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DENTAL THERAPISTS: ARIZONA DENTISTS' PERCEPTIONS AND ATTITUDES TOWARDS THE WORKFORCE MODEL

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Dedication

Thank you, God, for salvation, peace, and comfort. I can do all things through Christ who strengthens me ~Philippians 4:13

To my husband, Dustin. Thank you for believing in me and encouraging me to get my master's. Your optimism always inspires me. I am blessed to have you as my partner in life.

To my children, Luke and Lily. You have been so patient with me while I have been so busy with my schoolwork. Always pursue your dreams and never give up. My favorite thing in the world is being your mom.

And to my mom. I know you are beaming with pride!

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ABSTRACT

Dental therapists have emerged as a solution to improve access to dental care. Understanding Arizona dentists' attitudes towards dental therapists is crucial in the successful integration into the dental workforce and its potential to be a viable solution. Licensed dentists in Arizona were invited to participate in an anonymous study. Participants were asked questions regarding the scope of practice, current educational standards, and quality of treatment to determine the attitudes of dentists towards dental therapists. Eight dentists licensed in Arizona participated in the survey (N=8). The study found concerns among Arizona dentists regarding the treatment quality and educational standards (N=3; 37.5%). Still, most dentists believed that dental therapists could improve access to dental care in Arizona (N=5; 62.5%). Due to the limited response rate, continued research is necessary to ensure that dental therapists are an effective means to improving access to oral health care in Arizona.

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Chapter One

Introduction

According to the 2021 National Institutes of Health report, oral health is a 'fundamental component of health and physical and mental well-being'.[1] The report further highlighted the importance of oral health to a person's overall health, emphasizing oral health promotion and disease prevention.[1] Access to care barriers such as low-income, uninsured, or rural populations contribute to the rates of untreated oral diseases.[2,3] The World Health Organization recognizes that oral health is integral to general health, making access to oral care an absolute necessity for maintaining optimal well-being.[2,3] Dental therapists have been introduced as a solution to this gap in oral health care, serving as a new addition to the dental workforce.[4,5]

Dental therapists are midlevel treatment providers licensed to provide dental restorative treatment and preventive care to increase accessibility and affordability of care.[5,6] Dental therapists were first introduced in New Zealand in 1921 and have since been adopted in more than 50 other countries to combat the oral health crisis.[5,6,7] In the United States, dental therapists only recently gained licensure, with Alaska being the first state to grant licensure in 2004.[6,7] Fourteen states have since adopted licensure regulations approving the practice of dental therapists within the state.[8]

The Introduction of dental therapists into the workforce improves access to oral healthcare.[4,8] However, there are varying opinions on this new team member.[4,7,9] Arizona has authorized the practice of dental therapists within the

state and has issued licenses to eligible applicants. Identifying the attitudes and perceptions of Arizona dentists toward dental therapists will help evaluate the successful integration of this new midlevel provider into Arizona's workforce model.

Statement of the Problem:

Do Arizona dentists view dental therapists as a potential solution for enhancing access to dental care in the state? Do Arizona dentists believe that dental therapists can provide treatment of similar quality to dentists within their permitted scope of practice? Furthermore, is there a correlation between dentists' membership in a dental organization and their opinions regarding dental therapists?

Significance of the Problem:

Neglecting oral care adversely affects children and adults, leading to low self-esteem, strained relationships, and poor cognitive and behavioral abilities that can impact school and work performance.[1] Regular oral care can also help prevent pain, costly dental procedures, emergency room visits, and dental infections.[3] Research indicates that oral health problems are also connected to diabetes, heart disease, stroke, and respiratory diseases.[7] Maintaining good oral health and improving access to dental care can reduce rates of oral disease and enhance quality of life and overall well-being.[1-3]

Throughout the United States, dental professionals are maldistributed, resulting in access to care shortages in some areas.[10] The presence of 184 federally designated Dental Health Professional Shortage Areas within Arizona

alone contributes significantly to unmet dental needs, requiring the addition of an estimated 456 dentists to deliver dental services to Arizona residents.[11] Access to care is also affected by high treatment costs and lack of insurance coverage, with few dental providers accepting state dental insurance.[2,12] Efforts to address these barriers led to the introduction of dental therapists to the workforce in Arizona.[4,7,10] Dental therapists are midlevel providers that provide restorative and preventive care and are expected to improve access to care.[6]

Incorporating dental therapists into dental care delivery aims to enhance accessibility to oral healthcare, with more states passing laws to permit the licensing of dental therapists. However, there are differing opinions on this addition to the workforce model.[4,7,9] An American Dental Association (ADA) spokesperson stated that the ADA "does not consider the one-size-fits-all mid-level dental provider to be a viable solution to the diverse set of barriers that impede millions from getting dental care."[13] However, the American Dental Hygienist's Association supports the role of the dental therapist recognizing its potential to deliver dental care services to rural communities.[14]

Dental therapists are trained to be well-educated, highly trained, cost-effective providers. Fourteen states, including Arizona, have enacted laws to support the oral health needs within their state.[8] These midlevel providers are anticipated to alleviate the staffing issues in community health settings and rural areas and provide more affordable treatment options.[4,6]

The integration of dental therapists is expected to be a solution for addressing our communities' oral health needs. Therefore, it is crucial to assess

dentists' attitudes, shedding light on any potential issues that might impact the initiative's success. Unfortunately, there is a lack of long-term studies that provide statistical information on patient outcomes, cost-effectiveness, and overall impact of integrating dental therapists in the United States. However, the limited reports on the influence of dental therapists in the United States indicate that they have enhanced access to dental care and utilization, particularly among the rural and low-income populations.[4,15,16] Recognizing, understanding, and managing the perspectives of Arizona dentists toward dental therapists is essential for successfully integrating dental therapists into the workforce and achieving the overall goal of improving access to dental care.

Operational Definitions:

Dental therapist- a midlevel provider licensed and engaged in the general practice of dental therapy and all related and associated duties, including educational, clinical, and permitted therapeutic dental therapist procedures.

Oral health care team- dentists, dental hygienists, dental assistants, dental technicians, and other persons employed by dentists, firms, and businesses.

Oral disease- any condition that affects the health of the mouth, dentition, periodontium, or tongue.

Access to oral health care- access to dental services; preventive or restorative.

Restorative dental treatment- dental procedures and interventions that restore or repair damaged, decayed, or missing teeth and oral structures to their normal function and appearance.

Preventive dental treatment- dental procedures, practices, and strategies to prevent dental problems and maintain optimal oral health.

General supervision- a dentist is available for consultation regarding procedures the dentist has authorized and for which the dentist remains responsible. The dentist may or may not be physically present in the office.

Direct supervision- a licensed dentist is present in the office and available to provide treatment or care to a patient and observe the dental team members.

Chapter Two: Review of the Literature

Introduction

The literature review examines the implementation of dental therapists within the workforce model. Most available literature on this topic originates from countries other than the United States, as other countries have incorporated dental therapists into their healthcare systems long before the United States.

This review will focus on the origin of dental therapists, including the use of dental therapists internationally and in the United States workforce. The PubMed and the National Institute of Health databases were searched for keywords such as dental therapy, dental therapist, access to care, and oral health disparities.

Description and Origin of Dental Therapists

Dental therapists are considered midlevel providers licensed to provide preventive and basic restorative treatment under the supervision of a dentist.[6,8] The primary objective of the dental therapist's role is to improve access to affordable dental care in underserved, low-income, rural, and underinsured areas, thereby aiding in reducing oral health disparities within those communities.[4,6,7]

In 1921, New Zealand began training school dental nurses to provide basic preventive and restorative dental care to children within the school system.[4,5] The need for school dental nurses was in response to potential military inductees' poor oral health reports. The success of school dental nurses resulted in the expansion of this workforce model to other countries, with an increasing

number of dental nurses being utilized to enhance oral health care.[4,5] Around 1980, these school dental nurses would become known as dental therapists.[5] Currently, dental therapists are integrated into the workforce model in over 50 countries worldwide. Among those countries, New Zealand, Australia, the Netherlands, Canada, and Great Britain have reported success with dental therapist implementation.[4] The utilization of dental therapists is widespread, providing services in developed and developing countries and regions with varying levels of access to oral care.[4,5]

The dental therapists' scope of practice varies among countries, with some allowing more advanced restorative treatment procedures than others.[5] Typically, dental therapists provide dental exams, including diagnosis and treatment planning, preventive care, restorative treatment, and extraction of primary teeth. Although dental therapists typically work in school dental clinics, some countries have broadened their scope of practice to encompass community-based and hospital clinics. Additionally, they may provide services to adult patients instead of exclusively focusing on children.[5,17] The primary objective of dental therapists within the oral health workforce remains focused on enhancing access to care and providing affordable dental services to the population.[4,17]

Global Data

The global data indicates that children's dental disease rates have declined after the introduction of dental therapists in the workforce, thereby indicating the effectiveness of dental therapists.[5,17] Nash reports that the

"*Epidemiological data available since 1965 document that New Zealand has been more effective in treating dental caries in its public school-based program of care provided by dental therapists, than has the United States in its system of care in private offices by dentists".*[17] In 2010, New Zealand reported that 98% of children between the ages of 5 and 13 were actively involved in New Zealand's School Dental Service.[17] Those students participating in the School Dental Service had virtually no untreated dental decay at the end of the school year.[5]

The high success rate of the dental therapist program in New Zealand's school setting led to the approval of dental therapists in other countries. In Australia, dental therapists would become the primary dental care providers for most children, delivering treatment comparable in quality to that provided by dentists.[5] Studies have reported that the diagnosis, radiographic interpretation, and treatment planning were similar among dentists and dental therapists.[5,17] In addition, the rate of defective restorations placed by dentists was 2.6% compared to 1.8% defective restorations placed by dental therapists.[5] Canada, which integrated dental therapists to address the need for improved access to care, also reports similar findings, indicating that restorations performed by dental therapists are of equivalent quality to those performed by dentists.[5] When assessing the oral disease rates and utilization of dental services, various factors must be addressed, such as community water fluoridation and population health. Nonetheless, data suggests that introducing dental therapists into the oral health workforce leads to declining rates of dental disease among children, reducing the oral health disparities in those regions.[17]

Dental therapists have persevered despite initial resistance encountered in numerous countries such as Canada, Great Britain, and Malaysia. Dentists opposed dental therapists primarily out of concerns regarding the quality of treatment and competition.[5,7] However, countries such as Great Britain have not only permitted the practice of dental therapists but have embraced dental therapists as valuable members of the workforce model. A survey done in 2003 among dentists in Great Britain reports that 70% of dentists consider dental therapists to be a valued addition to the dental team.[5] In countries like Tanzania, patients report being satisfied with the care received by a dental therapist.[5] The literature review does not offer any evidence of patient safety concerns or harm resulting from the care provided by a dental therapist.[14,17] While treatment has continued to focus mainly on children within the school, services have also been extended to include adult care in some countries.[5,17]

Dental Therapists in The United States

The incorporation of dental therapists within the United States workforce model was initiated in response to the positive results seen in other countries.[14, 15] In 2003, the increasing concerns about oral health disparities in Alaska prompted the Alaska Native Tribal Health Consortium, in collaboration with the Indian Health Service, to send six Alaskans to New Zealand to be trained as dental therapists. In 2005, the trained dental therapists returned to Alaska to provide basic restorative dental care and prevention services. Shortly after their return, the American Dental Association (ADA) filed a lawsuit prohibiting dental therapists from practicing what the ADA considered ‘the illegal practice of

dentistry.'[5] In 2007, the lawsuit was dismissed as it was determined that the dental therapists were operating within the Alaska Tribal health system and were certified under federal law, allowing them to continue providing services.[5] They are now employed as Dental Health Aide Therapists, practicing only in tribal communities within Alaska. Federal regulations have determined their scope of practice to include oral health education, prepping and filling cavities, and simple extractions under general supervision.[7,17]

Minnesota followed suit in 2009, becoming the second state to authorize dental therapists, offering licensure as either a dental therapist or an advanced dental therapist.[10,17] Minnesota's dental therapists are permitted to provide preventive and other basic services under general supervision. Restorative treatment and primary tooth extractions are permitted under indirect supervision.[4] Advanced dental therapists may perform all procedures allowed by dental therapists, including nonsurgical extraction of mobile permanent teeth under general supervision with a signed agreement with a dentist.[4] In 2014, Maine became the third state to enact legislation granting authorization to dental therapists.[10]

In 2015, the Commission on Dental Accreditation (CODA), the accreditation organization for all dental education programs, implemented accreditation standards for dental therapist education programs, requiring three academic years of didactic and clinical training.[18] According to CODA, accredited programs equip students with the necessary education to become competent dental therapists.[18] Apart from the educational standards, the National Dental

Therapy Standards Consortium published the National Model Act for Licensing or Certification of Dental Therapists (The Model Act) in 2019. The Model Act, in conjunction with the National Model Rule and Best Practices Guide, aims to guide state legislation in defining the scope of practice, location of practice, and supervision requirements of dental therapists.[19]

Legislation regulating dental therapists differs from state to state (Table 1), with each state adopting its statutes regarding education, scope of practice, location of practice, and level of dentist supervision.[10,19] Most states require graduation from either an accredited CODA program or the Alaska Dental Health Aide Therapist program. Dental therapists' scope of practice ranges from oral health education and preventive dental care to restorative treatment, including cavity preparation, restorations, pulpotomies on primary teeth, placement of temporary crowns, and extraction of primary teeth. The nonsurgical extraction of diseased permanent teeth is approved in a few states.[4] Currently, dental therapists are limited to practicing in tribal areas, public health clinics, or offices with a minimum number of patients covered by state-funded dental insurance.[10] Supervision requirements by a dentist range from indirect to general supervision. However, general supervision is permitted only after fulfilling a specified number of direct supervision hours.[19] The Federal Trade Commission endorses general supervision of dental therapists, stating that "a requirement to have a supervising dentist on the premises will likely lead to unnecessary duplication of resources and thereby undercut the cost savings that otherwise might arise from the use of lower-cost providers, effectively defeating a major purpose of expanding the

supply of dental therapists."[20] Dental therapists operating under general supervision extend the range of practice locations and enhance access to care in rural areas, thus aligning with the objectives of the workforce model. Currently, 14 states, including Arizona, have enacted legislation authorizing the practice of dental therapists, with 16 states lobbying for legislative approval.[8]

TABLE 1. Dental Therapy Authorization by State

State	Year Signed into Law	Alaska DHAT Program or CODA Equivalent Program	CODA Accredited Program	Level of Supervision	Dental Therapists Licensed in the State	Authorized Practice Locations†	Must be a Licensed Dental Hygienist
Alaska	2005	●		G	●	T	
Arizona	2018	●	●	G	●	S	●
Colorado	2022		●	I		S	
Connecticut	2019		●	G		S	●
Idaho	2019	●	●	G		T	
Maine	2014		●	G	●	S	●
Michigan	2018		●	G	●	S	
Minnesota	2009		●	G	●	S	
Montana	2019		●	G		T	
Nevada	2019		●	G		S	●
New Mexico	2019	●	●	G		S	●
Oregon	2021	●	●*	G	●	S	
Vermont	2016		●	G		S	●
Washington	2017	●		G		T	

*Or graduation from the Oregon Dental Therapist Pilot Program. This provision will end on January 1, 2025.

†Authorized Practice Locations: Tribal only (T), Statewide (S).

Arizona's Expansion of the Workforce

Arizona has a significant need for dental providers due to shortages throughout the state. Arizona is ranked 28th in the nation for the ratio of dentists to its population, with only 54.1 dentists per 100,000 residents.[11] Dental provider shortages and the cost of dental treatment contribute to the rates of untreated

oral disease, which can lead to severe consequences, including costly dental procedures, dental pain, emergency room visits, and infections.[3] In a 2015 report, it was found that 52% of kindergarten children and 64% of third-grade children in Arizona have untreated tooth decay.[11] In addition, oral disease rates are much higher among specific demographic groups in Arizona, with 86% of American Indian/Alaska Native and 69% of Hispanic/Latino third-grade children having a history of tooth decay.[11] Children in low-income families within Arizona can receive dental benefits through the state's AHCCCS program. However, one report shows that only 38.8% of children in Arizona covered under the AHCCCS program utilized dental services.[12] Additionally, only 32% of dentists are enrolled as providers in the program, which does not necessarily reflect the number of dentists providing treatment for AHCCCS patients. The lack of participating providers leaves many families without dental care.[21]

The demand for affordable dental treatment options and improved access to care prompted Arizona to enact legislation to authorize licensure for dental therapists. In 2018, Governor Ducey signed bill HB2235 into law, allowing dental therapists to practice within Arizona.[22] According to state senator Nancy Barto, "Dental therapists are a proven workforce that will increase affordable care options without creating new, burdensome regulations."[23] Other state lawmakers assert that the initiative will enhance access to safe, high-quality, and affordable dental care, serving the needs of underserved populations in both rural and urban areas.[24]

Arizona's dental therapists must hold a dental hygiene license and complete three academic years of educational instruction to ensure the same quality training as dentists.[18,24] Their scope of practice includes about 80 procedures, including oral evaluation and diagnosis, dental prophylaxis, preparation and placement of direct restorations in primary and permanent teeth, preparation and placement of prefabricated stainless steel crowns, primary teeth extraction, and nonsurgical extractions of permanent teeth that exhibit extensive mobility.[22,24] Dental therapists may practice under general supervision after obtaining a written collaborative practice agreement with a dentist and completing 1000 hours of practicing under direct supervision.[22,24] Dental therapists in Arizona may only practice within tribal communities, federally qualified health centers, nonprofit dental clinics, and private dental practices that contract with federally qualified health centers.[22,24] In addition, the dental clinic must inform the patient of whether their appointment is with the dentist or dental therapist.[24]

Access to Care Implications

In the United States, several obstacles impact access to dental care, such as a shortage of dental providers in the community, the cost of dental procedures, lack of dental insurance coverage, and a low participation rate among providers in state dental insurance plans. According to data from 2024, there are 57 million individuals residing in Dental Health Professional Shortage Areas in the United States, indicating a demand for an additional 9,623 dental practitioners.[25] From 2011 to 2021, dental provider data reports that the number

of dentists practicing in rural areas has decreased.[26] Approximately only 18% of dentists in the United States provide services to at least 100 Medicaid patients per year, leaving a large part of the population without access to affordable services.[26] Dental therapists are expected to alleviate these challenges by improving access to dental care and delivering cost-effective dental services to those in rural areas.[4]

Expanding the dental workforce to incorporate midlevel providers has demonstrated an increase in access to care in underserved areas. Alaska and Minnesota, being the first states to permit the practice of dental therapists, are the primary sources of outcomes data. The first long-term outcome study in the United States assessed dental outcomes in Alaska's Yukon-Kuskokwim Delta following the introduction of dental therapists in the workforce. The results showed a positive correlation between implementing dental therapists and increased preventive care visits, indicating improved access to care.[10,27] In addition to Alaska, evidence points to dental therapists enhancing access to care in Minnesota, Oregon, and Washington.[10] A Minnesota study done in 2021 revealed an increase in dental visits following the implementation of a dental therapist within the state. However, when compared, the growth rate was lower than that observed in states without dental therapists.[15]

Implementing dental therapists can allow dentists to expand their patient base by offering more access to care. Dentists can then increase revenue by focusing on higher-cost procedures that require difficulty in skill by assigning routine procedures to these midlevel providers.[21] Dental therapists typically

receive lower salaries than dentists, offering more cost-effective treatment options within dental practices. The reduced salary rate of the midlevel provider can potentially encourage greater dental participation in state dental insurance programs, as the reimbursement rates could offset the cost of employing these providers.[7]

Differentiation of Philosophies for Dental Therapists

Despite the benefits and positive outcomes, the role of a dental therapist remains a subject of contention in the United States.[9,10,14] Dental organizations consistently oppose the addition of the workforce model, citing patient safety and quality concerns. Dentists argue that dental therapists lack the education and training required to provide quality care and cannot handle complications that may arise.[7,17] Dentists' concerns about competition have also fueled opposition, driven by the prospect of regulatory changes that could permit dental therapists to practice statewide rather than being restricted to tribal areas. Removing the restriction on practice locations raises concerns that the objective of serving underserved areas might not be achieved, as practitioners may not decide to work in the designated underserved areas.[7] Compared to the initiatives of the medical workforce model, adding the physician assistant as a midlevel provider was expected to improve access to care. However, the research implies that it was a failed attempt. While physician assistants were aimed to address healthcare gaps in underserved areas, they instead shifted toward working in subspecialty areas over time rather than addressing the primary care shortages in underserved regions.[7]

The debate regarding the effectiveness of dental therapists also revolves around whether oral health disparities originate from problems within the dental workforce model or within the population itself.[9] Despite dental therapists' aim to improve access to care, if individuals do not pursue dental visits, the initiative fails. Data has shown that many children from low-income families do not obtain dental services even though they are enrolled or are eligible for state dental insurance coverage.[28] The underutilization of dental services is more closely associated with the income and education level of parents within the family rather than solely arising from the shortage of dental providers. It can also be influenced by individuals' perceptions and cultural perspectives on dental services, including their understanding and value of dental services.[28]

The Academy of General Dentistry (AGD) "maintains that direct supervision by a licensed dentist is necessary to ensure patient safety."[29] The AGD acknowledges that improving access to dental care is a multifaceted challenge and encourages its members to advocate for strategies outlined by the AGD. These strategies prioritize oral health literacy and fluoridation programs as effective means to address oral health disparities rather than utilizing midlevel providers.[29] The American Dental Association (ADA) supports the expansion of the dental workforce model but is opposed to midlevel providers performing irreversible procedures, citing concerns for patient health and safety.[9]

Summary

A literature review revealed that dental therapists can be a valuable and effective addition to the workforce, improving access to care and reducing oral

health disparities. Although research indicates positive trends in access to care and potentially lower treatment costs for uninsured populations, there remains uncertainty about dental therapists' long-term influence and role. As the practice of dental therapists continues, the treatment outcomes should be continually assessed to evaluate effectiveness and quality of care.

Chapter Three: Methods and Materials

Introduction

This study aimed to assess the perceptions and attitudes of dentists licensed in Arizona concerning the dental therapist workforce model. The study utilized a survey research approach, implementing a quantitative data collection method. The survey was posted to the AZ Dental Connect Facebook group page, which is a Facebook group dedicated to Arizona dental professionals with approximately 3.4K members. The survey results were analyzed to determine the patterns, correlations, and trends of the perceptions and attitudes of dentists within Arizona.

Research Design

The study design implemented a survey questionnaire using a web-based survey (See Appendix A). The survey targeted dentists who are AZ Dental Connect Facebook group members. To be eligible for the study, participants must have been dentists licensed in Arizona.

Procedures

Approval for the study was obtained from the University of New Mexico Institutional Review Board, Human Resource Protections Office, HRRP #24-080 (See Appendix B). A survey questionnaire was posted to the AZ Dental Connect Facebook group page. The survey was developed using Microsoft Forms. The survey results were anonymous, and completion of the questionnaire indicated implied consent to participate in the study. The participants were allotted three weeks to complete the survey, with only completed submissions considered for

inclusion in the study. At the end of the study, the results were translated into numerical data to measure the results objectively.

Survey

The survey was a web-based questionnaire comprised of ten multiple-choice questions and one optional short-answer question. Full survey completion required a response to each of the ten multiple-choice questions. The survey was intended to be brief, taking approximately five minutes to encourage maximum participation.

Study Details

The survey results were anonymous and did not include any identification markers. Survey results were compiled on a spreadsheet for data analysis and stored on a password-protected computer. No compensation was provided to the participants for their involvement in the study. Furthermore, the subjects were not furnished with the study's results or analyzed data.

Data Collection

The study participants had three weeks to complete the online survey. Inclusion criteria included those who hold an active dental license in the state of Arizona; those who do not, were ineligible and were excluded from the study.

Data Analysis

This research aimed to evaluate several null hypotheses concerning the perception of dental therapists among Arizona dentists. The first null hypothesis suggested that Arizona dentists currently hold neutral views regarding dental therapists as a solution for improving access to dental care in the state. The

second null hypothesis suggested that Arizona dentists currently hold neutral views regarding the treatment quality for the same permitted services between dental therapists and dentists. The third null hypothesis suggested that no correlation exists between dentists who express uncertainty regarding the practice of dental therapists and their affiliation with a dental organization (e.g., American Dental Association, American Academy of Dentistry). The hypotheses aimed to uncover overarching opinions and concerns of dentists, highlighting uncertainties surrounding the yet-to-be-determined effectiveness and competence of dental therapists and their contributions to addressing oral health disparities in the state. These uncertainties emphasize the need for continued research to evaluate the long-term impact and value of dental therapists in Arizona.

Chapter Four

Results

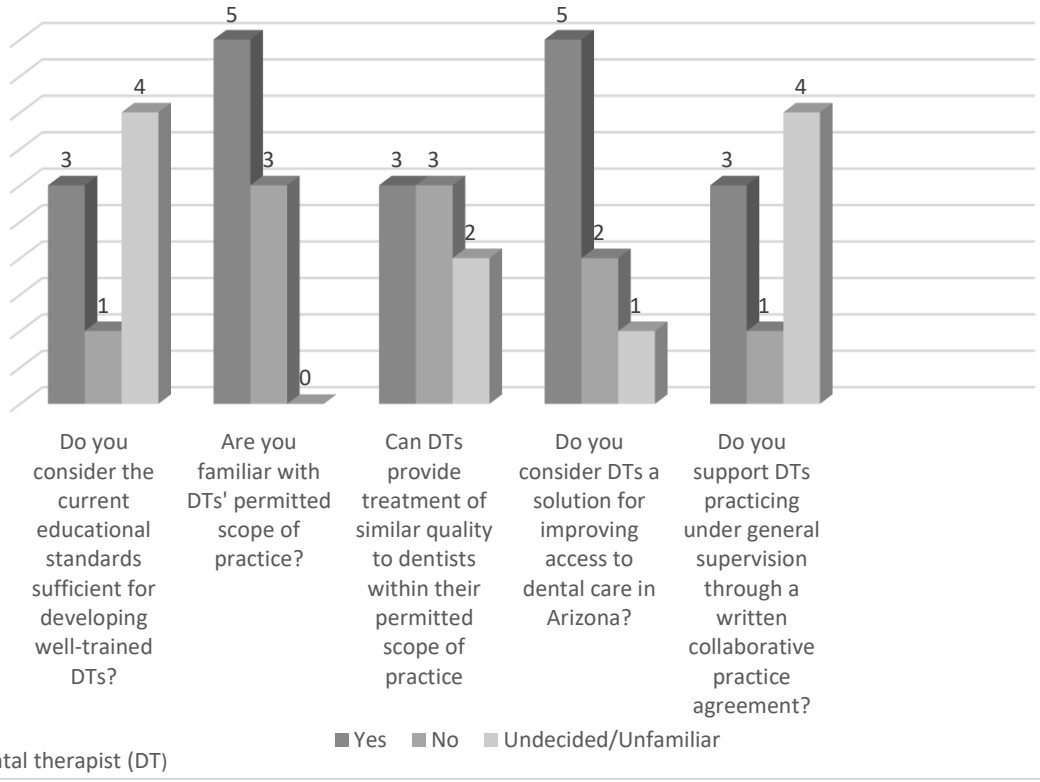
The survey data analysis provided valuable insights regarding Arizona dentists' perceptions of dental therapists. A total of eight participants completed the survey and fulfilled the eligibility criteria for inclusion in the survey results (N=8; 100%). Among the participants, all eight dentists held active dental licenses in Arizona, with each participant practicing in private practice settings. Demographic data of the study participants are shown in Table 2, revealing that most participants (N=5; 62.5%) practice in Yavapai County. All participants reported to have practiced for at least five years, while many dentists had over 15 years of experience (N=5; 62.5%) and belonged to a dental organization (N=7; 87.5%).

TABLE 2. Survey Participant Demographics

		# of responses
Licensed Dentist in the State of Arizona		8
Place of practice	Private Office	8
	Other	0
Location of practice	Yavapai County	5
	Maricopa County	3
	Other	0
# of years as licensed dentist	0-5 years	0
	5-10 years	2
	11-15 years	1
	15+ years	5
Dental organization membership	Yes	7
	No	1

The opinions regarding the educational standards, scope of practice, treatment quality, improving access to care, and supervision requirements are summarized in Figure 1. The table reflects the varied opinions of the educational standards for developing dental therapists. Only 37.5% of dentists (N=3) expressed satisfaction with the current standards, while half of dentists (N=4) stated unfamiliarity with the current standards. A considerable number of dentists (N=5; 62.5%) indicated familiarity with the permitted scope of practice for dental therapists, whereas others lacked knowledge on the subject (N=3; 37.5%). Beliefs regarding treatment quality provided by dental therapists were also varied. Three dentists (37.5%) considered dental therapists to have the ability to provide treatment of similar quality to dentists, while an equal number expressed skepticism. In considering dental therapists as a solution for improving access to dental care in Arizona, many dentists (N=5; 62.5%) were in favor and only a few were opposed (N=2; 25%). Most dentists (N=4; 50%) were undecided as to whether dental therapists should be allowed to practice under general supervision through a written collaborative practice agreement with a licensed dentist, however a few did support the legislation (N=3; 37.5%).

FIGURE 1. Arizona Dentists' Perceptions of the Dental Therapist Workforce



[+]Dental therapist (DT)

Discussion

The study's results highlight Arizona dentists' varied viewpoints regarding dental therapists and suggest potential challenges associated with integrating dental therapists into the dental profession. The qualitative data can be utilized to draw inferences regarding Arizona dentists' attitudes and perceptions toward dental therapists and the successful integration of dental therapists into the dental workforce.

Over half of dentists reported familiarity with the scope of practice for dental therapists (N=5; 62.5%). However, only 37.5% of participating dentists (N=3) regarded the treatment as comparable in quality to that provided by dentists. When compared to the review of the literature, the survey results do not mirror the data derived from other studies. Numerous reports from New Zealand

reveal that the quality of care is comparable to that provided by dentists.[5] Canada also reports that restorations placed by dental therapists are of equal, if not better, quality than those placed by dentists.[5] In addition, an assessment of the treatment quality provided by the first graduating cohort from Alaska's dental therapist program found that the providers met every standard of care and proved to be competent providers.[5] The literature review does not provide any data to support the participating dentists' concerns regarding the quality of treatment dental therapists provide.

Opinions regarding educational standards may offer insight into the potential reason for low confidence in the quality of treatment provided by dental therapists. Only 37.5% of dentists (N=3) believe the current educational standards are adequate for developing well-trained dental therapists. This suggests a need for further exploration into the educational standards and the factors contributing to this discrepancy, such as the clinical and didactic competencies among dental therapist programs. Dentists' opinions must also be examined to determine whether bias or negative opinions stem from misinformation or lack of accurate knowledge. Doubts regarding educational standards and treatment quality may hinder the acceptance of dental therapists among dentists, potentially impacting their career trajectory and access to care initiatives. In addition, it is important to address these discrepancies further to ensure patient safety, uphold professional standards, and foster confidence and collaboration within the dental care team.

Despite these concerns, just over half of participating dentists view dental therapists as a viable solution to improving access to care (N=5; 62.5%). While this represents a positive advancement in Arizona, uncertainty regarding the level of supervision may affect those initiatives. Dental therapists have effectively practiced under general supervision in Alaska and Minnesota without encountering adverse issues.[4] However, half of all participants (N=4) in this study remain undecided about the appropriate level of supervision for dental therapists.

The literature has shown that dental organizations consistently resist the inclusion of dental therapists, citing concerns about patient safety and quality. Dentists argue that dental therapists are inadequately educated and trained to deliver high-quality care.[7,17] Considering that 87.5% of participating dentists (N=7) reported belonging to a dental organization, the survey results suggest a correlation between the participating dentists and their affiliation with a dental organization. With only 37.5% of participating dentists considering the treatment quality and educational standards adequate, their views align with those held by the dental organizations.

Additional studies to further explore dentists' attitudes and beliefs regarding collaborative care agreements between dentists and dental therapists and the potential impact of dental therapists on private practice are needed. This research may help develop targeted interventions and strategies to facilitate the successful integration of dental therapists on the dental team. Moreover, longitudinal studies tracking the implementation of dental therapists in other states can provide valuable insights into the long-term outcomes and impacts on

access to care, reduction of oral health disparities, and patient satisfaction. Further research can also aid policymakers in developing strategies to enhance oral healthcare delivery and increase access to dental care in Arizona.

Conclusion

While the survey results offer valuable insights into Arizona dentists' perceptions of dental therapists, it is important to acknowledge that the limited number of participants represents only a small fraction of dentists in Arizona. Continued research, collaboration, and education regarding the scope and practice of dental therapists are essential to navigate the challenges and opportunities associated with integrating dental therapists into the dental workforce and improving access to oral health care in Arizona. By fostering a culture of collaboration and continuous improvement, the dental community can work together to ensure that Arizona residents have access to high-quality, comprehensive dental care.

CHAPTER FIVE: ARTICLE FOR SUBMISSION

DENTAL THERAPISTS: ARIZONA DENTISTS' PERCEPTIONS AND ATTITUDES TOWARDS THE WORKFORCE MODEL

ABSTRACT

Purpose: Oral health plays a crucial role in a person's overall well-being. However, oral health is greatly affected by access to dental care barriers such as low income, lack of insurance, and provider shortages in rural areas. Dental therapists have emerged as a potential solution to bridge this gap, offering affordable restorative treatment and preventive care options in rural settings. Understanding Arizona dentists' attitudes towards dental therapists is crucial to evaluate the successful integration into the dental workforce and its potential to be a viable solution.

Methods: Licensed dentists in Arizona were invited to participate in the study. The study utilized an anonymous survey that was posted on the AZ Dental Connect Facebook group over a three-week period. Questions regarding the scope of practice, current educational standards, and quality of treatment were used to determine the attitudes of dentists towards dental therapists.

Results: Eight dentists licensed in Arizona participated in the survey (N=8). Many dentists expressed familiarity with dental therapists' scope of practice (N=5; 62.5%). However, there were concerns regarding the treatment quality and educational standards (N=3; 37.5%). Still, most dentists believed that dental therapists could improve access to dental care in Arizona (N=5; 62.5%).

Conclusion: Understanding Arizona dentists' perspectives regarding dental therapists is vital for navigating the challenges associated with their integration into the dental workforce. Continued research, collaboration, and education are necessary to ensure that dental therapists contribute effectively to improving access to oral health care in Arizona, promoting overall well-being.
Keywords: dental therapists, access to care, dental workforce

Introduction

Oral health plays a crucial role in overall well-being, as emphasized by the 2021 National Institutes of Health report, which highlighted the significance of oral health promotion and disease prevention.[1] However, barriers such as low income, lack of insurance, and rural residence contribute to untreated oral diseases, underscoring the need for accessible dental care.[2,3] Dental therapists have emerged as a solution to bridge this gap.[4,5] Dental therapists are considered midlevel providers licensed to provide preventive and basic restorative treatment under the supervision of a dentist.[6,7] The primary objective of the dental therapist's role is to improve access to affordable dental care in underserved, low-income, rural, and underinsured areas, thereby aiding in reducing oral health disparities within those communities.[4,6,8]

In 1921, New Zealand began training school dental nurses to provide basic preventive and restorative dental care to children within the school system.[4,5] The need for school dental nurses was in response to potential military inductees' poor oral health reports. The success of school dental nurses resulted

in the expansion of this workforce model to other countries, with an increasing number of dental nurses being utilized to enhance oral health care.[4,5] Around 1980, these school dental nurses would become known as dental therapists.[5] Currently, dental therapists are integrated into the workforce model in over 50 countries worldwide. Among those countries, New Zealand, Australia, the Netherlands, Canada, and Great Britain have reported success with dental therapist implementation.[4] The utilization of dental therapists is widespread, providing services in developed and developing countries and regions with varying levels of access to oral care.[4,5]

Dental Therapists in The United States

In the United States, the incorporation of dental therapists began in Alaska in 2005, followed by Minnesota in 2009 and Maine in 2014.[9,10] In 2015, the Commission on Dental Accreditation (CODA), the accreditation organization for all dental education programs, implemented accreditation standards for dental therapist education programs, requiring three academic years of didactic and clinical training.[11]

Legislation regulating dental therapists differs from state to state (Table 1), with each state adopting its statutes regarding education, scope of practice, location of practice, and level of dentist supervision.[9,12] Most states require graduation from either an accredited CODA program or the Alaska Dental Health Aide Therapist program. Dental therapists' scope of practice ranges from oral health education and preventive dental care to restorative treatment, including cavity preparation, restorations, pulpotomies on primary teeth, placement of

temporary crowns, and extraction of primary teeth. The nonsurgical extraction of diseased permanent teeth is approved in a few states.[4] Currently, dental therapists are limited to practicing in tribal areas, public health clinics, or offices with a minimum number of patients covered by state-funded dental insurance.[9] Supervision requirements by a dentist range from indirect to general supervision. However, general supervision is permitted only after fulfilling a specified number of direct supervision hours.[12] Dental therapists operating under general supervision extend the range of practice locations and enhance access to care in rural areas, thus aligning with the objectives of the workforce model. Currently, 14 states, including Arizona, have enacted legislation authorizing the practice of dental therapists, with 16 states lobbying for legislative approval.[7]

TABLE 1. Dental Therapy Authorization by State

State	Year Signed into Law	Alaska DHAT Program or CODA Equivalent Program	CODA Accredited Program	Level of Supervision	Dental Therapists Licensed in the State	Authorized Practice Locations†	Must be a Licensed Dental Hygienist
Alaska	2005	●		G	●	T	
Arizona	2018	●	●	G	●	S	●
Colorado	2022		●	I		S	
Connecticut	2019		●	G		S	●
Idaho	2019	●	●	G		T	
Maine	2014		●	G	●	S	●
Michigan	2018		●	G	●	S	
Minnesota	2009		●	G	●	S	
Montana	2019		●	G		T	
Nevada	2019		●	G		S	●
New Mexico	2019	●	●	G		S	●
Oregon	2021	●	●*	G	●	S	
Vermont	2016		●	G		S	●
Washington	2017	●		G		T	

*Or graduation from the Oregon Dental Therapist Pilot Program. This provision will end on January 1, 2025.

†Authorized Practice Locations: Tribal only (T), Statewide (S).

Arizona's Expansion of the Workforce

Arizona has a significant need for dental providers due to shortages throughout the state. Arizona is ranked 28th in the nation for the ratio of dentists to its population, with only 54.1 dentists per 100,000 residents.[13] Dental provider shortages and the cost of dental treatment contribute to the rates of untreated oral disease, which can lead to severe consequences, including costly dental procedures, dental pain, emergency room visits, and infections.[3]

The demand for affordable dental treatment options and improved access to care prompted Arizona to enact legislation to authorize licensure for dental therapists. In 2018, Governor Ducey signed bill HB2235 into law, allowing dental therapists to practice within Arizona.[14] Arizona's dental therapists must hold a dental hygiene license and complete three academic years of educational instruction to ensure the same quality training as dentists.[11,15] Their scope of practice includes about 80 procedures, including oral evaluation and diagnosis, dental prophylaxis, preparation and placement of direct restorations in primary and permanent teeth, preparation and placement of prefabricated stainless steel crowns, primary teeth extraction, and nonsurgical extractions of permanent teeth that exhibit extensive mobility.[14,15] Dental therapists may practice under general supervision after obtaining a written collaborative practice agreement with a dentist and completing 1000 hours of practicing under direct supervision.[14,15] Dental therapists in Arizona may only practice within tribal communities, federally qualified health centers, nonprofit dental clinics, and private dental practices that contract with federally qualified health centers.[14,15] In addition, the dental clinic

must inform the patient of whether their appointment is with the dentist or dental therapist.[15]

Methods:

The study assessed Arizona dentists' perceptions and attitudes toward the dental therapist workforce model through a survey, which consisted of ten multiple-choice questions. Approval was obtained from the University of New Mexico Institutional Review Board to post the survey on the AZ Dental Connect Facebook group page. The survey assessed dentists' knowledge regarding the educational standards and scope of practice of dental therapists. In addition, dentists' views on dental therapists' ability to improve access to dental care and deliver treatment that was comparable in quality compared to dentists were also assessed. The survey results were analyzed to evaluate dentists' perceptions of dental therapists and their potential contributions to addressing oral health disparities in Arizona.

Results:

The survey data analysis provided valuable insights regarding Arizona dentists' perceptions of dental therapists. A total of eight participants completed the survey and fulfilled the eligibility criteria for inclusion in the survey results (N=8; 100%). Among the participants, all eight dentists held active dental licenses in Arizona, with each participant practicing in private practice settings. Demographic data of the study participants are shown in Table 2, revealing that most participants (N=5; 62.5%) practice in Yavapai County. All participants reported to have practiced for at least five years, while many dentists had over 15

years of experience (N=5; 62.5%) and belonged to a dental organization (N=7; 87.5%).

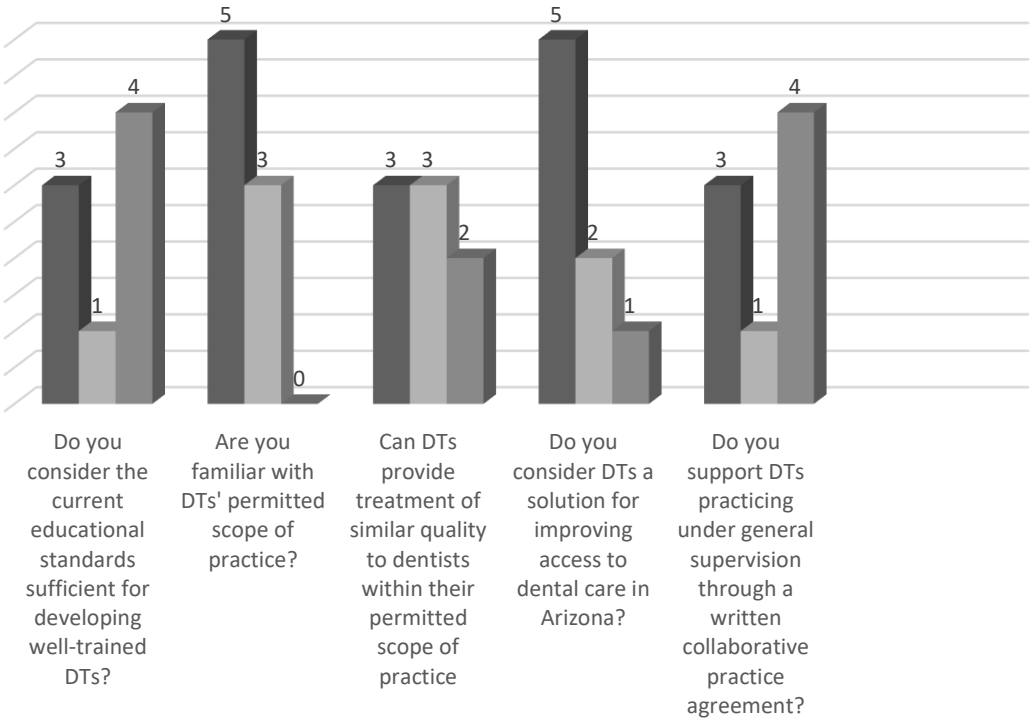
TABLE 2. Survey Participant Demographics

		# of responses
Licensed Dentist in the State of Arizona		8
Place of practice	Private Office	8
	Other	0
Location of practice	Yavapai County	5
	Maricopa County	3
	Other	0
# of years as licensed dentist	0-5 years	0
	5-10 years	2
	11-15 years	1
	15+ years	5
Dental organization membership	Yes	7
	No	1

The opinions regarding the educational standards, scope of practice, treatment quality, improving access to care, and supervision requirements are summarized in Figure 1. The table reflects the varied opinions of the educational standards for developing dental therapists. Only 37.5% of dentists (N=3) expressed satisfaction with the current standards, while half of dentists (N=4) stated unfamiliarity with the current standards. A considerable number of dentists (N=5; 62.5%) indicated familiarity with the permitted scope of practice for dental therapists, whereas others lacked knowledge on the subject (N=3; 37.5%). Beliefs regarding treatment quality provided by dental therapists were also

varied. Three dentists (37.5%) considered dental therapists to have the ability to provide treatment of similar quality to dentists, while an equal number expressed skepticism. In considering dental therapists as a solution for improving access to dental care in Arizona, many dentists (N=5; 62.5%) were in favor and only a few were opposed (N=2; 25%). Most dentists (N=4; 50%) were undecided as to whether dental therapists should be allowed to practice under general supervision through a written collaborative practice agreement with a licensed dentist, however a few did support the legislation (N=3; 37.5%).

FIGURE 1. Arizona Dentists' Perceptions of the Dental Therapist Workforce



⁺Dental therapist (DT)

Discussion

The study's results highlight Arizona dentists' varied viewpoints regarding dental therapists and suggest potential challenges associated with integrating

dental therapists into the dental profession. The qualitative data can be utilized to draw inferences regarding Arizona dentists' attitudes and perceptions toward dental therapists and the successful integration of dental therapists into the dental workforce.

Over half of dentists reported familiarity with the scope of practice for dental therapists (N=5; 62.5%). However, only 37.5% of participating dentists (N=3) regarded the treatment as comparable in quality to that provided by dentists. When compared to the review of the literature, the survey results do not mirror the data derived from other studies. Numerous reports from New Zealand reveal that the quality of care is comparable to that provided by dentists.[5] Canada also reports that restorations placed by dental therapists are of equal, if not better, quality than those placed by dentists.[5] In addition, an assessment of the treatment quality provided by the first graduating cohort from Alaska's dental therapist program found that the providers met every standard of care and proved to be competent providers.[5] The literature review does not provide any data to support the participating dentists' concerns regarding the quality of treatment dental therapists provide.

Opinions regarding educational standards may offer insight into the potential reason for low confidence in the quality of treatment provided by dental therapists. Only 37.5% of dentists (N=3) believe the current educational standards are adequate for developing well-trained dental therapists. This suggests a need for further exploration into the educational standards and the factors contributing to this discrepancy, such as the clinical and didactic

competencies among dental therapist programs. Dentists' opinions must also be examined to determine whether bias or negative opinions stem from misinformation or lack of accurate knowledge. Doubts regarding educational standards and treatment quality may hinder the acceptance of dental therapists among dentists, potentially impacting their career trajectory and access to care initiatives. In addition, it is important to address these discrepancies further to ensure patient safety, uphold professional standards, and foster confidence and collaboration within the dental care team.

Despite these concerns, just over half of participating dentists view dental therapists as a viable solution to improving access to care (N=5; 62.5%). While this represents a positive advancement in Arizona, uncertainty regarding the level of supervision may affect those initiatives. Dental therapists have effectively practiced under general supervision in Alaska and Minnesota without encountering adverse issues.[4] However, half of all participants (N=4) in this study remain undecided about the appropriate level of supervision for dental therapists.

The literature has shown that dental organizations consistently resist the inclusion of dental therapists, citing concerns about patient safety and quality. Dentists argue that dental therapists are inadequately educated and trained to deliver high-quality care.[7,17] Considering that 87.5% of participating dentists (N=7) reported belonging to a dental organization, the survey results suggest a correlation between the participating dentists and their affiliation with a dental organization. With only 37.5% of participating dentists considering the treatment

quality and educational standards adequate, their views align with those held by the dental organizations.

Additional studies to further explore dentists' attitudes and beliefs regarding collaborative care agreements between dentists and dental therapists and the potential impact of dental therapists on private practice are needed. This research may help develop targeted interventions and strategies to facilitate the successful integration of dental therapists on the dental team. Moreover, longitudinal studies tracking the implementation of dental therapists in other states can provide valuable insights into the long-term outcomes and impacts on access to care, reduction of oral health disparities, and patient satisfaction. Further research can also aid policymakers in developing strategies to enhance oral healthcare delivery and increase access to dental care in Arizona.

Conclusion

While the survey results offer valuable insights into Arizona dentists' perceptions of dental therapists, it is important to acknowledge that the limited number of participants represents only a small fraction of dentists in Arizona. Continued research, collaboration, and education regarding the scope and practice of dental therapists are essential to navigate the challenges and opportunities associated with integrating dental therapists into the dental workforce and improving access to oral health care in Arizona. By fostering a culture of collaboration and continuous improvement, the dental community can work together to ensure that Arizona residents have access to high-quality, comprehensive dental care.

Disclosures

The author does not have any conflicts of interest to report. No funding was needed for this research.

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Appendix A: HRRC Approval Letter

HEALTH SCIENCES
OFFICE OF RESEARCH

Human Research Protections Program

March 1, 2024
Nicole Gonzales
nchacon@salud.unm.edu

Dear Nicole Gonzales:

On 3/1/2024, the HRRC reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	DENTAL THERAPISTS: ARIZONA DENTISTS' PERCEPTIONS AND ATTITUDES TOWARDS THE WORKFORCE MODEL
Investigator:	Nicole Gonzales
Study ID:	24-080
Submission ID:	24-080
IND, IDE, or HDE:	None
Submission Summary:	Initial Study
Documents Approved:	• FB Admin Approval Signed.pdf • HRP-583 - Butler, Autumn.pdf • HRRC ID# 24-080 FB Recruiting Post Verbiage.pdf • HRRC ID# 24-080 Survey v 2.15.24.pdf • HRRC ID#24-080 Consent.pdf • Nathe HRPO Submission Approval.pdf
Review Category:	EXEMPTION: Categories (2)(i) Tests, surveys, interviews, or observation (non-identifiable)
Determinations/Waivers:	Employees. Provisions for Consent are adequate. HIPAA Authorization Addendum Not Applicable.
Submission Approval Date:	3/1/2024
Approval End Date:	None
Effective Date:	3/1/2024

The HRRC approved the study from 3/1/2024 to inclusive. If modifications were required to secure approval, the effective date will be later than the approval date. The "Effective Date" 3/1/2024 is the date the HRRC approved your modifications and, in all cases, represents the date study activities may begin.

Appendix B: Survey Recruitment

📢 **Calling all Arizona Dentists!** 📢

Are you a licensed dentist practicing in the state of Arizona?

We're seeking Arizona dentists to participate in a research project. This project seeks to assess the **perceptions and attitudes of Arizona dentists regarding the dental therapist workforce model**.

🔍 **What's Involved**:
Completing a brief online survey about your perceptions and attitudes towards the dental therapist workforce model.

The survey will only take about 5 minutes, and your responses will be completely anonymous.

📝 **How to Participate:**
Click on the survey link or scan the QR code below: https://forms.office.com/r/nFE77Qk2h1

We greatly appreciate your participation and support in this endeavor!

This study was approved by the UNM HRRC IRB, study HRRC ID# 24-080

No compensation will be provided for your participation. If you have any questions, concerns, or complaints about the research, please feel free to call Nicole Gonzales at (505) 272-4513.

This project is being conducted by Autumn Butler, RDH from UNM.

Appendix C: Survey Consent

HRRC ID# 24-080

DENTAL THERAPISTS: ARIZONA DENTISTS' PERCEPTIONS AND ATTITUDES TOWARDS THE WORKFORCE MODEL

Informed Consent for Survey

2/15/2024

Nicole Gonzales, from the Department of Dental is conducting a research project. The purpose of the research is to assess the perceptions and attitudes of Arizona dentists towards the dental therapist workforce model. You are being asked to participate because you are a licensed dentist in Arizona.

Your participation will involve the completion of an anonymous online survey. The survey should take about 5 minutes to complete. The survey includes questions such as your dentist licensure status in Arizona and your opinions regarding dental therapists. Your involvement in the research is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time. There are no names or identifying information associated with your responses. There are no known risks in this research, but some individuals may experience discomfort or loss of privacy when answering questions. Data will be stored without any identifiers on a password-protected computer. Your information collected for this project will NOT be used or shared for future research, even if we remove the identifiable information like your name or date of birth.

The findings from this project will provide information on the opinions of Arizona dentists regarding the dental therapist workforce model. If published, results will be presented in summary form only.

If you have any questions, concerns, or complaints about the research, please feel free to call Nicole Gonzales at (505) 272-4513. If you have questions regarding your rights as a research participant, or about what you should do in case of any harm to you, or if you want to obtain information or offer input, please contact the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

By completing this online survey you will be agreeing to participate in the above described research.

Appendix D: Survey

Arizona Dentists' Perceptions of the Dental Therapist Workforce

The survey is anonymous. Participation in the survey is optional, and completion provides implied consent. The following questions pertain to the practice of ***dental therapists within the state of Arizona****.*

1. Are you a **dentist** with an active dental license in Arizona?
    a. Yes
    b. No
2. Which best describes your place of practice?
    a. Private Office
    b. DSO (Dental Service Organization)
    c. Community Health Clinic
    d. Tribal Health Clinic
    e. Other
3. What Arizona county do you primarily practice in?
    - (Drop-down menu of the 15 different counties in Arizona)
        - Apache County
        - Cochise County
        - Coconino County
        - Gila County
        - Graham County
        - Greenlee County
        - La Paz County
        - Maricopa County
        - Mohave County
        - Navajo County
        - Pima County
        - Pinal County
        - Santa Cruz County
        - Yavapai County

- Yuma County

4. How many years have you been a practicing dentist?
    a. 0-5
    b. 5-10
    c. 11-15
    d. 15+
5. Are you a member of a dental organization? (e.g., American Dental Association, American Academy of Dentistry)
    a. Yes
    b. No
6. Do you consider the current educational standards sufficient for developing well-trained dental therapists?
    a. Yes
    b. No
    c. I am not familiar with the educational standards
7. Are you familiar with dental therapists' permitted scope of practice?
    a. Yes
    b. No
8. Can dental therapists provide treatment of similar quality to dentists within their permitted scope of practice?
    a. Yes
    b. No
    c. Undecided
9. Do you consider dental therapists a solution for improving access to dental care in Arizona?
    a. Yes
    b. No
    c. Undecided
10. Do you support the legislation permitting dental therapists to practice under general supervision through a written collaborative practice agreement with a licensed dentist?

a. Yes
b. No
c. Undecided

11. Please provide any comments below regarding dental therapists in Arizona (optional):

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