, policy changes resulted in an increase in the number of adults eligible for dental services under Medicaid (ADA, 2015c). Thereafter, more people were flooding to community health centers throughout the state for dental treatment (ADA, 2015c). A CDHC described how she was able to help patients feel comfortable receiving the care they needed. "As a CDHC I'm a great help because of the motivational interviewing skills that I learned during my training. That can be as simple as just looking the patient in the eye and having an open conversation with them," (ADA, 2015c). Similarly a CDHC in Vermont described how "Where I feel that my CDHC training benefits me is in everything I've learned about cultural competency and motivational interviewing. I feel like clinically and dental hygiene wise I know my skills, I know what I need to say, and, when I'm seeing a patient, I know what I need to do. But I think the CDHC for me has given more resources and more knowledge and information about taking that next step in being able to reach families in a way that's culturally competent. Some cultures don't like people looking in their mouths. They're offended by that. So that might come across as us trying to invade them. For me to be able to explain that in America, it's not an invasion — just being more educated on the public health dental system and the cultural competence — that goes with reaching out to this patient population group," (Williams, 2019). Accordingly, CDHCs are equipped to interact effectively with target populations through motivational interviewing training and by embodying cultural competence. With this edge, they are able to help patients feel more comfortable accessing care.

Outcomes of Other Dental Care Management Models

Dental case managers for people with HIV/AIDS. In a study reviewing outcomes of dental case managers for people with HIV/AIDS, an association with retention in dental care and treatment plan completion was observed for vulnerable populations. Two or more encounters with dental case managers significantly increased retention in care (Lemay et al., 2013). Further, participants with more encounters were 2.73 times more likely to complete treatment (Lemay et al., 2013). Thereafter, consistent use of care management not only improves access to and utilization of care, but also has potential to increase the likelihood patients complete treatment. More visits with a case manager is important for the continuity of care.

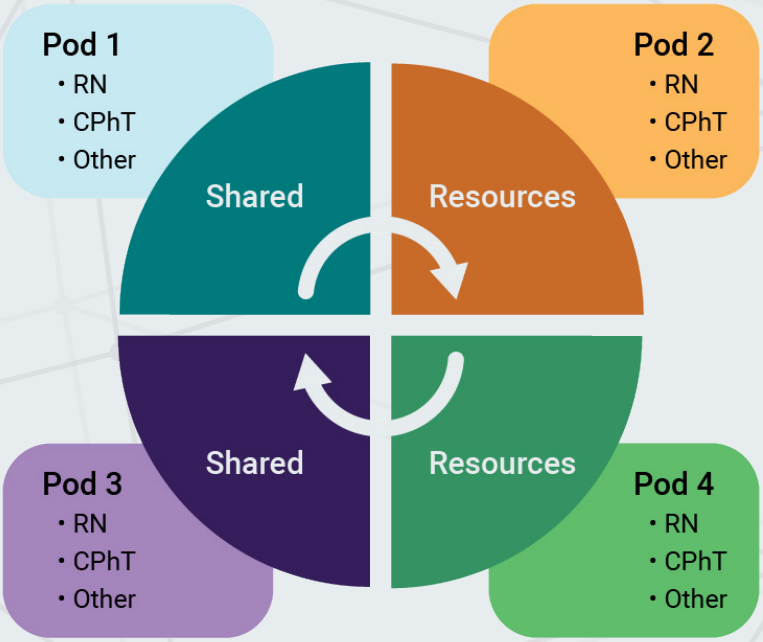
Care Management Models Within Medicine Across the US

Successful care management models within medicine can be used to advise dental care management models across the US.

Missions Health Partners medical home model. In North Carolina, challenges were noted that often prevent patients from achieving desired outcomes, including access to health care, high rates of poverty, transportation, and housing, among others. Mission Health Partners is a medical home model in NC that focuses on addressing social determinant gaps in their members and connects patients with a medical home, similar to a dental home, by using care coordination teams (Fields, 2017; Gold, 2016). They influence more than 70,000 lives in our state, including more than 50,000 Medicare beneficiaries spanning across 18 counties (Fields, 2017).

Interestingly, Mission Health Partners divides their care coordination team into pods, which are assigned to practices in the network based on patient attribution. The figure below shows how these pods consist of registered nurse (RN) care managers, certified pharmacy technician care coordinators (CPhTs), clinical pharmacists, licensed clinical social workers, and others working within their scopes of practice. The goal of the pod approach is to create intentional relationships between the Mission Health Partners care coordination team members and the staff and providers at the individual practices (Fields, 2017). Services like clinical pharmacy and behavioral health, as well as administrative support, are shared resources available to multiple pods (Fields, 2017). Further, these pods vary across settings. In primary care, a physician assistant may be employed to coordinate care, while in a hospital RNs are employed (Fields, 2017).

Figure 1.
Mission Health Partners Care Management Pod Model



Given the wide scope of populations Mission Health Partners is able to serve, an integrated type of model like the pod model might be a useful consideration for dental care management models that target various populations.

Synthesis of research on patient centered medical homes. Systematic reviews of patient-centered medical home models highlights how these models produce promising results. Patient-centered medical home models similarly emphasize comprehensive, coordinated, patient-centered care, with the goals of reducing spending and improving quality (Sinaiko et al., 2017). Like dental care management models, a primary focus of these models is coordinating patient care. These models are associated with less specialty visits, less spending, and more cancer screenings (Sinaiko et al., 2017). Similar models within dentistry would be expected to improve care quality and reduce spending. Value-based payment structures employed by these programs could be used to advise dental care management payment structure (Baseman, Boccuti, Moon, Griffin, & Dutta, 2016; Sinaiko et al., 2017).

Outcomes of other models within medicine. Research of care coordination models for non communicable disease (NCD) prevention and control showed integrated programs were typically effective (Puska, Nissinen, Shao, & Sarraf-Zadegan, 2004). Dental disease is also a NCD and like others, it can be prevented and has similar onset and progression. Thereafter, integrated community-based programs should be considered for dental care management models. Another study showed the effectiveness of community health workers in the care of persons with diabetes. The study showed improvements in participant knowledge and behavior, and a decrease in inappropriate health care utilization with the aid of community health workers (Norris, 2006).

Integration of medical and dental models. Health Commons is an integrated medical and dental home model model in New Mexico that emphasizes the importance of an interdisciplinary team of oral health, behavioral health, and physical health professionals with necessary social services workers to address social determinants (IOM, 2009). This comprehensive model brings together scarce resources for underserved areas to a single community-based setting. This model resulted in 1,500 dental visits in one month, while the yearly goal of dental visits is 16,000 and only 1,300 dental visits would be needed per month to meet this goal (IOM, 2009). An important aspect of this model is that education for all health professionals seeking employment within this model must include training with other team members (IOM, 2009).

Current State of Dental Care Management in NC

In North Carolina, dental care management workforce models are quite new like they are for the entire dental field (Grover, 2017). Although there is minimal information available, a few programs have been established and the positive outcomes of these programs are clear.

Kintegra Health dental navigators. Kintegra Health started using the dental navigator model in 2006 as part of a school-based program, with hygienists calling parents to schedule their children's appointments (Donigan, 2020). By 2010, dental navigators joined the hygienists at schools to help schedule appointments. During 2012, Kintegra hired a dental navigator for every county its school-based program served; one navigator each in Davidson, Lincoln, Catawba, and Iredell Counties, and two in Gaston County. Beginning in 2016, Kintegra Health placed dental navigators in other health care areas, including pediatric medical, OBGYN, and Women Infant Children (WIC) clinics to provide patient and parent education, schedule appointments in communication with parents, and apply fluoride varnish for children (Donigan, 2020). Although this program primarily serves children, some adults in OBGYN are also served. There is limited space for adults in Kintegra's dental clinics, so teledentistry is often used during medical appointments to bridge this gap (Donigan, 2020).

At Kintegra Family Health in Statesville, the pediatric medical clinic and family dentistry clinic once shared a waiting room. Since the offices were side-by-side, it was assumed that a medical provider would give a dental referral to patients and their parents, who would then schedule the appointment. Because of this, no dental navigator was employed at that location. In 2016, almost 970 new patients saw a dentist at Kintegra Health in Gaston County, where a dental navigator was employed in the pediatric medical clinic. During the same year, only 48 new dental patients were seen at Kintegra's Statesville location. After a navigator was employed in the Statesville WIC clinic, more than 50 new patients saw a dentist in just one month (Donigan, 2020). Now a total of 11 navigators are employed by Kintegra Health, and over the last eight years, these navigators have helped more than 9,500 patients access dental care (Donigan, 2020).

Kintegra Health has measured a 70 percent treatment completion rate for patients receiving oral health care with the help of dental navigators, compared to about a 30 percent completion rate in private practice (Donigan, 2020). Dr. William (Bill) Donigan, dental director at Kintegra Health, suggested that this difference is due to a lack of navigation. Thereafter, Kintegra Health's dental navigator model is increasing access to and use of care through care coordination.

CDHC education and training programs. Two CDHC programs are also established in North Carolina, one at Catawba Valley Community College and another at Alamance County Community College. These programs are year-long programs with specific curriculum, training, and internship requirements. Before entering the program, a CDHC candidate must also have a professional Dental Assistant II, Child Development Associate, or Registered Dental Hygienist license, as previously mentioned. While the CDHC curriculum is national, the programs are being adapted to make sure they are up-to-date and applicable for target populations in North Carolina (Alamance Community College, 2020; Catawba Valley Community College, 2020).

Further, in North Carolina, there are no CDHC-title jobs available; most jobs are marketed as general dental navigators without a specific CDHC requirement. Because of this, most students complete it as part of their continuing education and go on to work in other oral health roles (Adams, 2020; Alamance Community College, 2020; Catawba Valley Community College, 2020). The positive outcomes of the program need to be proven to stakeholders so that CDHC jobs are actually funded before CDHCs will be employed as CDHCs. More research, and time, is also needed to prove these models are working for the populations they are intended to work for.

Discussion

Upon reviewing research across dentistry and medicine, positive consequences and challenges are anticipated for implementation and success of dental care management workforce models, including dental navigators and CDHCs.

Anticipated Positive Consequences

Aside from expanding access to and use of care, there are other anticipated positive consequences of care management models. Similar models within medicine result in a higher quality of care and less waste across multiple domains. \

Higher quality of care. Care management models within medicine have proven to increase quality of care as care is provided more safely, delivered more equitably, delivered more efficiently, and is more effective (people get the care they need and people need the care they get) (Goodell et al., 2009).

Less waste across multiple domains. For similar models within medicine, less waste was observed across the clinical domains of care delivery and care coordination. In the care care delivery domain, less waste is observed especially due to the focus on preventative care. In the care coordination domain, waste is reduced as there are less ER admissions as a result of care coordination (Berwick, 2019; Goodell et al., 2009; Maddox, & McClellan, 2019; Shrank, Rogstad, & Parekh, 2019). These results are particularly applicable to dental care management workforce models as with focus on preventative care and care coordination in all models and focus on using care coordination to reduce ER admissions in some models. Like models within medicine, less waste across the clinical domains for oral health care would be expected. Medical models are also expected to reduce waste across other domains by reducing administrative complexity. Models would reduce the administrative burden by reducing time spent for billing and coding costs and reducing the insurance administrative burden and associated inefficiencies (Berwick, 2019; Goodell et al., 2009; Maddox, & McClellan, 2019; Shrank, Rogstad, & Parekh, 2019). Thereby, less waste is expected in the form of money spent on administrative work and the opportunity cost of time spent doing administrative work. More research is needed to prove this positive consequence, but similar models within dentistry would potentially reduce the administrative burden too (Berwick, 2019; Goodell et al., 2009; Maddox, & McClellan, 2019; Shrank, Rogstad, & Parekh, 2019).

Anticipated Challenges

There are a variety of challenges anticipated for implementation, as well as success of these models that should be considered and addressed.

Implementation of education and training programs and implementation of models into the workforce. The implementation of education and training programs, especially in the case of CDHC models, requires time, effort, and funding. Further, the implementation of these models into the workforce itself also requires time, effort, and funding. Ensuring all key stakeholders understand the purpose and goals of these models before implementation of education and training programs, as well as implementation of these models into the workforce is essential so that time spent feels worthwhile and efforts are clear. Without key stakeholders wanting to devote time and effort for the long-term goals of these models, early challenges may not be overcome. Funding also needs to be considered early on as implementation of training and educational programs and actual workforce models poses costs. These costs include paying educators and supporting students, paying employed graduates, supporting policy changes, and supporting associated advocacy work.

Recruiting individuals from vulnerable communities. These models seek to recruit culturally competent individuals from vulnerable communities, who are employed in and serve in their community. The cost of training and educational programs may pose a burden for some of these individuals who are low income. It may also pose a burden for individuals who need to stay in their community during education and training instead of leaving their community to obtain it (Adams, 2020; Donigan, 2020). Thereafter, ways to fund education for the individuals we wish to recruit should be considered. Additionally, a virtual format for education and training or on-site education and training should be considered for individuals who need to stay in their communities.

Applicability of a national curriculum. In the case of the CDHC model, consolidation and merging of programs under a national approach may lead to challenges. For example, state insurance programs vary and CDHC students in each state cannot be best equipped to serve their respective state by learning national material. Thereafter, content of the CDHC curriculum will need to be adapted for respective states, which will require additional time and potentially more funding (Adams, 2020; Alamance Community College, 2020; Catawba Valley Community College, 2020).

Payment issues of dentists. A variety of payment issues will need to be addressed for the long term success of these models. As a dental navigator or CDHC recruits more patients with needs, they will need to refer them to more dentists. This raises the question of where will patients with needs be referred when there are no more dentists willing to accept them (IOM, 2009). In North Carolina, approximately 31% of practicing dentists accept Medicaid although this is likely a lower statistic. Many of the people these models target are low-income and would likely be Medicaid beneficiaries. There may not be enough dentists willing to care for the Medicaid patients these models recruit.

Payment structure for dental navigators and CDHCs. These models focus on reducing

visits needed for treatment, eliminating duplication, and reducing visits needed for speciality care especially by focusing on prevention. Thereafter, challenges paying people employed as dental navigators or CDHCs under the current fee-for-service system would be expected. New codes for care coordination payment need to be considered so that dental navigators and CDHCs can actually make a living in these roles that is comparable to that they would make in other oral health professional roles (NCOHC, 2020). In this way, they are more likely to seek employment as a dental navigator or CDHC. (See Appendix B for code information.)

Timeliness and delayed results. These models are new, and it will be a long period of time before clear results are available. Inconsistent results would also be expected, especially as these models are new. Formative evaluations to make sure these models succeed long-term should be considered as results will not be obtainable quickly. Additionally, a sense of patience among key stakeholders for results will be necessary.

Recommendations for Dental Care Management Workforce Models in the State of North Carolina

Recommendations for the state of North Carolina as dental care management workforce models are considered and employed are outlined below.

1) **Determine whether to use dental navigators, CDHCs, or another model, and determine whether to establish education and training programs on-site, virtually, or off-site, or a combination of the like in consideration of population-by-population needs and barriers to accessing care.**
    a) Only require certain parts of formal criteria for some students depending on what they hope to accomplish with their education and training. For example, in the case of the CDHC model some CDHCs may not provide clinical care but are required to obtain Dental Assistant II, Child Development Associate, or Registered Dental Hygienist licensure before start or completion of CDHC programs. Not requiring clinical care skills enables some students to work in the field faster if they do not anticipate providing clinical care and rather want to focus on coordinating patient care.
2) **Engage stakeholders effectively early on.** Ensure they understand the prevalence of poor oral health and oral health access issues. Ensure they understand the goals of these programs of expanding access to and utilization of care, as well as improving oral health outcomes.
3) **Consider employing models in varied settings.** These models can be employed in the same communities where vulnerable populations reside, but they can also be employed in other areas where vulnerable populations go like emergency departments. They could also be employed at long-term-care facilities and in pediatric clinics for populations with poor oral health (i.e. older adults and young children).
4) **Consider training individuals who may not have oral health care experience.** Instead of training someone who already has oral health professional licensure, train someone who has no prior oral health professional experience. This might make recruiting individuals from vulnerable communities easier, especially if they are less likely to have oral health care experience.
5) **Continually monitor and evaluate programs to ensure their long-term success.**

Monitoring indicators could be patient education and patient volumes. Evaluation indicators could be prevalence of dental caries and prevalence of a connection with and use of a dental home. Data sources to obtain metrics are NCDHHS, providers, and community records via surveys.

6) **Expand Medicaid and make appropriate code changes to fund programs.** Medicaid expansion will make care more affordable for some people these models target. Further, Medicaid expansion will make working in vulnerable communities more attractive for dental navigators, CDHCs, and other oral health care providers as the populations there will be able to pay for care received. Code changes to provide for payment for care coordination management, addressing appointment compliance, motivational interviewing, and patient education will also make working as dental navigators or CDHCs more attractive (NCOHC, 2020) (See Appendix B).

7) **Employ a large scale oral health literacy campaign.** As mentioned previously, many people in the general population do not understand the importance of good oral health. With understanding, they will be more likely to use the care when given access. Partnering with professionals in other medical and public health fields could be considered to make sure this campaign reaches all of the people it needs to reach. A campaign will ensure that improved oral health literacy and expanded access to oral health care go hand in hand, and people actually utilize care more as a result.

Concluding Remarks

Dental care management models expand access to care for vulnerable populations through care coordination. Using care coordination, these models address social determinants of health and break down barriers to accessing dental care by connecting people not only with care itself but also connecting people with the resources needed to access care. By employing culturally competent individuals, these models also have the opportunity to improve oral health literacy and improve actual utilization of care. Access to and utilization of oral health care is expected to result in better oral health outcomes. Thereby, these models have strong potential to address the current dental care crisis by expanding access to care and improving oral health outcomes for Americans, especially vulnerable populations.

Dental navigator models and the ADA-formalized CDHC model specifically are already expanding access to care. Positive consequences and anticipated challenges of these models can be considered as more models are put into practice.

More research is needed to comprehensively evaluate current dental care management workforce models and ensure their long-term success. This additional research can be used to better inform future models as well. Areas for further research include community health workers with oral health focus. Community health workers are also employed in community-based settings and focus on connecting vulnerable populations with care and the resources needed to access it through care coordination.

The disproportionate effects of poor oral health outcomes on vulnerable populations and the changing care delivery system make these models increasingly more important to consider. The recommendations for dental care management workforce models in the state of North Carolina, as based on other models, will be invaluable going forward.

References

Access to Health Services. HealthyPeople.gov. (2020, September 30). https://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services

ADA Health Policy Institute. (2020). *ADA Health Policy Institute FAQ – Dental Patients in the U.S.* American Dental Association. https://www.ada.org/en/science-research/health-policy-institute/dental-statistics/patients

Adams, C. (June, 2020). Catawba Valley Community College Community Dental Health Coordinator Program Director; NC. Interview.

Alamance Community College. (2020). *Community Dental Health Coordinator.* https://www.alamancecc.edu/continuing-education-site/home/healthcare-2/community-dental-health-coordinator/

American Academy of Pediatric Dentistry. (2015). *Definition of Dental Home.* The Reference Manual of Pediatric Dentistry. https://www.aapd.org/research/oral-health-policies--recommendations/Dental-Home/

American Dental Association. (2012, October). *Breaking Down Barriers to Oral Health for All Americans: The Community Dental Health Coordinator.* http://www.ada.org/~/media/ADA/Advocacy/Files/ADA_Breaking_Down_Barriers-Community_Dental_Health_Coordinator.pdf

American Dental Association. (2013, April). *The Dental Divide in America.* https://www.ada.org/~/media/ADA/Public%20Programs/Files/ADH%20PDFs/ADA_Dental-Divide-in-America-Infographic.pdf

American Dental Association. (2014, November 14). *South Dakota Dental Partnership Improves Oral Health on American Indian Reservations.* https://www.ada.org/en/public-programs/action-for-dental-health/action-for-dental-health-success-stories/south-dakota-dental-partnership-improves-oral-health-on-american-indian-reservations

American Dental Association. (2015a, February 23). *Health Department in West Virginia Connects Low-Income Adults with Community Dentists.* https://www.ada.org/en/public-programs/action-for-dental-health/action-for-dental-health-success-stories/health-department-in-west-virginia-connects-low-income-adults-with-community-dentists

American Dental Association. (2015b, April 3). *CDHC Helps Virginia Community Overcome Barriers to Dental Care.* https://www.ada.org/en/public-programs/action-for-dental-health/action-for-dental-health-success-stories/cdhc-helps-virginia-community-overcome-barriers-to-dental-care

American Dental Association. (2015c, September 25). *CDHC Helps New Pennsylvania Medicaid Patients Navigate Public Health Care System.* https://www.ada.org/en/public-programs/action-for-dental-health/action-for-dental-health-success-stories/cdhc-helps-new-pennsylvania-medicaid-patients-navigate-public-health-care-system

American Dental Association. (2020a). *Action for Dental Health.* https://www.ada.org/en/public-programs/action-for-dental-health

American Dental Association. (2020b). C*ommunity Dental Health Coordinator: Empowering Communities through Education and Prevention.* https://www.ada.org/~/media/ADA/Public%20Programs/Files/CDHC_Brochure.pdf?la=en

American Dental Association. (2020c). *Solutions: About CDHCs.* https://www.ada.org/en/public-programs/action-for-dental-health/community-dental-health-coordinators

American Dental Association. (2020d, January). *Community Dental Health Coordinators Provide Solutions Now.* https://www.ada.org/~/media/ADA/Public%20Programs/Files/ADA_CDHC_Flyer_Infographic_Jan2020.pdf?la=en

Baseman, S., Boccuti, C., Moon, M., Griffin, S., & Dutta, T. (2016, November 17). *Payment and Delivery System Reform in Medicare: A Primer on Medical Homes, Accountable Care Organizations, and Bundled Payments - Report.* KFF. https://www.kff.org/report-section/payment-and-delivery-system-reform-in-medicare-report/

Berwick D. M. (2019). Elusive Waste: The Fermi Paradox in US Health Care. *JAMA*, 10.1001/jama.2019.14610. Advance online publication. https://doi.org/10.1001/jama.2019.14610

Binkley, C. J., Garrett, B., & Johnson, K. W. (2010). Increasing dental care utilization by Medicaid-eligible children: a dental care coordinator intervention. *Journal of public health dentistry,* 70(1), 76–84. https://doi.org/10.1111/j.1752-7325.2009.00146.x

Braveman, P., & Gottlieb, L. (2014). The social determinants of health: it's time to consider the causes of the causes. *Public health reports (Washington, D.C. : 1974), 129 Suppl 2*(Suppl 2), 19–31. https://doi.org/10.1177/00333549141291S206

Care Coordination. (August, 2018). Agency for Healthcare Research and Quality, Rockville, MD. https://www.ahrq.gov/ncepcr/care/coordination.html

Catawba Valley Community College. (2020). *Community Dental Health Coordinator.* http://www.cvcc.edu/CCE/Health_Services/Community-Dental-Health-Coordinator.cfm

Center for Disease Control. (2011). *Oral health; preventing cavities, gum disease, tooth loss, and oral cancers : at a glance 2011.* CDC Stacks Public Health Publications .

https://stacks.cdc.gov/view/cdc/11862

Donigan, B. (July, 2020). Kintegra Health Dental Director; NC. Interview.

Fields R. (2017). Mission Health Partners: A Community-Based Social Determinants Driven Accountable Care Organization. *North Carolina medical journal, 78*(4), 245–247. https://doi.org/10.18043/ncm.78.4.245

Figueroa, J. F., Wadhera, R. K., & Jha, A. K. (2020). Eliminating Wasteful Health Care Spending-Is the United States Simply Spinning Its Wheels?. *JAMA cardiology, 5*(1), 9–10. https://doi.org/10.1001/jamacardio.2019.4339

Fraher, E. P., & Ricketts, T. C., 3rd (2016). Building a Value-Based Workforce in North Carolina. *North Carolina medical journal, 77*(2), 94–98. https://doi.org/10.18043/ncm.77.2.94

Gold, J. (2016, July 13). *Accountable Care Organizations, Explained.* Kaiser Health News. https://khn.org/news/aco-accountable-care-organization-faq/

Goodell, S., Berry-Millet, R., & Bodenheimer, T. (2009, December). *Care Management of Patients with Complex Health Care Needs.* The Synthesis Project. https://www.rwjf.org/en/library/research/2009/12/.html. care-management-of-patients-with-complex-health-care-needs

Grover J. (2017). Community Dental Health Coordinators: Cultural "Connectors" for Oral Health. *North Carolina medical journal, 78*(6), 383–385. https://doi.org/10.18043/ncm.78.6.383

Institute of Medicine (US) Board on Health Care Services. *The U.S. Oral Health Workforce in the Coming Decade: Workshop Summary.* Washington (DC): National Academies Press (US); 2009. 10, Workforce Strategies for Improving Access. Available from: https://www.ncbi.nlm.nih.gov/books/NBK219681/

Joynt Maddox, K. E., & McClellan, M. B. (2019). Toward Evidence-Based Policy Making to Reduce Wasteful Health Care Spending. *JAMA, 322*(15), 1460–1462. https://doi.org/10.1001/jama.2019.13977

Lantz, P. M., Lichtenstein, R. L., & Pollack, H. A. (2007). Health policy approaches to population health: the limits of medicalization. Health affairs (Project Hope), 26(5), 1253–1257. https://doi.org/10.1377/hlthaff.26.5.1253

Lantz P. M. (2019). The Medicalization of Population Health: Who Will Stay Upstream?. *The Milbank quarterly, 97*(1), 36–39. https://doi.org/10.1111/1468-0009.12363

Lemay, C. A., Tobias, C., Umez-Eronini, A. A., Brown, C., McCluskey, A., Fox, J. E., Bednarsh, H., & Cabral, H. J. (2013). Dental case manager encounters: the association with retention in dental care and treatment plan completion. *Special care in dentistry : official publication of the American Association of Hospital*

Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry, 33(2), 70–77. https://doi.org/10.1111/j.1754-4505.2012.00293.x

Manchir, M. (2018a, November 9). *ADA visits Navajo Nation, where Community Dental Health Coordinators' work is in the spotlight.* American Dental Association. https://www.ada.org/en/publications/ada-news/2018-archive/september/ada-visits-navajo-nation-where-community-dental-health-coordinators-work-is-in-the-spotlight

Manchir, M. (2018b, November 19). *Helping veterans navigate care: Community Dental Health Coordinators pitch in.* American Dental Association. https://www.ada.org/en/publications/ada-news/2018-archive/november/helping-veterans-navigate-care

McGovern, L. (2014, August 21). *The Relative Contribution of Multiple Determinants to Health.* Health Affairs. https://www.healthaffairs.org/do/10.1377/hpb20140821.404487/full/

Mertz E. A. (2016). The Dental-Medical Divide. *Health affairs (Project Hope), 35*(12), 2168–2175. https://doi.org/10.1377/hlthaff.2016.0886

Murray-Schoenecker, D. L., & Kimball, C. E. J. (2016, October 1). Dental Navigator. https://dimensionsofdentalhygiene.com/dental-navigator/

Norris, S. L., Chowdhury, F. M., Van Le, K., Horsley, T., Brownstein, J. N., Zhang, X., Jack, L., Jr, & Satterfield, D. W. (2006). Effectiveness of community health workers in the care of persons with diabetes. *Diabetic medicine : a journal of the British Diabetic Association, 23*(5), 544–556. https://doi.org/10.1111/j.1464-5491.2006.01845.x

North Carolina Oral Health Collaborative. (2020). NCOHC Policy Brief 2020. https://drive.google.com/file/d/109TC0av7PfGuQP9K4EaMnzt_RQ5DAChK/view?mc_cid=8c86835e94&mc_eid=17653913ae

Phipps, K.R., & Ricks T.L. (2015). *The oral health of American Indian and Alaska Native children aged 1-5 years: results of the 2014 IHS oral health survey.* Indian Health Service data brief. Rockville, MD: Indian Health Service.

Pronych, G. J., Brown, E. J., Horsch, K., & Mercer, K. (2010). Oral health coordinators in long-term care--a pilot study. *Special care in dentistry : official publication of the American Association of Hospital Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry, 30*(2), 59–65. https://doi.org/10.1111/j.1754-4505.2010.00123.x

Puska, P., Nissinen, A., Shao, R., & Sarraf-Zadegan, N. (2004, August 1). *The Protocol for the WHO Study on the Effectiveness of Community-Based Programmes for NCD Prevention and Control (COMPASS).* World Health Organziation. https://apps.who.

int/iris/bitstream/handle/10665/68766/a85150.pdf

Ricketts, T. C., & Fraher, E. P. (2013). Reconfiguring health workforce policy so that education, training, and actual delivery of care are closely connected. *Health affairs (Project Hope), 32*(11), 1874–1880. https://doi.org/10.1377/hlthaff.2013.0531

Removing Barriers to Care. Academy of General Dentistry. https://www.agd.org/dental-practice-advocacy-resources/advocacy-resources/key-federal-issues/removing-barriers-to-care.

Ruggiero K, Pratt P, Antonelli R. Improving outcomes through care coordination: Measuring care coordination of nurse practitioners. J Am Assoc Nurse Pract. 2019 Aug;31(8):476-481. doi: 10.1097/JXX.0000000000000276. PMID: 31389863.

Silverman, J., Douglass, J., & Graham, L. (2013, June). The Use of Case Management to Improve Dental Health in High Risk Populations. https://www.aapd.org/assets/1/7/Case_Management.pdf

Sinaiko, A. D., Landrum, M. B., Meyers, D. J., Alidina, S., Maeng, D. D., Friedberg, M. W., Kern, L. M., Edwards, A. M., Flieger, S. P., Houck, P. R., Peele, P., Reid, R. J., McGraves-Lloyd, K., Finison, K., & Rosenthal, M. B. (2017). Synthesis Of Research On Patient-Centered Medical Homes Brings Systematic Differences Into Relief. *Health affairs (Project Hope), 36*(3), 500–508. https://doi.org/10.1377/hlthaff.2016.1235

Shrank, W. H., Rogstad, T. L., & Parekh, N. (2019). Waste in the US Health Care System: Estimated Costs and Potential for Savings. *JAMA, 322*(15), 1501–1509. https://doi.org/10.1001/jama.2019.13978

The Pew Charitable Trusts. (2009, May). *Help Wanted: A Policy Maker's Guide to New Dental Providers.* The Pew Center on the States. https://www.pewtrusts.org/en/research-and-analysis/reports/2009/05/28/help-wanted-a-policy-makers-guide-to-new-dental-providers

U.S. Centers for Medicare & Medicaid Services. *Navigator - HealthCare.gov Glossary.* HealthCare.gov. https://www.healthcare.gov/glossary/navigator/

U.S. Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General.* Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

Vujicic, M., Buchmueller, T., & Klein, R. (2016). Dental Care Presents The Highest Level Of Financial Barriers, Compared To Other Types Of Health Care Services. *Health affairs (Project Hope), 35*(12), 2176–2182. https://doi.org/10.1377/hlthaff.2016.0800

Wall T, Nasseh K, Vujicic M. *Majority of dental-related emergency department visits lack urgency and can be diverted to dental offices.* Health Policy Institute Research Brief. American Dental Association. August 2014. Available from: http://www.ada.org/~/media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_0814_1.ashx.

Williams, J. (2019, April 15). *Vermont Community Dental Health Coordinators shine.* American Dental Association. https://www.ada.org/en/publications/ada-news/2019-archive/april/vermont-community-dental-health-coordinators-shine

Appendix A. Metrics for comparing how similar other states are to NC and assessing the applicability of their models.

Measures Evaluated:

1) Partisan ID index
2) Liberal-Conservative Demographic
3) Per Capita Income
4) Age Distribution
5) African-American/Hispanic Population
6) Urbanization Index

States Under Consideration (In Reference to the Metrics Above):

North Carolina compared to _____

1) South Carolina
2) Georgia
3) Missouri
4) Tennessee
5) West Virginia
6) Kentucky
7) Louisiana
8) Pennsylvania (although this state seems to differ it is similar with restrictive oral health policy)
9) Arizona (tribal models applicable to tribal communities in NC)
10) Oklahoma (tribal models applicable to tribal communities in NC)

Table 1: Evaluation of Metrics by State

	Partisan ID	Per Capita Income	Liberal-Conservative Demographic	Age Distribution	African American Population	Hispanic Population	Urbanization Index (8.26 - 12.56)
NC	41% D 41%R Classification: Competitive	$45,834	Competitive	Children: 24% Adults: 60% 65+: 16%	21.13%	962,000	10.32
SC	37% D 47% R Classification: Strong Republican	$42,736	Conservative	Children: 23% Adults: 59% 65+: 18%	26.80%	285,000	10.11
GA	43% D 42% R Classification: Competitive	$45,745	Competitive	Children: 26% Adults: 60% 65+: 14%	31.03%	1,001,000	10.55
MO	38% D 42% R Classification: Lean Republican	$46,635	Conservative	Children: 24% Adults: 59% 65+: 17%	11.49%	255,000	10.20
TN	35% D 49% R Classification: Strong Republican	$47,179	Conservative	Children: 24% Adults: 60% 65+: 16%	16.65%	361,000	10.20
WV	37% D 49% R Classification: Strong Republican	$40,578	Conservative	Children: 21% Adults: 59% 65+: 20%	3.59%	22,000	9.11

KY	42% D 45% R Classification: Competitive	$41,779	Competitive	Children: 24% Adults: 60% 65+: 16%	7.87%	155,000	9.79
LA	37% D 45% R Classification: Lean Republican	$45,542	Conservative	Children: 25% Adults: 60% 65+: 15%	32%	243,000	10.18
PA	46% D 40% R Classification: Lean Democratic	-	Liberal	Children: 22% Adults: 59% 65+: 18%	12.54%	905,156	11.15
AZ	41% D 41% R Classification: Competitive	-	Competitive	Children: 24% Adults: 57% 65+: 18%	5.29%	2,163,310	11.30
OK	38% D 46% R Classification: Lean Republican	-	Conservative	Children: 26% Adults: 59% 65+: 16%	9.06%	407,521	9.94

*FiveThirtyEight's urbanization index is calculated as the natural logarithm of the average number of people living within a five-mile radius of a given resident and sources from the American Community Survey.

References

Partisan ID: https://news.gallup.com/poll/247025/democratic-states-exceed-republican-states-four-2018.aspx

Income Rate Per Capita 2018: https://worldpopulationreview.com/states/per-capita-income-by-state/

Political Ideology By Region: https://www.pewforum.org/religious-landscape-study/compare/political-ideology/by/region/

Age Distribution 2018 (Census Bureau's American Community Survey, 2008-2018): https://www.kff.org/other/state-indicator/distribution-by-age/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

African American Demographic Based on State Population Percentage 2020: https://worldpopulationreview.com/states/black-population-by-state/

Hispanic Population By State in 2017: https://worldpopulationreview.com/state-rankings/hispanic-population-by-state

Urbanization Index: https://fivethirtyeight.com/features/how-urban-or-rural-is-your-state-and-what-does-that-mean-for-the-2020-election/

Census Data: https://www.census.gov/quickfacts/fact/table/NC,US/PST045219

Appendix B. Policy codes to consider in NC include CDT code D9991-D9994

Dental navigators / community care coordination — CDT code D9992 provides for care coordination management, which involves assisting in a patient's decisions regarding coordination of oral health care across multiple providers, health systems, specialty areas of treatment, and payment systems. Application of this code would allow for "dental navigators," Community Dental Health Coordinators (CDHC), and Community Health Workers (CHW) with an oral health focus to be paid for their care coordination work (NCOHC, 2020).

D9991, D9992, D9993 and D9994 — Service covered by CDT code D9992 (care coordination management) plays an important part in providing patient-centered care. NCOHC recommends that public and private payer sources add D9992 as a covered service. Additional codes that should be considered as part of incentivizing patient-centered care include: D9991 (addressing appointment compliance), D9993 (motivational interviewing), and D9994 (patient education to improve oral health literacy) (NCOHC, 2020).