

Spring 2018

A Survey of Dental Hygiene Program Directors: Curriculum Development and Implementation for the Dental Hygiene-Based Dental Therapist

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A Survey of Dental Hygiene Program Directors: Curriculum Development and
Implementation for the Dental Hygiene-Based Dental Therapist

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Masters of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Heidi Desmarais

Spring 2018

Major Professor: Rebecca Stolberg, MSDH

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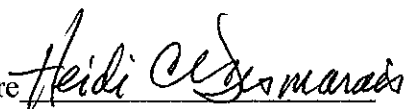
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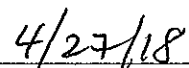
MASTER'S THESIS

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Human Subjects Approvals

TO: Heidi Desmarais, Department of Dental Hygiene

FROM: Ruth A. Galm, EWU Human Protections Administrator

DATE: July 21, 2015

SUBJECT: A Survey of Dental Hygiene Program Directors:
Curriculum Development and Implementation for the
Dental Hygiene-Based Dental Therapist(HS-4868)

Human subjects protocol HS-4868 entitled "A Survey of Dental Hygiene Program Directors: Curriculum Development and Implementation for the Dental Hygiene-Based Dental Therapist" has been approved as an exemption from federal regulations under CFR Title 45, Part 46.101(b)(1-6).

Student research qualifying for an exempt IRB review is valid for a period of one year. If subsequent to initial approval, the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departure from the original proposal must be reviewed through a Change of Protocol application submitted to the IRB before the protocol may be altered. Please refer to HS-4868 on future correspondence as appropriate as we file everything under this number.

Cc: HS-4868 file
Prof., Rebecca Stolberg, RPI
Graduate Office

DENTAL HYGIENIST/ DENTAL THERAPIST CURRICULUM

TO: Heidi Desmarais, Department of Dental Hygiene

FROM: Ruth A. Galm, EWU Human Protections Administrator

DATE: July 21, 2015

SUBJECT: A Survey of Dental Hygiene Program Directors: Curriculum Development and Implementation for the Dental Hygiene-Based Dental Therapist (HS-4868)

The Change of Protocol request received August 20, 2015, for HS-4868 entitled "A Survey of Dental Hygiene Program Directors: Curriculum Development and Implementation for the Dental Hygiene-Based Dental Therapist" has been reviewed and is approved.

The project changes are effective beginning August 24, 2015, through July 20, 2016, the anniversary date of your application.

If you have questions please contact me by phone or email. Please refer to HS-4868 on any additional correspondence as the protocol is filed under that number.

Cc: HS-4868 file

Prof. Rebecca Stolberg, RPI

Graduate Office

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Abstract

Purpose: This study used a survey of program directors and program chairs to analyze relationships related to curriculum development for a dental hygiene-based dental therapist and the question of how external variables affect allied health workforce development and implementation.

Methods: A survey instrument was utilized to help identify the relationship between a dental hygiene-based dental therapist curriculum and the external influences of *future needs of the dental hygiene profession and workforce*; *external influences*; and *institutional influences* on curriculum design and implementation using Spearman's rho testing. The open-ended question was studied through the application of grounded theory analysis. (N=340).

Results: Upon comparison of ten curricular concepts related to external influences across all three areas of influence, *Business Management* was a significantly related curriculum item, followed by *Dental Hygiene Diagnosis*; *Foundational Knowledge*; and *Communications and Technology*. As dental hygiene-based dental therapy curriculum is developed, these curricular relationships may be referenced in relation to how outside influences affect and facilitate workforce and program success. ($n=133-138$; 43%).

Conclusion: Curriculum should be developed based upon the actual assessment of workforce and patient need, rather than on an assumption of need. This analysis helped to develop curriculum guidelines for a dental hygiene-based dental therapist workforce model that is responsive to workforce needs, professional requirements, and institutional needs and influences. An accurate, need-based curriculum can be used to develop performance measures that can be measured, evaluated, and improved over time.

Acknowledgements

I would like to thank my major professor, Rebecca Stolberg for her contribution to the topic of dental therapy, and for her unwavering ability to have patience and faith in my abilities, just when I needed it the most. Additionally, I would like to thank Professor Ann Wetmore for her keen ability to tease out the fine details in my work, but more importantly her ability to always draw out “just a little bit more”. You are truly an advocate for women, students, and for dental hygienists. I cannot thank Professor Michael Reynolds enough for his immense contribution to my statistics. Thank you so much for the long, patient hours you spent cheering me on, and for offering to help shoulder the burden of graduate student mentorship. Your time, patience, and kindness will always be thoughtfully remembered. Finally, I would like to thank Doctors Lee, Steketee, Rogers, and Moran for allowing me to use their *Theoretical Framework for Curriculum Development in Health Professional Education* in this study.

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Introduction

Introduction to the Research Question

Despite significant improvements in oral health prevention and treatment over the past half-century (U.S. Dept. of Health and Human Services: HealthyPeople 2020, 2010), Americans with the lowest access to these services have the highest rates of oral diseases

Dept. of Health and Human Services [HHS], 2000). Major oral health disparities are present among populations classified by socioeconomic status (SES), age, sex, disabilities, and race/ethnicity, with those suffering the most being the poor of all ages, minorities, and persons with disabilities (HHS, 2000). More than 53 million people live in areas with low provider shortages to oral health care (Health Resources and Services Administration [HRSA], 2017). Seventeen million children lacked dental care in 2009 (Pew Center on the States [Pew], 2010). With the Affordable Care Act (ACA) and enhanced children's dental benefits through Medicaid and the Children's Health Insurance program (CHIP) there have been millions of children now extended insurance benefits, yet less than half of children's Medicaid eligible are utilizing services (Centers for Medicare and Medicaid Services [CMS], 2016; Medicaid and CHIP Payment and Access Commission [MACPAC], 2016).

In 2000, the first Surgeon General's Report on Oral Health included several landmark findings and suggestions (HHS: Oral Health in America: A Report of the Surgeon General, 2000). Significant findings included the understanding that dental disease is nearly always preventable and affected by lifestyle choices and behaviors, oral health reflects general wellness, and severe oral health disparities exist in the U.S. (HHS,

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2000). The National Call to Action was produced, encouraging oral health organizations and partners to focus on increasing research and public knowledge in oral health issues, and devising an oral health plan to remove barriers to care, utilizing public and private partnerships in order to meet the needs of all Americans (HHS: A National Call to Action, 2003). Five Actions were collectively composed as a result of the National Call to Action partnership between the Surgeon General's office and the Partnership Network (HHS: A National Call to Action, Appendix A). One particular action identified was to, "increase oral health workforce diversity, capacity, and flexibility" (HHS: A National Call to Action, 2003, p.21). The Healthy People 2020 Initiative includes six primary oral health objectives aimed at prevention and control of oral health diseases and conditions, and improving access to oral health (HHS: Healthy People, 2010). The 2000 Surgeon General's report on Oral Health was a breakthrough for many in terms of several issues regarding oral health in America; one was bringing needed exposure to oral health access issues for those without insurance and monetary resources. Effectively addressing access to care disparities is a complex issue requiring planning, coordination, and evaluation of numerous systems (Hilton & Lester, 2010). Three of the major issues surrounding access to care for underserved populations include not having insurance coverage, the cost of care, (KFF, 2016b) and a shortage of dental providers (KFF, 2016c).

In response to the 2000 Surgeon General's report, several Health Policy organizations, such as the Institute of Medicine (IOM) and the National Governor's Organization have encouraged the states to amend their laws in order to allow greater flexibility of health care professionals in the treatment of oral health needs (Institute of Medicine [IOM], 2011), to make better use of the existing dental workforce, such as

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“advanced practice dental hygienists” and to consider emerging dental workforce models, such as dental therapists (National Governors Association [NGA], 2014). One practical solution to the perplexing issue of an accessible, cost-effective, and readily available provider is the expanded utilization of the dually licensed dental hygienist – dental therapist workforce model, heretofore referred to as dental hygiene-based dental therapist.

Dental hygiene-based dental therapists are mid-level oral health providers professionally licensed in both dental hygiene and dental therapy. Dental hygienists are preventive oral health professionals educated and licensed to provide educational, clinical, and therapeutic services that support both oral and total (American Dental Hygienists’ Association [ADHA], 2016). Dental therapists are oral health professionals educated and trained to perform basic clinical dental treatment and preventive services within a variety of practice settings and their state regulatory scope of practice. The dental therapist responsibilities may include a range of procedures including, but not limited to: assessment, prevention, prophylaxis, restorative, simple surgical extraction, emergency palliative, and administration of certain medications and local anesthetic (CODA, 2015). Combining the scope of both oral health practitioners provides a broad variety of preventive, therapeutic, and restorative services that satisfy most general oral health issues, thereby allowing expanded access to a broader population. As an existing licensed and educated workforce, dental hygienists are a practical solution to expanding access to care for the underserved through increased education and skills, especially in those states where dental hygienists are already providing direct access to care, and even some limited restorative services (ADHA, 2017b).

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The dually licensed dental hygiene-based dental therapist provides a professional, cost-effective contribution to meeting many of the access, and financial burdens of the underserved oral health population (Minn. Department of Health ,[DOH], 2017; Minn. DOH, 2014; Pew, 2014a; Pew, 2014b). However, the introduction of a new workforce model to an “oral health care system virtually unchanged in the past half century” (American Dental Education Association [ADEA], 2002, p. 556) offers curricular and educational challenges. Several associations and institutions, based upon differing models of dental therapists, have proposed and implemented various standards, curriculums, and competencies for dental therapy education (American Dental Association Commission on Dental Accreditation [CODA], 2015; Community Catalyst, 2017; Alaska Native Tribal Health Consortium (ANTHC): Ilisagvik College, 2016; Metropolitan State University, 2017; University of Minnesota School of Dentistry, 2016). In 2009, the Minnesota Board of Dentistry requested dental therapy accreditation standards through American Dental Association Commission on Dental Accreditation (CODA), as the dental health professions only accepted accrediting agency of dental and allied health programs. National dental therapy accreditation standards were adopted through CODA in February 2015, and implemented in August 2015 (CODA, 2015).

The process of gaining accreditation for dental therapy standards was lengthy, entailing initial denial from CODA, intervention on behalf of the Federal Trade Commission, one re-written set of standards, and two comment periods before final adoption (ADHA, 2014; CODA, 2015, FTC, 2014). Minimum standards for dental therapy education include:

- Three academic years of full time instruction

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- Curriculum in general education, biomedical science, and clinical and didactic dental sciences
- Scope of practice in therapeutic, restorative, and some preventive services

The standards also support articulation agreements between existing allied oral health programs, such as dental hygiene and dental assisting that result in advanced standing for dental hygienists or dental assistants (CODA, 2015). The decision to include a dual educational tract that included dental hygiene-based dental therapy was decided based upon the observation of existing and proposed programs within the U.S. by the CODA task force. (CODA, 2015, p. 9). Dental therapy standards were developed from “a combined document that included standards for dental education and dental hygiene education” (CODA, 2015, p. 3), and comments that the “dental therapist should be trained to the standard of care set for any dental professional” (CODA, 2015, p. 4), further emphasizing the same standard of care delivery expected of licensed dental therapists as licensed dentists and dental hygienists.

Many of the standards were developed with the aid of the aforementioned task force who developed the dental therapist standards, including several dental hygiene program directors (Evans, 2011). Criteria for a dental therapy program director includes a full-time position, and licensure in dental therapy and/or dentistry with graduate-level education in teaching methodology (CODA, 2015). CODA standards currently allow for a dental hygiene-based program director as long as they are dually licensed as a dental therapist. Dental hygiene program directors are uniquely qualified to help determine dental therapy program needs, and are likely to help satisfy the development, implementation, and evaluation of any dental hygiene-based dental therapy curriculum.

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However, dental hygiene program directors have yet to be collectively surveyed regarding curriculum design for the dental hygiene-based dental therapist. The role of CODA is to provide minimum educational standards (CODA, 2015). While each program is granted flexibility as necessary in order to achieve CODA standards (CODA, 2015), it is fundamentally important to calibrate the specific curricular needs of the dental hygiene-based dental therapist to standardize educational practices, and to provide strong pathways to future advancement (ADEA: Bracing for the Future..., 2011; ADHA, 2014c). Therefore, the purpose of this study is to help provide clarification regarding curriculum specific to the dually licensed dental hygiene-based dental therapist. The charge of this study was to determine,

1. What curriculum should be specific to the dental hygiene-based dental therapist?
2. What is the relationship between a specific dental hygiene-based dental therapist curriculum and considerations regarding future needs of the dental hygiene profession and workforce?
3. What is the relationship between curriculum for the dental hygiene-based dental therapist and influences external to curriculum design?
4. What is the relationship between curriculum for the dental hygiene-based dental therapist and institutional influences on curriculum design?

Statement of Problem

According to the 2000 Surgeon General's Report on the oral health crisis in America, in order to eliminate health disparities all health professionals must work together, with the understanding that improving the existing oral health framework is a

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complicated process requiring a multi-factorial approach (HHS, 2000). The IOM addressed concerns regarding the needs of patients and the changing healthcare system. This included all health professionals gaining education in evidence-based practice and quality improvement, and advancing the education of entry-level clinicians beyond technical skill (IOM, 2002).

The oral healthcare climate is changing, as are population demographics. The population is growing, with increasing diversity, and longer life span (White, 2012). These factors all affect current and future oral health needs (White, 2012). The workforce must be adaptable, and prepared for these changes. Cost of training practitioners, geographic availability, cultural and ethnic competency, knowledge of public health policy, and research, planning, and development of evidence-based solutions are all important in terms of producing improved oral health outcomes (Hilton & Lester, 2010). Current and future workforce education must address the needs of the target demographics (Hilton & Lester, 2010; White, 2012).

Related Theoretical Frameworks

The purpose for development and promotion of the dental hygiene-based dental therapist is to ensure more cost-effective, efficient, and accessible delivery of oral health care to underserved and untreated populations. Health care curriculum is a multi-faceted process, involving institutional missions, values and goals, as well as individual program goals (Diamond, 2008; Billings & Halstead, 2012). Dental health providers in the U.S. are educated by nationally accredited institutions, which establish accreditation standards for dental and allied health education (CODA, 2014). Health care education employs an outcomes format, whereby students demonstrate competency of learning objectives as

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they move toward meeting their learning outcomes (Billings & Halstead, 2012).

“Competencies are written statements describing the levels of skills, knowledge, and values expected of graduates” to begin the practice of dental therapy (CODA, 2015, p. 15). Curriculum development begins with a broad understanding of what students need to know such as evidence-based research, public health policy, and management, resulting in a structured framework for curriculum design, based upon theories that are “embedded” in overall competency domains and specific competencies (Billings & Halstead, 2012, p. 149).

Curriculum design does not factor for outside influences that affect program design such as future workforce needs; changes in the health care climate; economic and political pressures; and the institutional environment. Lee, Steketee, Rogers, and Moran identified these variables in their research on curriculum development in health professional education (2013). This curriculum development framework connects political, social, and economic issues with traditional curriculum design, and institutional and cultural influences for a larger theoretical curriculum framework (See Figure 1) (Lee et al, 2013).

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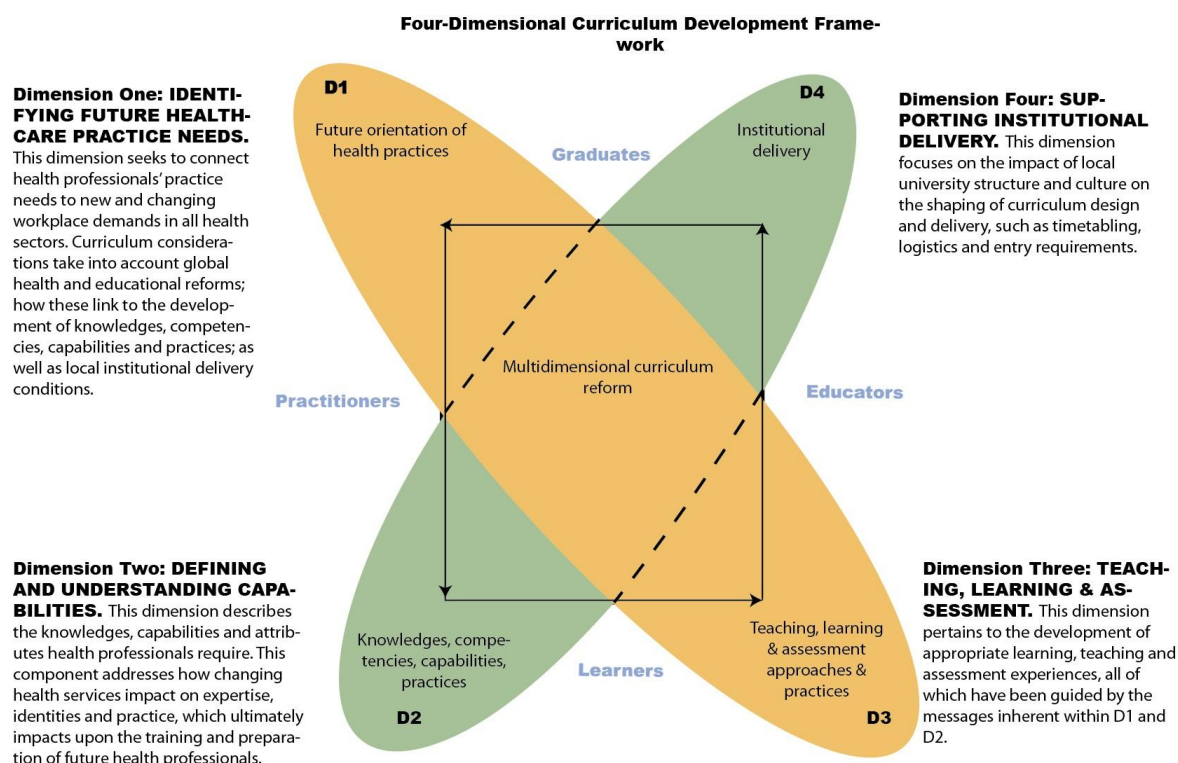


Figure 1. Four Dimensional Curriculum Development Framework (Lee et.al, 2013). Each dimension represents different influences related to healthcare curriculum development.

Dimension #1: *Big Picture Decisions – the why?* Health professional curriculum structure should respond to economics, health policy, regulation, accreditation, as well as public and private practice workforce needs. It should also represent the needs of the future workforce, and the values and interests of the profession that it embodies. For the purposes of this study, Dimension #1 relates to the perspective that dental hygiene-based dental therapy curriculum should be innately designed and developed to respond to the balanced demands of the regulatory body and the current and future health care needs of the public and private workforce. This curriculum is a reflection of the mission and values of the dental hygiene profession, thus contributing to improved patient health outcomes.

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Dimension #2: *Defining Capabilities of Graduates – the what?* This dimension reflects the “multi-dimensional, contextually specific, reflection” of health care, and notes that today’s graduates should practice these qualities through job training and active learning reflection and critical thinking (Lee et al., 2013, p. 70). For the purposes of this study, Dimension #2 correlates to the rapid changes occurring in health care, and the static nature of technical curriculum. Setting a minimum standard for entry into a profession with high expectations of professionalism and trust, requiring minimum educational standards benefits from pre-requisite standardization. Pre-requisite requirements facilitate development of providers that will enable growth and change, such as evidence-based decision-making, and the development of critical thinking skills as a reasoned practitioner. Health care models require the ability to develop and change with technology, research, and evolving health policy. This dimension directly addresses the education, knowledge and skill necessary for current and future workforce needs.

Dimension #3: *Teaching, Learning, and Assessment – the how?* This dimension addresses the types of learning modes used, along with the relationship between educational theory and practice. For the purposes of this study, Dimension #3 relates to the outcomes based competencies and assessment methods that determine content and criteria specific to dental hygiene-based dental therapists who are prepared to meet the ongoing demands with knowledge, skill, and adaptability.

Dimension #4: Organisation (sic) – the where? This dimension applies to the institutional influences that affect curriculum design, such as institutional norms, educators, students, administration, and cultural influences. These elements are often “overlooked” by curriculum design, but can be largely influential (Lee et al., 2013, p. 71).

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For the purposes of this study, Dimension #4 relates to all of those influences affecting the curriculum of a dental hygiene-based dental therapist, that reside within the educational institution, such as administration, faculty, students, and resources (Lee, et al., 2013).

Overview of Research

The following overview of the literature provides a perspective on market and workforce limitations that exist within the current profit-driven dental care delivery system, beginning with a brief history of dentistry, dental public health, and the international development of the dental hygiene therapist, followed by the emergence of the dental therapist and dental hygiene-based dental therapist in the U.S. This chronology lends context to the criteria provided for a very practical workforce model for private and public health: the dental hygiene-based dental therapist. Basic criteria include provider efficiency, cost-effectiveness, and accessibility. Additionally, conceptual tools that represent preparedness for current and future workforce growth including research knowledge, management, technology, health policy, program development, and outcomes assessment. The culmination of this review invites one to question what specific program needs define the dental hygiene-based dental therapist.

Historical perspective. Historical accounts of tooth and jaw treatment exist as early as 2600 BC; however, the first organized system of treatment began in France around 1200 AD, with two types of barbers: one specializing in surgical procedures, and the other lay barbers in general hygiene and extractions. Over the centuries, despite the introduction of numerous mechanical indices and textbooks detailing technical performance, the focus of dentistry remained mechanical until the discovery of the

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bacterial justification for decay by Willoughby Miller in 1890 (ADA: History of Dentistry, 2014). This discovery opened the door to prevention; the introduction of brushing and flossing soon followed, and by 1913, the first school of Dental Hygiene was established in Bridgeport, Connecticut at Fones Clinic (ADA: History of Dentistry, 2014).

In 1945, the next fundamental turning point for oral health came with “one of the top ten public health achievements in the twentieth century” (U.S. Centers for Disease Control and Prevention [CDC], 2001), the advent of public water fluoridation. Water fluoridation stabilized decay rates in the U.S. to a significant degree. For example, decayed, missing, and filled teeth (DMFT) rates of twelve year-olds dropped from 4.0 in 1966-1970 to 1.3 during 1988-1994 (CDC, 2001, www.cdc.gov). This improvement in decay rates created an opportunity for dentistry to focus more attention on prevention and public health issues and less on surgical and restorative interventions.

Traditional model and economics. By the mid-1980’s, signs of epidemiological changes in oral health and water fluoridation were noticeable, and periodontal disease as well as decay rates were more stable (Brown & Nash, 2012). Brown’s study on dental economics highlighted the effect this had on changing demand for services and practitioners (2012). The market for dentistry is a two-tiered model: patients with private insurance or those able to afford out of pocket payments choose to see private practice dentists, and parties without insurance or without willing providers of public insurance choose to use safety-net providers (California Healthcare Foundation, 2009). The dental “safety-net” is the term used for the provision of care for the underserved in

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the United States. This group is a small subset of various providers, services, and payment programs that support care for the underserved.

The traditional economic model of dentistry is a supply model, shifting with market demands. Private practice dentistry is generally competitive, and prices are adjusted according to what the market will bear, with the goal of maximizing profits and minimizing costs (Brown & Nash, 2012). These driving forces determine need for dental education and ultimately for dentists (Brown & Nash, 2012). Safety-net providers are often supplemented with grant monies, such as the federal 330 grant for Federally Qualified Health Centers that covers an average of slightly over 50% of clinic expenses (Beazoglou, Bailit, DeVitto, McGowan, & Myne-Joslin, 2012). Patients paying out of pocket are offered an income-adjusted sliding-scale fee for their services. These mechanisms do not respond to a traditional supply and demand market.

The existing oral health model is not the most cost-effective model for treating the underserved considering several important variables. Dentists are fewer in numbers than dental hygienists (ADHA, 2013), are retiring at a rate greater than they are being replaced by graduating dentists (Beazoglou & Brown, 2000), and are significantly more expensive to educate than any other oral health provider; making them the most expensive possible provider of oral health services (Hilton & Lester, 2010). Even if there were to be an increased number of dental schools, the impact these numbers would have on services for those in rural areas, and with oral health disparities would be nominal (Warchek & Rehann, 2013; Bailit & D'Adamo, 2012). Most importantly, there is little relationship between per capita number of dentists in an area, and the number of underserved patients receiving care (Bailit & D'Adam, 2012).

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History of public health access issues. The inability to care for populations with unique socioeconomic and access issues is not a new concept to the oral health care system in the U.S. For more than 75 years there have been reports articulating the need for public health dentistry efforts (Dunning, 1996), as well as numerous studies in the past 35 years identifying public dental health access issues, without providing long-term or sustainable solutions (Damiano, Brown, Johnson, & Scheetz, 1990; Dunning, 1966; Kushman, 1978; Morrey, 1963). Several authors have developed helpful historical inventories of public health dentistry and dental education. In 1930, the American Dental Association (ADA) appointed a public health committee on dental economics due to the depression. Working with the U.S. Public Health Service, they examined nearly one million children. Yet, when offered a compulsory health insurance system, the National Health Program Committee,

Disapproved the rendering of dental service under a compulsory health insurance system (and instead) approved voluntary budget plans under professional control which will enable patients to apportion costs and timing of payments as to reduce the burdens of (dental) costs and remove the economic barriers which now militate against the receipt of adequate (dental) care. (ADA transactions, 1938, p. 327, as cited in Morrey, 1963)

The ADA next created a public health policy in 1938 originally with eight points, and ultimately modified to four in 1944. One of their four basic tenants included, “Dental care should be available to all regardless of income or geographic location”

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(ADA transactions, 1944, p. 376, as cited in Morrey, 1963). However, dental care is still not available to all and economic barriers still exist.

World War II had a significant influence in public health awareness and change, due to returning dentist's exposure to dental needs in the armed forces. This began a gradual sense of awareness for public health benefits and the limitations of private practice (Dunning, 1966). In 1950 the American Board of Public Health was created. After the passage of Medicaid and Medicare legislation in 1965, the American Association of Dental Schools began to encourage dental public health in dental school curriculum (CMS: History, 2014; Dunning, 1966). Dunning & Morrey expressed optimism that public health was to become a significant portion of oral health care (Dunning, 1966; Morrey 1963), yet today the dental safety net is a very small population of dental providers with little promise of more entering the workforce (Edelstein, 2010; Tomar, 2006). A study by Tomar noted only 544 ADA members reporting Dental Public Health as their specialty in 2002 (Tomar, 2006). This translated to 605,208 persons per ADA member public health specialist in the entire U.S. (Tomar, 2006). Conversely, a study by Brown indicated there were 1834 persons per private practitioner in 2002 (Brown, 2012). Edelstein reports that "less than 3 percent of US dentists are employed in the safety net, and less than one-quarter of private practice dentists are accessible to underserved populations" (2010).

A Medicaid study conducted in California on reimbursement in 1971 and 1974 indicated less effective economies of scale with set fees over time and a tendency for providers to discontinue accepting new Medi-Cal patients, despite accepting other new patients (Kushman, 1978). Twelve years later, Damiano also cited low reimbursement

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rates through Medicaid as a reason for limiting access to Medicaid patients (1990). Prior to 2009, and the Affordable Care Act (ACA), there was a steady decline of Americans with private dental benefits from 2000 to 2012, and an increase in adults and children moving into Medicaid or Children's Health Insurance Program (CHIP) (Nasseh & Vujicic, 2014). In 2010, the ACA offered comprehensive dental benefits for children up to the age of 19, for families who were not formerly eligible for Medicaid under standard Federal Poverty Level (FPL) guidelines. Under expanded eligibility guidelines, "states may get CHIP enhanced match for coverage up to 300% of the FPL" (Medicaid.gov, retrieved July 13, 2017a). As of 2017, 49 states cover children with incomes up to 200% of FPL through Medicaid and CHIP (Kaiser Family Foundation, [KFF], 2017).

According to the Medicaid and CHIP Payment and Access Commission (MACPAC), the percentage of children ages 0-18 in Medicaid or CHIP, "has increased from 38.5% in 2007 to 45.9% in 2013", while privately held children's insurance remained relatively unchanged, from 56.9% in 2007 to 57.1% in 2013 (MACPAC, 2016). As of 2015, due to Medicaid expansion, only 5% of children in the U.S. were without insurance coverage (KFF, 2016b), yet children's insurance status in 2013 demonstrated only children ages 0-4 shared similar Medicaid utilization rates to those children with private insurance, as compared to children ages 5-18 who were on Medicaid or who were uninsured. (MACPAC, 2016). In 2014, less than half of the children's Medicaid eligible insured received preventive dental services, and less than 25% received dental treatment services (CMS, 2016). Moreover, while children's dental benefits are mandatory in both Medicaid and CHIP, adult dental Medicaid benefits are optional for states (Medicaid.gov, retrieved July 13, 2017b). While children's Medicaid insurance rates demonstrate

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relative increases, rates for non-elderly working adults continue to decline (Vujicic & Nasseh, 2015). Of those states offering adult Medicaid in 2013, utilization rates defined as those beneficiaries who, “received any type of dental service within the Federal fiscal year” (Vujicic & Nasseh, 2015, p. 2) ranged from 13.9% to 34.8%, as compared to private insurance utilization rates ranging from 52.6% to 65.9% (Vijicic, Nasseh, 2015). Several suggestions for this divergence between children’s and adult insurance rates, are state and Federal policy maker’s willingness to prioritize adult dental coverage (Vijicici & Nasseh, 2015), insurance eligibility gaps as defined individually on the state level, immigration status, and tax credit eligibility (KFF, 2016b). With the ACA Medicaid expanded coverage provisions, the uninsured non-elderly adult population has dropped from 44 million in 2013 to 27 million in 2017 (KFF, 2016b); however, many of these adults have emergency-only, or limited benefits, while only 16 states offer extensive benefits as of 2016 (KFF, 2016a). The vast majority of dentists are private practitioners who participate in Medicaid at a rate just below 25% (Hilton & Lester, 2010; Bailit, Beazoglou, DeVitto, McGowan & Myne-Joslin, 2012) and with the ACA Medicaid expansion participate at an average rate of 35.3% in 2013 (American Dental Association, 2014).

An overburdened safety-net system. When the private and public oral health care system fails to accommodate the needs of the underserved, individuals often turn to emergency department (ED) settings for acute care, where they receive palliative treatment at premium cost (California Healthcare Foundation, 2009; Davis, Deinard & Maiga, 2010; HHS, 2000; Junhie & Leonard, 2012; Okunseri, Pajewski, Jackson, & Szabo, 2011; Pew Center on the States [Pew], 2012; Wall & Jujicic, 2015). In a study of

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Medicaid participants' tendency to return to ED for non-traumatic dental conditions (NTDCs), 6.5 % of these were repeat users for NTDC (Okunseri, 2011). In a study of 10,000 participants, during a one year period in 2004 and 2005, Davis noted nearly 25% of ED visits in five different hospitals in the St. Paul/ Minneapolis area were for treating dental health problems, with an annual expenditure of nearly five million dollars, billed primarily to public programs such as Medicaid, with a frequency of return visits at nearly 25%. (2010). A four-year study in Rhode Island demonstrated ED utilization for emergency dental visits for the uninsured or for Medicaid enrollees accounted for 79% of the user visits (Junhie, 2012). In a California study conducted by the California Healthcare Foundation, the cost for a preventive exam (ADA 2005 national average) was \$41 compared to an ED visit at \$172 with the median fee of \$5044 if the patient was admitted with hospitalization. In the same study, ED rates were nearly three times higher for patients without private dental insurance, and those with Medi-Cal were significantly more inclined to have an ED visit for a dental problem than private paying clients (California Healthcare Foundation, 2009). The Pew Charitable Trust (Pew), a non-governmental public policy organization, reviewed numerous studies in their brief on the costs of emergency dental care, including hospital association reports, and state public health institutes (Pew, 2012). The brief indicated rising dental-related ED costs during 2000-2010 nationwide, with a 16% overall increase in ER visits for preventable dental conditions (Pew, 2012). Several studies concluded that with increased ED visits, any savings made by states in dental Medicaid cuts would contribute to much greater state costs in the future (California Healthcare Foundation, 2009; Davis, 2010; Junhie, 2012; Pew, 2012; Wall & Jujicic, 2015.)

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While only 3% of U.S. dentists choose employment in the dental safety net, dental hygienists provide a broad and meaningful contribution by being routinely employed in the safety net system (Edelstein, 2010). Researchers of oral health disparities have evaluated the complicated issue of improved access to care and removal of barriers. Several have suggested expanding the dental workforce size, and introduction of new provider types (ADHA, 2017; Edelstein, 2010; Hilton & Lester, 2010, NGA, 2014; Nash, 2008; Nash, 2009; Pew, 2010; Skillman, Doescher, Mouradian, & Brunson, 2010).

Why a dental hygienist-based workforce model? Just as Public Health conducts research and surveillance in order to set preventive strategies (Goldsteen, Goldsteen, & Graham, 2011), prevention is the cornerstone of oral health and oral health is a fundamental indicator of overall health. Dental hygienists are specialists in oral health screening, overall health intake, caries risk assessment, periodontal risk assessment, and preventive oral health education. Additionally, dental hygienists provide the majority of preventive clinical oral health services, such as prophylaxis, non-surgical periodontal therapy, sealants, radiographs, oral cancer screenings, fluoride treatments, and in most states, play an active role in pain control (ADHA, 2017). Many dental hygienists also provide restorative services, depending upon their state practice acts and state scope of practice rules related to supervision (ADHA, 2017).

According to the Bureau of Labor Statistics, between the years of 2014 to 2024, dentists are projected to have 4,960 average annual openings, whereas dental hygienists are projected to have 7,030 annual openings in terms of growth (Bureau of Labor Statistics: Occupational Projections, 2016b). There will be steady growth in the dental hygiene workforce, and it will be greater in numbers than dentists. This, along with half

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the pay requirements for this provider, make it a logical access provider for underserved populations (BLS, 2016a). As licensed preventive oral health professionals, dental hygienists are required to remain current in their continuing education, infection control knowledge, and cardiopulmonary resuscitation. Dental hygienists enter educational programs with an average of 40 credit hours of general requirement courses in English, math, social science and natural science, and average 84 credit hours for completion of an associate degree, or 118 credit hours for a baccalaureate degree (ADHA, 2014a).

Accreditation standards require a licensed dental hygienist to have an educational background in biomedical sciences, dental sciences, periodontics, oral pathology, pharmacology, pain control, medical emergencies, management of the medically compromised patient, cultural competency, inter-professional education, dental public health and community health, ethics, research methods, the patient-provider relationship, and be clinically proficient in the Dental Hygiene Process of Care: Assessment, Diagnosis, Planning, Treatment, Evaluation, and Documentation (CODA, 2018). Many dental hygienists also choose graduate degrees for leadership positions in research, education, public health, and administration (ADHA, 2014a).

Criteria for a professional dental hygiene-based dental therapist to satisfy current and future workforce needs. The introduction of a new workforce model comes with specific and varied roles. Patient needs are increasingly more complex, and in order to meet these needs, a new provider requires education that addresses current and future oral health issues (American Dental Education Association: Position paper, 2011; ADHA, 2014b). According to *Transforming Dental Hygiene Education: New Curricular Domains* established through a collaboration between ADHA and Academy for

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Academic Leadership (AAL) (ADHA, 2014b) the six proposed domains for educating the dental hygienist include: (1) *Foundational Knowledge*, including the basic scientific and behavioral knowledge base necessary for complex knowledge, skills, and attitude formation; (2) *Customized Patient-centered Care* (CPC), and the oral health – overall health relationship. CPC also includes the systematic process of patient care, including assessment, planning, implementation, evaluation, and documentation. Finally, CPC incorporates the relationship between oral health systems and larger health care systems including advocacy, research, and business; (3) *Communication and Collaboration*, technology, communication and writing skills required for working with patients, peers, and inter-professionally; (4). *Professionalism*, and the necessary attitudes, and ethics required for professional leadership; (5). *Critical Thinking and Research*, including evidence-based research as applied to clinical dental hygiene practice (ADHA, 2014b).

Each of these domains represents professional development within clinical, research, business, technology, health policy, and public health areas. The domains are broad enough to offer diverse and advanced opportunities for future growth and flexibility within a changing oral health care environment. Each also provides a framework for educating current and future workforce needs.

Evolution of the international dental hygiene-based therapist. Dental hygiene-based therapists and dental therapists provide mid-level oral health services successfully for decades, in over 50 international countries, and in Canada (Nash, 2009; Nash et al., 2013). Internationally, most receive training dually as dental hygiene-based therapists, and are able to practice a complete range of diagnostic, preventive, and therapeutic services (Rowbotham, Godson, Williams, Csikar & Bradley, 2009; Calache & Hopcraft,

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2011; Coates, Kardos, Moffat, & Kardos, 2009; Luciak-Donsberger & Eaton, 2009).

Internationally, dental therapists have been successfully utilized for nearly a century in New Zealand (Coates et al., 2009) and for decades in other parts of Europe, Asia, Australia, and Canada (Nash et al., 2013).

International Dental Hygiene Therapists' education, scope of practice, and regulation. There has been a major shift in education, since the turn of the 21st century, toward including both dental therapy and dental hygiene, along with an overall increase in number of bachelor's degree programs, extended scope of practice, and more autonomous practice (Coates et al., 2009; Luciac-Donsberger & Eaton, 2009; Rowbotham et al., 2009). Two major rationale for combining the professions of dental therapy and dental hygiene, and for increasing educational standards were to calibrate educational and practice models between other countries, and to open opportunities for dental therapists to work within public health as well as private dental practices (Rowbotham et al., 2009).

The first country to implement a dental therapist was New Zealand in 1921 (Coates et al., 2009; Nash et al., 2012), and dental therapists have successfully treated children, and more recently adults, for nearly 100 years. According to Nash et al. (2013), of the 54 countries safely and effectively using dental therapists, four out of the five of the most highly developed nations on the list: Australia, Great Britain, New Zealand and The Netherlands have included the specialty of prevention along with the therapeutic merits of the dental therapist. Thereby, this provider is educated as both Dental Hygienist and Dental Therapist. Australia, Great Britain, and New Zealand each have a three-year integrated program. The Netherlands has a four-year integrated program. Many of these

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programs either offer, or require a Bachelor's degree in Oral Health Sciences (Calache, 2011; Coates, 2009; Luciak-Donsberger & Eaton, 2009; Rowbotham, Godson, Williams, Csikar & Bradley, 2009). Bachelor's degrees for European countries are quite different than U.S. systems, as most European countries subscribe to the Bologna Degree System, and require an average of 240 credits for a Bachelor's degree. The Bologna Bachelor's degree is primarily focused on the major study unlike the U.S. which includes additional studies in general education studies and electives along with major studies, and requires an average of 120 semester hours for graduation. The Bologna degree completion takes between three to four years, while the U.S. education takes an average of four years (International Educator: Bologna Supplement, 2007).

Scope of practice for providers is liberal, and somewhat varied between countries. According to two studies in Australia and one in New Zealand, dually educated providers are able to treat children and young adults, and with a special "adult competency" certification in restorative care, they are able to treat more mature adults, although no program is in place in New Zealand for adult competency certification as of this report (Calache & Hopcraft, 2011; Coates, Kardos, R., Kardos, T., & Moffat, 2009; Nash et al., 2013). In the Netherlands, dental hygienists are trained with the broadest scope of practice and education in Europe and practice independently, only needing a referral from a dentist for restorations and radiographs (Luciak-Donsberger, 2009).

The correlation between education and autonomy for dental hygienists. In the interest of licensure portability and educational competency, the European Union and European Economic Area (EU/EEA) has made changes by unifying their curriculum to the European Credit Transfer System (ECTS) (Luciak-Donsberger & Eaton, 2009).

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Luciak-Donsberger conducted a study linking education and regulation in the EU and found since 2003 there has been an increase in bachelor degree programs along with autonomous practice with Czech Republic, Finland, Norway, Portugal, and Sweden requiring bachelor's degrees and the Netherlands and United Kingdom requiring dually educated dental hygiene therapists (Luciak-Donsberger, 2009). Similar linkages between education and regulation are seen in the United States. Five states with some of the most restrictive scope of practice and regulation according to ADHA are Alabama, Delaware, Louisiana, South Carolina, and Wyoming. Among those five states, four offer entry-level Bachelor's degree programs for dental hygiene, and one offers Bachelor of Science in Dental Hygiene (BSDH) degree completion. Conversely, five of the most progressive states, California, Connecticut, Michigan, Minnesota, and Washington offer eleven entry-level Bachelor's degree programs along with ten BSDH programs for degree completion and professional advancement (ADHA, 2015a, 2015b). Minnesota has the most progressive dental hygiene-based dental therapist model, combining a progressive scope of practice with graduate entry-level education (Minnesota Board of Dentistry, 2009). In 2014, Maine, a state with two dental hygiene bachelor's degree completion programs, passed legislation for both independent practice of dental hygienists, and more recently for the dental hygiene-based dental therapist model to address their state's access issues (LD 1230 Maine; An Act to Improve Oral Healthcare, 2014). In 2016, Vermont, a state with a degree completion program, including an online option, passed legislation for a dental hygiene-based dental therapist with general supervision (SB 20 Vermont: Dental Therapist, 2016). States pursuing legislation for dental hygiene-based dental therapy in 2018 are Kansas, Maryland, New Mexico, Ohio, Washington, Arizona, New Hampshire,

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Massachusetts, Connecticut, Michigan, and Florida (Pew, 2016: States Expand the Use of Dental Therapy, Updated 1/2018). Each of these states offer degree completion programs. Additionally, Connecticut, Massachusetts, Michigan, New Mexico, Ohio, Texas, and Washington offer Master of Science programs in Dental Hygiene (ADHA, 2017b).

The correlation between improved patient health outcomes and dental

hygienists. Dental hygienists are uniquely skilled to treat periodontal disease; a condition with an overall systemic relationship with numerous other conditions, such as diabetes, cardiovascular disease, respiratory diseases, and cancer (American Academy of Periodontology, 2017). A five-year study performed by United Concordia Dental found that treatment of periodontal disease reduced total medical costs for individual patients each, by “\$2433 for members with pregnancy, \$5681 for members with cerebrovascular disease, \$1090 for members with coronary artery disease, and \$2840 for members with diabetes” (United Concordia Dental, 2014, p 2). Additionally, these same patients demonstrated decreased hospitalizations between 21-39% (United Concordia Dental, 2014). Improvements in cost savings and hospitalizations may be used to imply improvements in patient health outcomes with periodontal treatment and ongoing maintenance (United Concordia Dental, 2014). Integrated models of primary care and oral health care have significantly increased as more states have increased the scope of practice for dental hygienists (Langelier & Surdu, 2017). Currently there are 40 states that allow some form of direct access of dental hygienists to patients without the specific authorization of a dentist (ADHA, 2017.) With integrated health/oral health models of care, there is a greater emphasis on high-quality, value-based services (Langelier &

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Surdu, 2017). According to Langelier and Surdu, these expanded and integrated models have not only enhanced health and oral health workforce opportunities, noting an overall increase in the mean correlation between scope of practice and utilization of oral health services by the state's population from 43.5 in 2001 to 57.6 in 2014, as a reflection of dental hygienists' contribution to public health services when restrictive supervision levels are lifted (Langelier & Surdu, 2017). These policy implications have also indicated changes in improved oral health outcomes according to the Dental Hygiene Professional Practice Index (DHPPI), 2017. Using multilevel logistic modeling and population oral health surveillance data, dental hygiene scope of practice as defined by regulation, supervision, tasks, and reimbursement, was "positively and significantly associated with an improved oral health outcome", noting that "as the DHPPI score increased in states, the likelihood of the population having no teeth removed due to decay or disease also increased" (Langelier & Surdu, 2017, p. 20).

Dental Therapists' cost-effectiveness and accessibility. Several studies have demonstrated improved cost-effectiveness and patient accessibility with several dental therapists' models (Delta Dental, 2017a; Delta Dental 2017b; Minnesota Board of Dentistry [MBOD] and Minnesota Dept. of Health [MDH]), 2014; Pew, 2014, part I; Pew, 2014, part II). As a new workforce model, dental therapists needed to define their own patient base and producer relationships, yet within two years, dental therapists demonstrated cost-effectiveness in several areas (MBD & MDH, 2014; Pew, 2014, part I; Pew, 2014, part II). Dental therapists result in cost-effectiveness in both salaries and reduced malpractice insurance rates as compared to dentists. Annual cost savings were estimated between \$35, 000 – 62,000, depending upon malpractice insurance rates (MBD

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& MDH, 2014). In a case study conducted by Pew organization, Dr. John Powers employed the first dental therapist in Minnesota, and within 11 months observed an increase in net profits of \$23,831 (Pew, 2014, part I). People's Center Health Services, was the first federally qualified health center to hire a dental therapist in April 2012. This clinic was having difficulty retaining dentists, and reported a 50-60% immigrant population, most of whom had never been to the dentist, and 25% who needed interpretive services. Sixty-five percent of the practice was clients with Medicaid benefits. In one year, the dental therapist generated more than \$30,000 net profits in Medicaid reimbursement, despite a 25 % collection failure rate, and without accounting for any net profit for the other 35 % of the patient mix (Pew, 2014, part II). Dental therapists enabled dentists to do more complex and higher producing services (MBD & MDH, 2014; Pew, 2014, part I, Pew, 2014 part II), and offer potential for reducing costly emergency room visits (MBD & MDH, 2014). In 2012, a combined total from two Alaskan dental therapists (DHATs) performing preventive, restorative, and therapeutic services netted \$215,000. Additionally, they saved Medicaid an estimated \$95,000 in potential emergency dental flight services that were formerly performed before the implementation of DHATs (Pew, 2014, part II). Delta Dental of Minnesota performed a study of financial gains upon adding a dental therapist, and found monthly gains with a dental therapist were 2.4 times greater with a dental therapist than before a dental therapist was included in the production formula (Delta Dental, 2017a). A separate case study performed over 11 months in Minnesota noted improvements in patient accessibility and cost-effectiveness, especially after five months (Delta Dental, 2017b). The study noted a decrease in patient wait times from three to four weeks, and patients

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reported satisfaction with the quality of care they received from the dental therapist (Delta Dental 2017b). Additionally, during the eleven months the dental therapist was added, average monthly revenues demonstrated an increase of 19 percent (Delta Dental, 2017b).

Dental therapists have demonstrated improved access to patients from underserved populations in Alaska and Minnesota (Alaska Native Tribal Health Consortium [ANTHC], 2015; Delta Dental, 2017a; Delta Dental, 2017b; MBD & MDH, 2015; Pew, 2014, part II), and advanced dental therapists provide more accessibility than dental therapists (MBD & MDH, 2014). Dental Health Aide Therapists (DHATs) have been providing care and accessing underserved populations since 2003, reporting oral health and restorative services to over 35,000 persons in remote and rural communities in Alaska (ANTHC, 2015). In Minnesota, dental therapists and advanced dental therapists are required to practice in settings serving “primarily low income, uninsured and underserved patients, or in areas designated as Health Professional Shortage Areas (HPSAs)” (MBD & MDH, 2014, p. 5). A report on the impact of dental therapists in Minnesota indicated a general increase in patient access, “directly attributable” to dental therapists, with one clinic reporting a 24 % increase in patients, adding an additional clinical chair in order to accommodate additional patient demand (MBD & MDH, 2014). Several clinics reported ability for dentists to treat more medically complex cases, while dental therapists served more immigrants, elderly, and refugee populations, all due to cost-effectiveness (MBD & MDH, 2014). Many of the clinics mentioned they would like to hire additional dental therapists. Some of those interested in hiring more were particularly interested in advanced dental therapists, due to their broader scope of

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practice, enabling the practice more opportunity for patients to see advanced dental therapists when dentists are not present (MBD & MDH, 2014). Results from a Delta Dental study found that more patients were able to be served by public insurance after the practice added a dental therapist, with dental therapist serving 71% public insurance, while the dentists served 22% public insurance (Delta Dental, 2017).

Dental therapists and dental hygiene-based dental therapists' efficiency and safety. Nash conducted a literature review of 54 countries, including 17 consultants, and over 1100 documents on dental therapists was performed in order to evaluate usage global use of dental therapists, particularly for children, as dental therapists are used for the care of children consistently abroad. It was determined that dental therapists deliver safe, effective, economical, and quality care for children within dentistry (Nash et al., 2013). In a study assessing Dental Health Advanced Therapists (DHATs) in Alaska, dental therapists were evaluated according to patient perception, oral health, clinical performance, clinical facilities, and implementation of community prevention (Wetterhall, Bader, Burrus, Lee, & Shugars, 2010). Five DHATs studied were found to be operating safely and appropriately within their defined scope of practice. The study also found DHATs to be technically competent, with patients generally very satisfied with the care they received from these providers. These DHATs practiced under direct supervision of dentist, must have attended a two-year education program, and did not perform dental hygiene services. In another study of four Alaska DHATs, Williard & Fauteaux (2011) interviewed the supervising dentists to determine safety and quality of the DHAT's work. The study indicated that the DHATs provided safe, quality care within their limited scope of practice.

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In Minnesota, the report on dental therapists and advanced dental therapists noted several areas of improved efficiency (MBOD & MDH, 2014). “Nearly 1/3 of patients” surveyed identified reduced wait times (MBOD & MDH, 2014). Clinics reported expanded capacity at the clinics for vulnerable populations, and “increased dental team productivity” (MDOB & MDH, 2014, p. 2)

Dental therapy and dental hygiene-based dental therapy education and scope of practice in the U.S. In the U.S., each of the three models practicing as dental hygiene-based dental therapists or dental therapists denote various levels of education, skill, and supervision (ANTHC, 2017; Minnesota Board of Dentistry, 2013). The Dental Health Aide Therapists (DHATs), a very unique subset of Dental Therapists originally regulated by the Alaska Native Tribal Health Consortium, part of the Alaska Tribal Health System. Additionally, DHAT’s educated in Alaska are also practicing on tribal lands in Oregon and Washington. Tribal consortiums are allowed far more freedom to develop tribal land only practitioners, that are certified, and self-governed by the consortium (Dept. of Interior: Indian Affairs, 1975). These practitioners are not bound by the same rules and regulations, or the same legislative process as are those regulated and licensed within the State guidelines. These unique properties of the Indian Health Services system enable them to create flexible workforce opportunities with broader scope of practice definitions. DHATs provide a broad host of diagnostic, preventive and therapeutic oral health services to remote Alaskan villages, and recently transferred their program from one initially set up at University of Washington (MEDEX), to one locally in Alaska at Ilisagvik College, and will be conferring a certificate of completion and an Associates of Arts degree, beginning with the first class in the fall of 2016 (ANTHC,

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2017). Figure 2 details the three different dental therapy providers, along with levels of

	AK DHAT	MN-ADV DT	MN-DT
Level of Supervision	General	General	Indirect
Scope of Practice			
Evaluation and Preventive Services			
Examination/Assessment/Inspection	Yes	Yes	No
Dental Radiography	Yes	Yes	Yes
Provide, dispense, administer select medication	No	Yes	No
Counseling	Yes	Yes	Yes
Cleaning above the gumline (sic)	Yes	Yes	Polish
Fluoride application	Yes	Yes	Yes
Sealant placement	Yes	Yes	Yes
Cleaning below the gumline (sic)	No	Yes	No
Space maintainers	Yes	Yes	Yes
Basic Restorative Services			
Temporary filling/ART technique	Yes	Yes	Yes (general)
Isolation (placement of rubber dam)	Yes	Yes	Yes (general)
Injection of local anesthetic	Yes	Yes	Yes
Tooth preparation (drilling primary & permanent teeth)	Yes	Yes	Yes
Tooth restoration (filling primary & permanent teeth)	Yes	Yes	Yes
Primary tooth SSC (preformed cap)	Yes	Yes	Yes
Primary tooth pulpotomy (nerve treatment)	Yes	Yes	Yes
Surgical Services			
Extract primary teeth (uncomplicated)	Yes	Yes	Yes
Extract permanent teeth (conditional uncomplicated)	Yes	Yes	No
Other surgical care	No	No	No
Advanced Restorative Services			
Periodontal treatment	No	No	No
Endodontic treatment	No	No	No
Fixed prosthodontic treatment	No	No	No
Removable prosthodontic treatment	No	No	No
Orthodontic treatment	No	No	No
Adjunct Services			
Community level oral health programming	Yes	Yes	Yes
Population assessment, Research	No	Yes	Yes
Care coordination	Yes	Yes	Yes

supervision, scope of practice, and allowable services provided. (Figure 2).

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Figure 2. Dental Therapy Scope of Practice in the U.S. (Edelstein, L., 2010).

Community Catalyst, a team of researchers, educators and stakeholders in oral health developed a report and curriculum on dental therapy based strongly on the outcomes of the DHAT model. The Community Catalyst curriculum is a community college-based curriculum that advocates for a community student-provider base, a more culturally diverse provider mix, and affordable tuition for best meeting access needs (Community Catalyst, 2017). Minnesota has two dental therapy (DT) models: the advanced dental therapist, and dental therapist. There are currently two separate programs: Metropolitan State University [MSU] has a collaborative arrangement with Normandale Community College to provide education for the advanced dental therapist. MSU requires that applicants first be licensed dental hygienists and offers a Master of Science in advanced dental therapy as a 44-credit program entitling graduating students to dental therapy licensure testing and advanced dental therapy certification resulting in dual dental hygiene/dental therapy licensure and advance dental therapy certification (MSU, 2017). As of fall 2016, University of Minnesota began offering a 71 credit Bachelor of Science in Dental Hygiene degree in combination with a 47 credit Master of Science in Dental Therapy program, for a total of 4 ½ years (University of Minnesota School of Dentistry [UM], 2017). Those interested in advanced dental therapy are then eligible for certification, after 2000 additional practice hours and passage of an examination through the board of dentistry UM, 2017). University of Minnesota's basic DT model offers restorative and therapeutic services, along with some preventive services. Dental hygiene was added to the curriculum after a survey was conducted, and upon the encouragement of public health dentists in practice (UM, 2017). Advanced

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dental therapists are able to practice under general supervision of a dentist, through a collaborative management agreement (CMA), which offers a broader scope of practice than does a dental therapist (Minnesota Statutes, 2013a, 2013b). (See Figure 2) (Edelstein, 2010)

The advanced dental therapist program offered through Metropolitan State University was modeled after the advanced dental hygiene practitioner (ADHP) curriculum put forth by the ADHA (ADHA, 2004). This dental hygiene-based, interdisciplinary model provides diagnostic, preventive, therapeutic, administrative, and research education with developed theoretical concepts in community involvement, public policy, and understanding of designing for quality in healthcare (MSU, 2017). Both the DT and ADT programs offered through University of Minnesota have basic biomedical science entry pre-requisites, and each are grounded in foundational biomedical sciences, dental sciences, as well as advanced concepts related to inter-professional collaboration, the provider-patient relationship, several courses in public health, practice management, and research methods (UM, 2017). It is worthy of noting University of Minnesota shares several of its DT course curriculum with dental and dental hygiene students in an intra-professional collaborative environment (UM, 2017).

Minimum accreditation standards for dental therapy In 2009, the Minnesota board of dentistry approached the CODA and requested accreditation standards be formed for dental therapy, as it is the only recognized accrediting body recognized for dentistry and allied dental health programs (CODA, 2017). In February 2015, the CODA, the only recognized accrediting body recognized for dentistry and allied dental health programs, provisionally adopted accreditation standards for dental therapy, and

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later implemented dental therapy standards in August 2015 (CODA, 2015). Dental therapy standards include a “minimum of three academic years of full-time instruction...in post-secondary instruction”, including an advanced standing allowance for dental hygienists (CODA, 2015). The purpose for accrediting agencies is to ensure that minimum educational standards are met on a continuous basis, and standards are fundamental to ensuring consistent qualifications for entry into professional disciplines (American Occupational Therapy Association, 2017; American Psychological Association, 2017; CODA, 2017). Although accreditation is tasked with determining minimum educational standards for consistent and qualified professional practice, specific criteria for dental therapy practice are ultimately determined on the individual state and program level. As a new workforce model requiring a consistent national guideline for knowledge and skill development, answers to specific curriculum requirements and educational concepts for dental hygiene-based dental therapy can help define consistent licensure and practice, and a strong base for future growth, research, and structure for improved overall patient health outcomes.

Summary

The research has defined how limitations within the profession of dentistry have consistently failed to address oral health disparities in populations with the greatest need for decades (HHS, 2000; Pew, 2010; Vargas & Ronzio, 2006; Dye, Arevalo, & Vargas, , 2010) despite public health accomplishments and opportunities for social relief (CDC, 2001; Morrey, 1963). Plans of equitable oral public health and community health success were eventually extinguished, as a few decades would define a weak dental safety-net structure within a profit-driven dental care delivery system (Brown, 2012; Edelstein,

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2010; HHS, 2000; Nash, 2012; Tomar, 2006). Many persons within the underserved population are eligible for Medicaid benefits; however less than 25% of dentists accept this form of compensation (Bailit et al., 2012; Hilton & Lester, 2010), even with the ACA Medicaid expansion participate at an average rate of 35.3% in 2013 (ADA, 2014). While some improvements have been seen in particular children's populations with the Medicaid expansion, many adults with Medicaid benefits have emergency-only, or limited benefits, while only 16 states offer extensive benefits as of 2016 (KFF, 2016a). There are significant gaps in the existing safety net system.

Education and development of more dental hygiene-based dental therapists capable of providing expanded services to a broader population, in a more cost-effective, efficient, and accessible manner is a meaningful approach to the complex problem of treatment for underserved populations (Nash, 2008; Hilton & Lester, 2010). Dental therapists are widely used in over 54 countries internationally (Nash, 2009; Nash et al., 2013), and many are dually licensed dental hygiene therapist educated and skilled in prevention, therapeutic, and restorative services, with three to four year integrated programs and bachelor's degrees in oral health (Calache, 2011; Coates, 2009; Luciak-Donsberger & Eaton, 2009); Rowbotham, Godson, Williams, Csikar, & Bradley, 2009). While there are three dental therapy programs in the U.S., one of which is dental hygiene based (ANTHC, 2017; MSU, 2017; UM, 2017), the CODA's minimum accreditation standards for dental therapy have recently been accepted (CODA, 2015). These standards make provisions for advanced standing for dental hygienists and dental assistants (CODA, 2015). Dental therapy program directors are required to be a dental therapist with graduate education, or a dentist with a background in education (CODA,

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2015). There is a significant likelihood dental hygiene program directors will provide a pathway to host these programs and to help define dental hygiene-based dental therapy education; therefore, this study seeks to survey dental hygiene program directors regarding curriculum for dental hygiene-based dental therapy.

Methodology

Research Design

This quantitative correlational, descriptive design study sought to gather information regarding curriculum specific to dental hygiene-based dental therapy curriculum, and to demonstrate relationships that may exist related to developing and implementing a dental hygiene-based dental therapy curriculum, and influences outside of curriculum design, and within educational institutions.

This research focused on answering the following:

1. What curriculum should be specific to the dental hygiene-based dental therapist?
2. What is the relationship between a specific dental hygiene-based dental therapist curriculum and considerations regarding future needs of the dental hygiene profession and workforce?

HO₁: There is no significant relationship between a specific dental hygiene-based dental therapist curriculum and considerations regarding future needs of the dental hygiene profession and workforce.

3. What is the relationship between curriculum for the dental hygiene-based dental therapist and influences external to curriculum design?

HO₂: There is no significant relationship between curriculum for the dental hygiene-based dental therapist and influences external to curriculum design.

4. What is the relationship between curriculum for the dental hygiene-based dental therapist and institutional influences on curriculum design?

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HO₃: There is no significant relationship between curriculum for the dental hygiene-based dental therapist and institutional influences on curriculum design.

A quantitative approach was selected because the research seeks to investigate relationships among variables within the study (Rawbone, 2015). A quantitative correlational study helps to understand and demonstrate relationships that exist among variables (Joyner, Rouse, & Glatthorn, 2013). As such, the main objective of the correlational research design was to measure the behavior and strength of any relationship that existed between two variables (Leedy & Ormrod, 2013). Correlational design was ideal for this study, as it utilizes a larger sample in order to demonstrate statistically relevant relationships, and was a research design that did not require an intervention (Grove, Burns, & Gray, 2013). Correlational research design was appropriate since this study did not involve any manipulation of variables or the use of a controlled experimental research setting (Goertz & Mahoney, 2012). This study followed a non-experimental design, there was no manipulation of variables, and participants were not involved in any experimentation.

An additional benefit to correlational design was the benefit to future research in the event changes in one variable ultimately reflected changes in other variables. With the use of correlational research, relationships and inverse relationships could be implied (Creswell, 2012). Correlational design is not to be confused with causal design, a research method with a hypothesis that includes controls. Use of correlational design is used with studies without a control. The outcome of the study relationships can then be used to formulate a hypothesis for further study (Grove et al., 2013). The goal of this

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study was to support the existence of several influences on dental hygiene-based dental therapy curriculum development and implementation that fell outside of program development. Grounded theory technique was applied to analyze a single open-ended question at the end of the study, whereby content was analyzed for themes and codes (Glaser & Strauss, 1967).

The other quantitative research design used was a descriptive design.

Quantitative descriptive research studies are conducted in order to obtain information on particular characteristics on a particular field being studied by providing a systematic descriptive analysis of the characteristics of a particular population or event (Christensen, Johnson, & Turner, 2011). The main purpose of a descriptive design is to give ability to the researcher to identify the variable within the phenomenon of interest (Grove et al., 2013). For this study, the phenomenon of interest was regarding curriculum specific to dental hygiene-based dental therapy curriculum. This research design was also chosen because the researcher had no intentions of collecting data through the introduction of any treatment to the subjects.

The study design was developed with the aid of a theoretical framework for healthcare curriculum development (Lee et al., 2013), which employed a strategic, “why, what, how, and where” design to influences on healthcare curriculum development (Figure 1). The resultant quantitative study design consisted of an introduction, explaining the study objective and familiarizing participants regarding current passage of CODA accreditation standards for dental therapists, and educational concept criteria in the form of ADHA *Transforming Dental Hygiene Educational* domains, 2014. The research design was structured to enable investigation of the complexities involving

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deeper issues related to curriculum development in healthcare and offered a mechanism to study potential relationships (Lee et al., 2013).

Procedures

Human subject's protection/informed consent. Human subject's protection approval was obtained from Eastern Washington University (EWU) Institutional Research Board (IRB). The human subjects of this research were those who willingly completed the online survey, thus consent was implied through survey completion. The identity of the respondents was anonymous through SurveyMonkey® privacy settings. SurveyMonkey® required a secured user name and password to access the data. The data was imported to a Microsoft Excel® spreadsheet and organized. This data was stored on the PI's password protected personal computer.

Population source, plan, description of setting. The inclusion criteria and study population consisted of all U. S. program directors and/or department chairs of dental hygiene programs, thus 340, ($N=340$) (ADHA, 2015) with an anticipated response rate of 19%, or 64 ($N=64$) respondents (Constantcontact.com, 2015; Sheehan, 2006). The confidence level used was 95%, with a sampling error of 8.7% (dssresearch.com, 2015). Respondents were provided with a follow up email including results and a thank you. The population was obtained by requesting a current list of dental hygiene programs from ADHA, and contact information for their designated program director or department chair. The advantage to using dental hygiene program directors and/or department chairs was that administrators by accreditation standards are responsible for curriculum design and have knowledge specific to the profession of dental hygiene. Additionally, these

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same administrators possess the knowledge required for many of the minimum educational requirements necessary for dental therapy education (CODA, 2015).

Variables. Dependent study variables included demographics, workforce influences shaping dental hygiene-based curriculum, forces external to curriculum design and institutional influences shaping curriculum design and implementation.

Demographic variables included: age, state, level of education, and length as a program director/department chair. Age, state, education, and ADHA membership were collected and analyzed to describe the sample and determine generalization of the research results.

Workforce Influences shaping dental hygiene-based dental therapy included: CODA, dentistry, regulation, restricted scope of practice; dental hygiene's current and future workforce needs; reflect the professional values and mission of dental hygiene; reflect patient healthcare outcomes; and a cost-effective, efficient, and accessible workforce model. Influences external to curriculum design included: program director's knowledge and skill, pre-requisite knowledge, credentials and education level.

Institutional influences shaping curriculum design and implementation included: faculty support; administrative support; resource support; and identifying a mechanism to implement a dental hygiene-based dental therapy program. The independent variable was curriculum for the dental hygiene-based dental therapist.

Instruments. The survey instrument was divided into three main sections, and one open-ended question: Demographics; Influences shaping specific dental hygiene-based curriculum; and Institutional influences shaping curriculum design and implementation. Aside from demographics, all questions were rated using a seven point Likert-type scale, with seven possible values, from strongly agree to strongly disagree,

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with the exception of one question on curriculum which rated items from very important to very unimportant. There was one qualitative open-ended question in the survey questionnaire regarding input regarding specific dental hygiene-based dental therapy curriculum, provided in the hopes of gaining richer insight on this subject than the limitations of a fixed question survey may have provided.

The survey included items regarding demographics, influences shaping dental hygiene based curriculum, and institutional influences shaping curriculum development and implementation. Items # 1-7 elicited demographic data, including age, state, gender, highest educational degree earned, number of years as a program director/program chair, ADHA membership status, and race/ethnicity. A 7-point Likert-type scale, ranging from strongly agree to strongly disagree, was used by respondents to rate fourteen questions, # 8-16, and 18-21, regarding influences that shape dental hygiene-based curriculum, and institutional influences shaping curriculum design and implementation. One item, #17, asked respondents to rate curriculum content in order of importance using a 7-point Likert-type scale, ranging from very important to very unimportant, and # 22 was an open-ended question asking respondents to volunteer additional comments related to dental hygiene-based curriculum.

Research questions one through four. Research question one was answered by survey items 16, and 17. Survey item #16 asked respondents to rank the importance of the *Transforming Dental Hygiene Education* domains. Survey item #17 asked respondents to rate the underlying educational concepts in order from *most important* to *least important*, thus providing the basis for the independent variable of curriculum.

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Research question two was answered by survey items 8,9,10,11, and 15. Survey items# 8-9 related to variables external to curriculum design such as regulation, restrictive scope of practice, dentistry's inability to accommodate underserved populations, CODA requirements, and the workforce needs of the dental hygiene profession. Answers to these questions helped answer the question of "*why*" a theoretical framework is necessary for development of a dental hygiene-based dental therapy curriculum with a need for professional accountability and future workforce considerations. Survey items# 10, 11, and 15 related to variables that help specifically define a dental hygiene-based dental therapist, such as a professional vision, reflection of current and future workforce needs, dental hygiene-based health outcomes, and the cost-effectiveness, accessibility and efficiency of the workforce. Answers to these questions helped answer the question of "*why*" and "*what*" were needed to enable growth and change for a dental hygiene-based dental therapy curriculum.

Research question three was answered by survey items 12, 13, and 14. Survey items #12, 13, and 14 related to the criteria for a dental hygiene based dental therapy curriculum, and sought to answer pre-requisite knowledge information for candidates and program directors for the dental hygiene-based dental therapist. Answers to these questions helped answer the question of "*how*" to implement a dental hygiene-based dental therapy curriculum.

Research question four was answered by survey items # 18 – 21 related to institutional influences in curriculum development and implementation, such as faculty, administrative, and resource support, as well as opinion regarding seeing a mechanism for hosting a dental hygiene-based dental therapy program. Answers to these questions

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helped answer the question of “*where*” curriculums are shaped, and how and why they are constrained by local bureaucracies (Lee et al., 2013). See Appendix A for the complete survey questionnaire.

Validity and Reliability. Tests of overall study validity include construct validity and content validity. These each measure study design for relevance to what is being studied and measured. Construct validity measures if one is actually measuring what they intend to study. Construct validity is tested by asking, “Do the variables in the study relate?” (Grove et al., 2013). For example:

external influences -----dental hygiene-based dental therapy curriculum
 educational concepts-----dental hygiene-based dental therapy curriculum
 professional/workforce needs---dental hygiene-based dental therapy curriculum
 institutional influences-----dental hygiene-based dental therapy curriculum

According to Grove et al. (2013), a theoretical framework can be applied to help analyze the research question, to provide a framework for the research design, and to validate the relationship of the variables. In this study, the variables were related to the “*why, what, how, and where*” relevant to dental hygiene-based dental therapy curriculum, and each specific influence related to curriculum development and implementation (Lee et al., 2013). Content validity was a measure of context as compared to content. It was important to detail the criteria for detailing the explanation for content, such as literature, representatives of the relevant population, or content experts (Grove et al., 2013). In this study, curricular criteria was provided through the ADHA *Transforming Dental Hygiene: New Curricular Domains*, and an extensive literature review was offered for variables such as access issues and future workforce needs, dentistry, CODA, regulation and

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limited scope of practice, improved patient health outcomes, and workforce efficiency and cost-effectiveness. Additionally, influences outside of curriculum were studied, such as pre-requisite requirements for potential students. Content validity tests for study bias and ambiguity (Grove et al., 2013). A pretest with an expert panel of EWU dental hygiene instructors was administered in order to measure content validity.

Steps to implementation. Following IRB approval, the PI conducted a pretest of the instrument using a small sample of people who were similar to the target respondents. This was completed through submission of a pilot survey to an expert panel of full time dental hygiene professors at EWU, who are knowledgeable in dental hygiene curricular methodology, development, and implementation. Feedback was incorporated into the final questionnaire to minimize question wording ambiguity and response bias (Cooper & Schindler, 2011). Professor Rebecca Stolberg requested email addresses of current program directors and/or department chairs of CODA accredited dental hygiene programs from the ADHA, as it is ADHA policy not to release this information directly to students. Each respondent was emailed from Professor Rebecca Stolberg's Eastern Washington University email address with a personal introduction and request to consider taking the PI's survey. The survey was created on www.surveymonkey.com. The Survey Monkey® survey link was sent to program directors, courtesy of first chair, Professor Rebecca Stolberg, inviting them to participate in the survey including a description of the study, its significance, and an explanation of the educational concepts. Included was EWU IRB approval, and details regarding study confidentiality. A drawing was offered for participants with a reward of one out of three \$50.00 Amazon gift cards. To be eligible for the drawing, the respondent needed to send an email to the PI's email address

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indicating completion of the survey, and requesting entry into the drawing. The respondents were ensured survey anonymity by responding in this manner.

Two weeks after the original email, a second email reminder was sent courtesy of Professor Rebecca Stolberg to all study respondents. Those respondents who entered the drawing were removed from the email list. The survey remained open for two more weeks before a third email reminder was sent courtesy of Professor Rebecca Stolberg, and then was closed, resulting in a total conducted survey time of six weeks. In the event survey times needed to be adjusted due to academic schedules, participants were not able to be identified due to differing time frames, regardless of when they filled out the survey.

Survey data, collected primarily from quantitative measures and a single open-ended qualitative question were applied in order to analyze relationships related to dental hygiene-based curriculum development and implementation. An open-ended question was added to the survey, requesting additional information regarding dental hygiene-based curriculum design and implementation.

Summary

This quantitative correlational, descriptive research study utilized a theoretical framework developed specifically for understanding the influences surrounding the development of healthcare curriculum (Lee et al., 2013), and related to curriculum development and implementation for the dental hygiene-based dental therapist workforce model. This study used the proposed Transforming Dental Hygiene educational domains (ADHA, 2014d) as a curriculum template for comparison. The survey instrument was developed to survey dental hygiene program directors and

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department chairs, each from CODA accredited programs across the United States. The study objective was to analyze opinions regarding curriculum, and outside influences regarding curriculum development and implementation.

Results

Description of Sample

An email and introduction were sent to 340 qualified participants, with a link to the survey at SurveyMonkey© for the opportunity to participate in the study. Eight were returned due to email kickback. Corrected email addresses were obtained through the ADHA and were resubmitted; one email was returned due to kickback, thus bringing the total possible responses to 339. Research indicated an anticipated 19% return rate ($N=46$) (Constantcontact.com, 2015; Sheehan, 2006); however, the current study had a 43% return rate ($N=147$). Respondents were permitted to skip items; therefore, the sample size varied per item. All variations in this study were due to unanswered questions.

Demographic data of this study's sample is displayed in Table 1. The majority of the sample was aged 51 years and above ($n=147$; 77.55%). They primarily reported that they were white ($n=147$; 91.16%), female ($n=147$; 93.88%), with Master's degrees ($n=145$; 43.45%), and held current membership in ADHA ($n=147$; 90.48%). (Table 1).

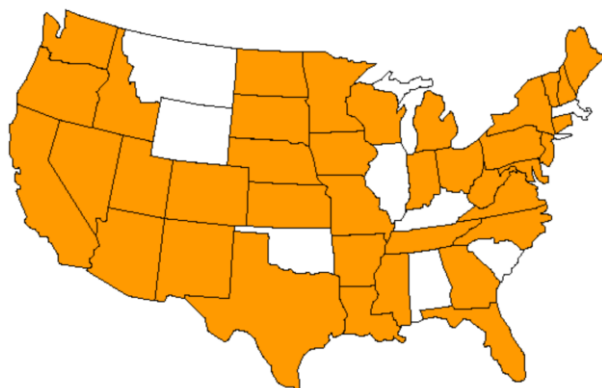
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Table 1.

Demographic description of survey sample (N=339)

Response Rate	n	%
Response	147	43.23
Age (in years)		
30 or I	1	0.68
31-40	5	3.4
41-50	27	18.37
51+	114	77.55
Gender		
Female	138	93.88
Male	8	5.44
Other	1	0.68
Race/ethnicity		
Black/Non-Hispanic	3	2.04
Hispanic	6	4.08
White/Non Hispanic	134	91.16
Other	4	2.72
Highest Education		
Bachelor's	1	0.68
Master's	105	71.43
Doctoral	41	27.89
How long PD/Chair		
0-5 years	63	43.45
6-10 years	32	22.07
11-15 years	22	15.17
15-20 years	12	8.28
20+ years	16	11.03
ADHA Member		
Yes	133	90.48
No	14	9.52

There were respondents from most states, with the exception of Alabama, Delaware, Hawaii, Illinois, Kentucky, Montana, New Hampshire, Oklahoma, Rhode Island, South Carolina, and Wyoming ($n=145$). (Figure 3).



Statistical Analysis

Table 2

Frequency and Percentage Summaries related to use of Transforming Dental Hygiene

Education domains

	Frequency	Percent
<i>16. The new Transforming Dental Hygiene Education domains should be used to provide a competency framework for dental hygiene-based dental therapists.</i>		
1 Strongly disagree	0	0.0
2 Disagree	1	0.7
3 Somewhat disagree	1	0.7
4 Neither agree nor disagree	6	4.1
5 Somewhat agree	13	8.8

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6 Agree	61	41.5
7 Strongly agree	56	38.1
Missing	9	6.1

Note: n=133-138

Table 3 summarizes the responses to question item 17, ratings on the educational concepts related to the *Transforming Dental Hygiene Education* domains according to level of importance for a dental hygiene-based dental therapist. The summary of responses in Table 3, represents the respondents' opinion related to level of importance to related educational concepts.

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Table 3

Level of Importance for Educational Concepts

		Very Unimportant	Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Important	Very Important
DH Diagnosis								
n = 134	<i>f</i>	0	1	0	2	1	20	114
$\mu = 6.76$	%	0.00%	0.72%	0.00%	1.45%	0.72%	14.49%	82.61%
Foundational Knowledge								
n = 133	<i>f</i>	0	0	1	2	2	38	95
$\mu = 6.62$	%	0.00%	0.00%	0.72%	1.45%	1.45%	27.54%	68.84%
Business Management								
n = 138	<i>f</i>	0	0	0	6	28	67	37
$\mu = 5.98$	%	0.00%	0.00%	0.00%	4.35%	20.29%	48.55%	26.81%
Inter-professional Collaboration								
n = 138	<i>f</i>	0	0	0	3	3	34	98
$\mu = 6.64$	%	0.00%	0.00%	0.00%	2.17%	2.17%	24.64%	71.01%
Public Health								
n = 138	<i>f</i>	0	0	0	3	8	48	79
$\mu = 6.47$	%	0.00%	0.00%	0.00%	2.17%	5.80%	37.78%	57.25%
Communications/Tech								
n = 138	<i>f</i>	0	0	1	3	5	40	89
$\mu = 6.54$	%	0.00%	0.00%	0.72%	3.17%	3.62%	28.99%	64.49%
Customized Patient Care								
n = 138	<i>f</i>	0	0	0	2	4	32	100
$\mu = 6.67$	%	0.00%	0.00%	0.00%	1.45%	2.90%	23.19%	72.46%
EB Research								
n = 138	<i>f</i>	0	0	1	3	1	21	112
$\mu = 6.74$	%	0.00%	0.00%	0.72%	2.17%	0.72%	15.22%	81.16%
Cultural Competency								
n = 138	<i>f</i>	0	2	0	2	7	41	86
$\mu = 6.49$	%	0.00%	1.45%	0.00%	1.45%	5.07%	29.71%	62.32%
Leadership								
n = 138	<i>f</i>	0	0	1	4	14	52	66
$\mu = 6.30$	%	0.00%	0.00%	0.73%	2.92%	10.22%	37.96%	48.18%

Level of importance of Educational Concepts are represented by Figure 2. On a seven point Likert scale, the weighted means for educational concepts were between 5.98 and 6.76, $n=138$ (Figure 2).

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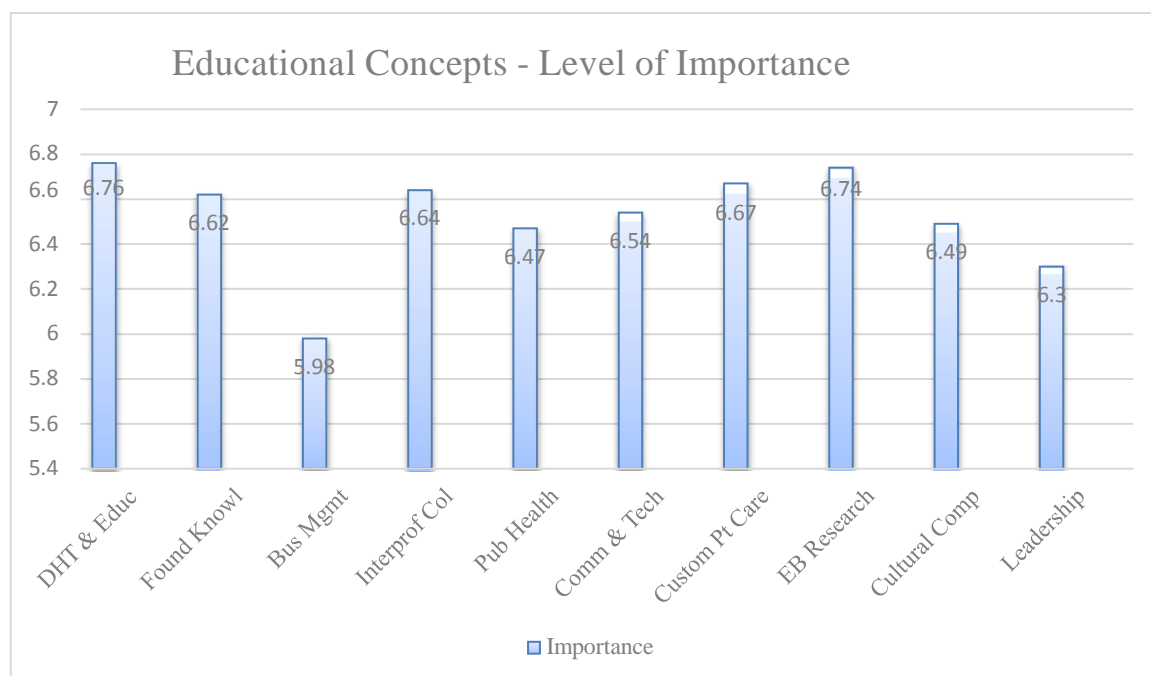


Figure 4. Mean Level of Importance for Educational Concepts.

Research Question Two (RQ2). “What is the relationship between a specific dental hygiene-based dental therapist curriculum and considerations regarding future needs of the dental hygiene profession and workforce?” The independent variables were the responses on question 17 regarding the rating of the level of importance for the 10 Educational Concepts related to the new *Transforming Dental Hygiene Education* domains for a dental hygiene-based dental therapist. The dependent variables were the responses on survey items 8, 9, 10, 11, and 15, representing Future Needs of the Dental Hygiene Profession and Workforce. Based upon the summary of frequency and percentage responses in Table 4, the majority of the respondents agreed or strongly agreed to survey items 8, 9, 10, 11, and 15, considerations regarding future needs of the dental hygiene profession and workforce. These items include professional workforce variables external to curriculum design such as regulation, restrictive scope of practice, dentistry’s inability to accommodate underserved populations; CODA

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requirements, and the workforce needs of the dental hygiene profession; and professional workforce variables that help specifically define a dental hygiene-based dental therapist, such as a professional values, dental hygiene-based health outcomes, and reflection of current and future workforce needs. Each of the five variables representing agreement related to professional workforce needs represented between 79.6 – 91.2% agreement or strong agreement. Additionally, Figure 5 represents the weighted means for all five workforce needs on a 1-7 Likert agreement scale, reflecting a mean average between 5.43 – 6.34.

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Table 4

Frequency and Percentage Summaries of Responses on Survey Items 8, 9, 10, 11, and 15

	Frequency	Percent
<i>8. Variables outside of curriculum design, such as dental hygiene regulation and scope of practice, and dentistry's limited services to underserved populations have inhibited the dental hygiene profession's ability to develop dental hygiene-based dental therapy</i>		
1 Strongly disagree	5	3.4
2 Disagree	2	1.4
4 Neither agree nor disagree	4	2.7
5 Somewhat agree	12	8.2
6 Agree	53	36.1
7 Strongly agree	66	44.9
Missing	5	3.4
<i>9. Selecting a curriculum for a dental hygiene-based dental therapist must respond to the requirements of CODA while also serving the workforce needs of the dental hygiene profession in charge of shaping the curriculum.</i>		
1 Strongly disagree	1	0.7
2 Disagree	4	2.7
3 Somewhat disagree	3	2
4 Neither agree nor disagree	4	2.7
5 Somewhat agree	14	9.5
6 Agree	53	36.1
7 Strongly agree	64	43.5
Missing	4	2.7
<i>10. It is important for the profession of dental hygiene to define a contribution to the dental therapist model that specifically reflects the professional values and mission of dental hygiene.</i>		
1 Strongly disagree	1	0.7
2 Disagree	1	0.7
3 Somewhat disagree	2	1.4
4 Neither agree nor disagree	2	1.4
5 Somewhat agree	14	9.5
6 Agree	41	27.9
7 Strongly agree	82	55.8
Missing	4	2.7
<i>11. It is important for the profession of dental hygiene to define a contribution to the dental therapist model that specifically reflects dental hygiene patient's health care outcomes.</i>		
1 Strongly disagree	1	0.7
2 Disagree	2	1.4

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3 Somewhat disagree	1	0.7
4 Neither agree nor disagree	2	1.4
5 Somewhat agree	12	8.2
6 Agree	43	29.3
7 Strongly agree	78	53.1
Missing	8	5.4
<i>15. Competency domains for a dental hygiene-based dental therapist should reflect an efficient, cost-effective and accessible workforce model prepared to meet current and future workforce demands.</i>		
1 Strongly disagree	1	0.7
2 Disagree	0	0.0
3 Somewhat disagree	0	0.0
4 Neither agree nor disagree	2	1.4
5 Somewhat agree	3	2
6 Agree	49	33.3
7 Strongly agree	85	57.8
Missing	7	4.8

Level of agreement for Current and Future Workforce Needs are represented by

Figure 3. On a seven point Likert scale, the weighted means for workforce needs were between 5.43 and 6.34, $n=139$ (Figure 3).

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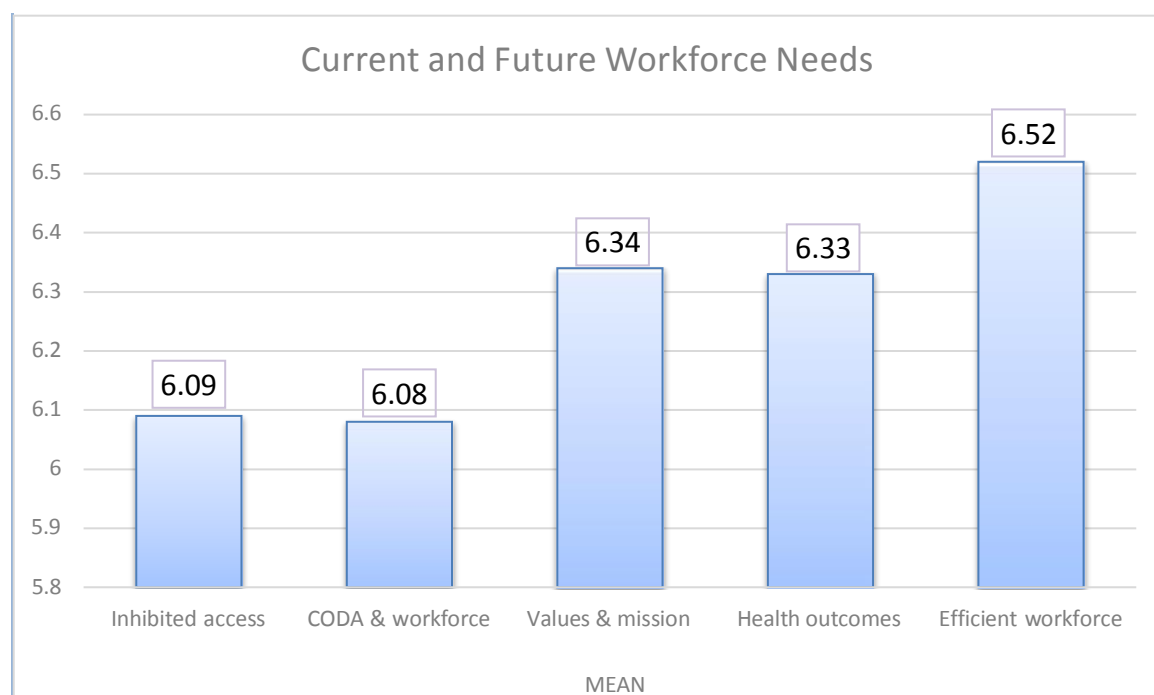


Figure 5. Mean Level of Agreement for Current and Future Workforce Needs.

Spearman's rho correlations were calculated to determine whether there was a significant relationship between survey items related to Future Dental Hygiene Profession and Workforce, and the level of importance for each of the 10 Educational Concepts related to the specific Dental Hygiene-based Dental Therapist Curriculum.

Table 5 demonstrates the summaries of the Spearman's rho analysis of the relationship between Future Dental Hygiene Professional Workforce Considerations and Curriculum Concepts. Workforce considerations are represented through survey items 8, 9, 10, 11, and 15. Curriculum Concepts are represented by the 10 educational concepts represented in survey item 17 (See Appendix C).

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Table 5

Spearman's Rho Correlations for Research Question Two; Importance of Curriculum Areas and Future Needs of the Profession

	Dental Hygiene	Foundational	Business	Healthcare	Public Health	Communication	Customized	Critical Thinking	Cultural	Leadership and
Variables Outside of Curriculum Design have Inhibited the Development of Dental Therapy Programs										
r_s	0.183	0.088	0.236	0.068	0.145	0.206	0.204	0.198	0.191	0.200
p	0.032 *	0.305	0.005 **	0.427	0.090	0.015 *	0.016 *	0.020 *	0.025 *	0.019 *
Dental Hygiene-Based Dental Therapy Curriculum must comply with CODA and Workforce demands										
r_s	0.270	0.232	0.227	0.083	0.147	0.208	0.200	0.172	0.098	0.160
p	0.001 ***	0.006 **	0.007 **	0.330	0.085	0.014 *	0.018 *	0.043 *	0.251	0.061
The Dental Hygiene Profession's contribution to the Dental Therapist program model must be congruent with the values and mission of Dental Hygiene practice										
r_s	0.393	0.280	0.216	0.156	0.027	0.258	0.154	0.183	0.233	0.145
p	0.000 ***	0.001 ***	0.011 *	0.066	0.751	0.002 **	0.070	0.031 *	0.006 **	0.091
The Dental Hygiene Profession's contribution to the Dental Therapist program model must be congruent with the Patient's desired health outcomes.										
r_s	0.302	0.240	0.312	0.324	0.270	0.362	0.314	0.268	0.282	0.253
p	0.000 ***	0.005 **	0.000 ***	0.000 ***	0.001 ***	0.000 ***	0.000 ***	0.002 **	0.001 *	0.003 **
Competency domains for a dental hygiene-based dental therapist should reflect an efficient, cost-effective and accessible workforce model										
r_s	0.210	0.303	0.264	0.209	0.293	0.300	0.186	0.269	0.105	0.246
p	0.013 *	0.000 ***	0.002 **	0.014 *	0.000 ***	0.000 ***	0.029 ***	0.001 ***	0.219	0.004 **

* indicates $p < .05$, ** indicates $p < .01$, *** indicates $p < .0004$

There was one .01 moderately conservatively significant correlation between *Variables Outside of Curriculum Design have Inhibited the Development of Dental Therapy Programs* and *Business Management* ($r_s = .236$, $n = 138$, $p = .005$). There were four .05 significant correlations between *Variables Outside of Curriculum Design have Inhibited the Development of Dental Therapy Programs* and *Communications and Technology* ($r_s = .206$, $n = 138$, $p = .015$), *Customized Patient Care* ($r_s = .204$, $n = 138$, $p = .016$), *Critical Thinking* ($r_s = .198$, $n = 138$, $p = .020$), and *Leadership and Advocacy* ($r_s = .200$, $n = 138$, $p = .019$).

There were three .01 moderately conservatively significant correlation between *Dental Hygiene-based Dental Therapy Curriculum must comply with CODA and Workforce Demands* and *Dental Hygiene Diagnosis* ($r_s = .270$, $n = 139$, $p = .001$), *Foundational Knowledge* ($r_s = .232$, $n = 139$, $p = .006$), and *Business Management* ($r_s = .227$, $n = 139$, $p = .007$). There were two .05 significant correlations between *Dental Hygiene-based Dental Therapy Curriculum must comply with CODA and Workforce*

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Demands and Customized Patient Care ($r_s = .200$, $n = 139$, $p = .018$), and

Communications and Technology ($r_s = .208$, $n = 139$, $p = .014$).

There was one .0004 conservatively significant correlation between *Dental Hygiene profession's contribution to the Dental Therapist program model must be congruent with the values and mission of Dental Hygiene* and *Dental Hygiene Diagnosis* ($r_s = .393$, $n = 139$, $p < .000$). There were three .01 moderately conservatively significant correlations between *Dental Hygiene profession's contribution to the Dental Therapist program model must be congruent with the values and mission of Dental Hygiene* and *Foundational Knowledge* ($r_s = .280$, $n = 139$, $p = .001$), *Communications and Technology* ($r_s = .258$, $n = 139$, $p = .002$), and *Cultural Competency* ($r_s = .233$, $n = 139$, $p = .006$).

There was one .05 significant correlation between *Dental Hygiene profession's contribution to the Dental Therapist program model must be congruent with the values and mission of Dental Hygiene* and *Business Management* ($r_s = .216$, $n = 139$, $p = .011$).

There were five .0004 conservatively significant correlations between *The Dental Hygiene profession's contribution to the Dental Therapist program model must be congruent with Improved Patient Health Outcomes* and *Dental Hygiene Diagnosis* ($r_s = .302$, $n = 137$, $p < .000$), *Business Management* ($r_s = .312$, $n = 137$, $p < .000$), *Healthcare Collaboration* ($r_s = .324$, $n = 137$, $p < .000$), *Communications and Technology* ($r_s = .362$, $n = 137$, $p < .000$), and *Customized Patient Care* ($r_s = .314$, $n = 137$, $p < .000$). There were five .01 moderately significant correlations between *The Dental Hygiene profession's contribution to the Dental Therapist program model must be congruent with Improved Patient Health Outcomes* and *Foundational Knowledge* ($r_s = .240$, $n = 137$, $p = .005$), *Public Health Knowledge* ($r_s = .270$, $n = 137$, $p = .001$), *Critical Thinking* ($r_s = .268$, $n = 137$, $p = .001$), *Healthcare Collaboration* ($r_s = .268$, $n = 137$, $p = .001$), and *Business Management* ($r_s = .268$, $n = 137$, $p = .001$).

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=137, $p = .002$), *Cultural Competency* ($r_s = .282$ $n = 137$, $p = .001$), and *Leadership and Advocacy* ($r_s = .246$ $n = 136$, $p = .004$).

There were three .0004 conservatively significant correlations between *Competency Domains for a Dental Hygiene-based Dental Therapist should reflect an Efficient, Cost-effective, Accessible Workforce and Foundational Knowledge* ($r_s = .303$ $n = 138$, $p < .000$), *Public Health Knowledge* ($r_s = .293$ $n = 138$, $p < .000$), and *Communications and Technology* ($r_s = .300$ $n = 138$, $p < .000$). There were three .01 moderately conservatively significant correlations between *Competency Domains for a Dental Hygiene-based Dental Therapist should reflect an Efficient, Cost-effective, Accessible Workforce and Business Management* ($r_s = .264$ $n = 138$, $p = .002$), *Critical Thinking* ($r_s = .269$ $n = 138$, $p = .001$), and *Leadership and Advocacy* ($r_s = .246$ $n = 138$, $p = .004$). There were two .05 significant correlations between *Competency Domains for a Dental Hygiene-based Dental Therapist should reflect an Efficient, Cost-effective, Accessible Workforce and Dental Hygiene Diagnosis* ($r_s = .210$ $n = 138$, $p = .013$), and *Healthcare Collaboration* ($r_s = .209$ $n = 137$, $p = .014$).

Research Question Three (RQ3). “What is the relationship between curriculum for the dental hygiene-based dental therapist, and influences external to curriculum design?” The independent variables were the responses on question 17 regarding the rating of the level of importance for the 10 educational concepts related to the new *Transforming Dental Hygiene Education* domains for a dental hygiene-based dental therapist. The dependent variables were responses to survey items 12, 13, and 14, *Influences External to Curriculum Design*. These items include Dental Hygiene Program Director’s Prerequisite knowledge and skill requirements for providing and directing

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Dental Therapy Programs; Student Entrants to Dental Therapy Programs should include Dental Hygiene licensure from a CODA Accredited Program; and Dental Hygiene-based Dental Therapists should be expected to complete more than Entry-Level Dental Hygiene Education. Based upon the summary of frequency and percentage responses in Table 6, the majority of the respondents agreed or strongly agreed to survey items 12,13, and 14, Influences External to Curriculum Design. Dental Hygiene licensure from CODA Accredited Programs, along with Dental Hygiene-based Dental Therapy program requirement for more than Entry-level Dental Hygiene Education represented between 81.6 – 83.0% agreement or strong agreement, while Dental Hygiene Program Director's Pre-requisite knowledge and skill for directing Dental Therapy Education Programs represented 76.2% somewhat agreement to strong agreement. Additionally, Figure 4 represents the weighted means for all three External Influences on a 1-7 Likert agreement scale, reflecting a mean average between 5.43 – 6.44.

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Table 6

*Frequency and Percentage Summaries of Responses on Survey Items 12, 13, and 14**About Influences External to Curriculum Design*

	Frequency	Percent
<i>12. Dental hygiene program directors have the knowledge and skill required to provide and direct dental therapy education programs.</i>		
1 Strongly disagree	2	1.4
2 Disagree	8	5.4
3 Somewhat disagree	9	6.1
4 Neither agree nor disagree	10	6.8
5 Somewhat agree	32	21.8
6 Agree	39	26.5
7 Strongly agree	41	27.9
Missing	6	4.1
<i>13. A pre-requisite for entry into a dental therapy program should include dental hygiene licensure from a CODA accredited program.</i>		
1 Strongly disagree	2	1.4
3 Somewhat disagree	4	2.7
4 Neither agree nor disagree	4	2.7
5 Somewhat agree	9	6.1
6 Agree	21	14.3
7 Strongly agree	101	68.7
Missing	6	4.1
<i>14. Dental hygiene-based dental therapists should be expected to complete more than entry-level dental hygiene education.</i>		
1 Strongly disagree	0	0
2 Disagree	3	2
3 Somewhat disagree	5	3.4
4 Neither agree nor disagree	4	2.7
5 Somewhat agree	9	6.1
6 Agree	26	17.7
7 Strongly agree	94	63.9
Missing	6	4.1

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Level of agreement for Influences External to Curriculum are represented by Figure 6. On a seven point Likert scale, the weighted means for external influences were between 5.43 and 6.44, $n=141$ (Figure 4).

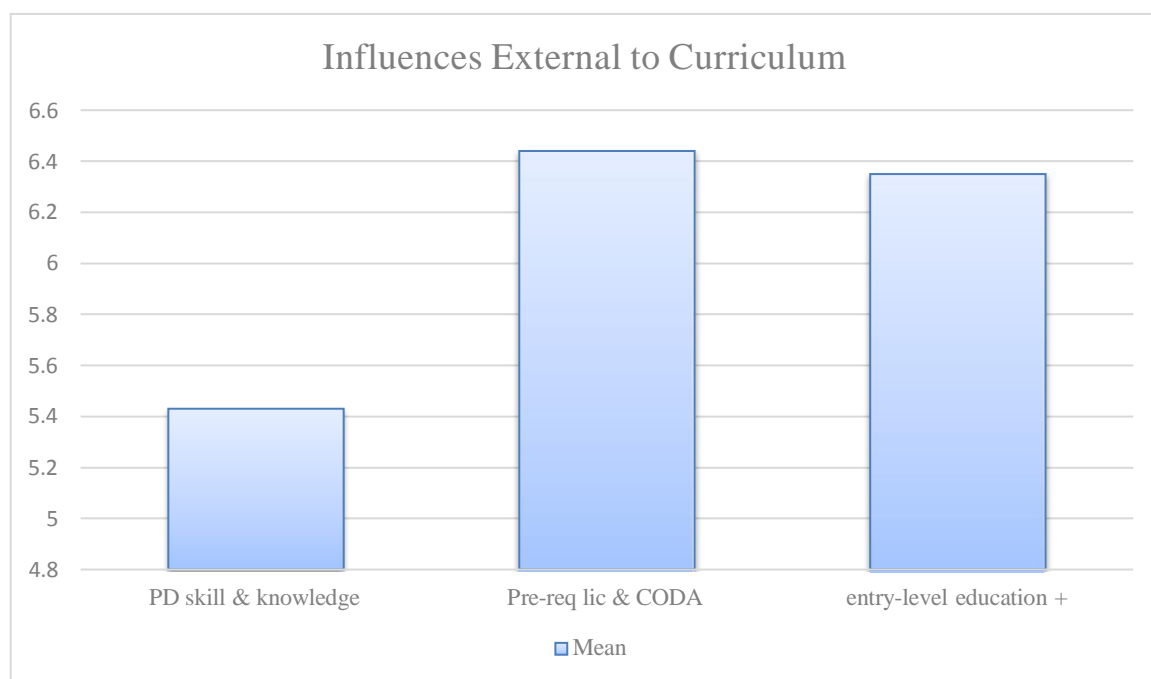


Figure 6. Mean Level of Agreement for Influences External to Curriculum.

Spearman's rho testing was conducted to determine whether there was a significant relationship between survey items related to Influences External to Curriculum Design, and the level of importance for each of the 10 Educational Concepts related to the specific Dental Hygiene-based Dental Therapist Curriculum. Table 7 demonstrates the summaries of the Spearman's rho analysis of the relationship between Influences External to Curriculum Design and Curriculum Concepts. External Influences are represented through survey items 12, 13, and 14. Curriculum Concepts are represented by the 10 educational concepts represented in Survey item 17 (Appendix C).

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Table 7

Spearman's Rho Correlations for Research Question Three: Importance of Curriculum Areas and External Influences

	Dental Hygiene	Foundational	Business	Healthcare	Public Health	Communication	Customized	Critical Thinking	Cultural	Leadership and
Dental Hygiene Program Directors Have Prerequisite Skills to Direct Dental Therapy Programs										
r_s	0.119	0.046	0.245	0.020	0.153	0.094	0.089	0.102	0.091	0.165
p	0.164	0.593	0.004 **	0.813	0.073	0.271	0.298	0.232	0.285	0.054
Student Entrants to Dental Therapy Programs should come from CODA Accredited Programs										
r_s	0.309	0.205	0.206	0.044	0.052	0.156	0.113	0.134	0.167	0.168
p	0.000 ***	0.015 *	0.015 *	0.610	0.545	0.067	0.187	0.115	0.050 *	0.049 *
Dental Hygiene-based Dental Therapists should be Expected to Complete more than Entry-Level Dental Hygiene Education										
r_s	0.218	0.317	0.294	0.278	0.188	0.224	0.175	0.180	0.177	0.188
p	0.010 *	0.000 ***	0.000 ***	0.001 ***	0.027 *	0.008 **	0.040 *	0.034 *	0.037 *	0.027 *

* indicates $p < .05$, ** indicates $p < .01$, *** indicates $p < .0004$

There was one .01 moderately conservatively significant correlation between *Dental Hygiene Program Directors have the knowledge and skill to provide and direct Dental Therapy Programs* and *Business Management* ($r_s = .245$ $n = 139$, $p = .004$).

There was one .0004 conservatively significant correlation between *Prerequisite for Entry into a Dental Therapy Program should include dental hygiene licensure from a CODA accredited program* and *Dental Hygiene Diagnosis* ($r_s = .309$ $n = 139$, $p < .000$).

There were two .05 significant correlations between *Prerequisite for Entry into a Dental Therapy Program should include dental hygiene licensure from a CODA accredited program* and *Foundational Knowledge* ($r_s = .205$ $n = 139$, $p = .019$), *Business Management* ($r_s = .206$ $n = 139$, $p = .015$).

There were two .0004 conservatively significant correlations between *Dental Hygiene-based Dental Therapists should be expected to complete more than entry-level Dental Hygiene education* and *Foundational Knowledge* ($r_s = .317$ $n = 139$, $p < .000$), and *Business Management* ($r_s = .294$ $n = 139$, $p < .000$). There were three .01 moderately conservatively significant correlations between *Dental Hygiene-based Dental Therapists should be expected to complete more than entry-level Dental Hygiene education* and *Dental Hygiene Diagnosis* ($r_s = .218$ $n = 139$, $p = .010$), *Healthcare Collaboration* ($r_s =$

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.278 $n=139$, $p=.001$), and *Communications and Technology* ($r_s=.224$ $n=139$, $p=.008$).

Research Question Four (RQ4). “What is the relationship between curriculum for the dental hygiene-based dental therapist and institutional influences on curriculum design?” The independent variables were the responses on question 17 regarding the level of importance rating for the 10 educational concepts related to the new *Transforming Dental Hygiene Education* domains for a dental hygiene-based dental therapist. The dependent variables were responses on survey items 18, 19, 20, and 21, institutional influences shaping curriculum design and implementation. Based upon the summary of frequency and percentage responses in Table 7, the majority of the respondents somewhat agreed, agreed, or strongly agreed to survey items 18, 19, 20 and 21, Institutional Influences on Curriculum Design. These items include Institutional Mechanism for hosting a Dental Hygiene-based Dental Therapy Program; Faculty Support for hosting a Dental Hygiene-based Dental Therapy Program; Administrative Support for hosting a Dental Hygiene-based Dental Therapy Program; and Institutional Resources for hosting a Dental Hygiene-based Dental Therapy Program. Faculty Support represented 62.5% somewhat agreement, agreement or strong agreement, with 18.3% represented by somewhat to strong disagreement. Mechanism for Hosting represented 61.9% somewhat agreement, agreement or strong agreement, with 12.2% somewhat to strong disagreement; Institutional Resources represented 56.9% somewhat agreement, agreement or strong agreement, with 27.1% somewhat to strong agreement; and Administrative Support represented 53.1% somewhat agreement, agreement or strong agreement, with 17.7% somewhat to strong disagreement. Additionally, Figure 7

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represents the weighted means for all five workforce needs on a 1-7 Likert agreement scale, reflecting a mean average between 4.49 – 5.21.

Table 8

*Frequency and Percentage Summaries of Institutional Influences Shaping Curriculum**Design and Implementation*

	Frequency	Percent
<i>18. Mechanism for hosting</i>		
1.0 Strongly disagree	5	3.4
2.0 Disagree	13	8.8
3.0 Somewhat disagree	9	6.1
4.0 Neither agree nor disagree	20	13.6
5.0 Somewhat agree	22	15
6.0 Agree	39	26.5
7.0 Strongly agree	30	20.4
Missing	9	6.1
<i>19. Faculty support</i>		
1.0 Strongly disagree	2	1.4
2.0 Disagree	8	5.4
3.0 Somewhat disagree	8	5.4
4.0 Neither agree nor disagree	28	19
5.0 Somewhat agree	23	15.6
6.0 Agree	33	22.4
7.0 Strongly agree	36	24.5
Missing	9	6.1
<i>20. Administrative Support</i>		
1.0 Strongly disagree	7	4.8
2.0 Disagree	11	7.5
3.0 Somewhat disagree	8	5.4
4.0 Neither agree nor disagree	34	23.1
5.0 Somewhat agree	24	16.3
6.0 Agree	27	18.4
7.0 Strongly agree	27	18.4
Missing	9	6.1
<i>21. School Resources</i>		
1.0 Strongly disagree	9	6.1
2.0 Disagree	18	12.2
3.0 Somewhat disagree	13	8.8
4.0 Neither agree nor disagree	27	18.4

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5.0 Somewhat agree	16	10.9
6.0 Agree	33	22.4
7.0 Strongly agree	20	13.6
Missing	11	7.5

Level of agreement for Institutional Influences on Shaping Curriculum Design and Implementation are represented by Figure 4. On a seven point Likert scale, the weighted means for external influences were between 4.49 and 5.21, $n=136$ (Figure 5).

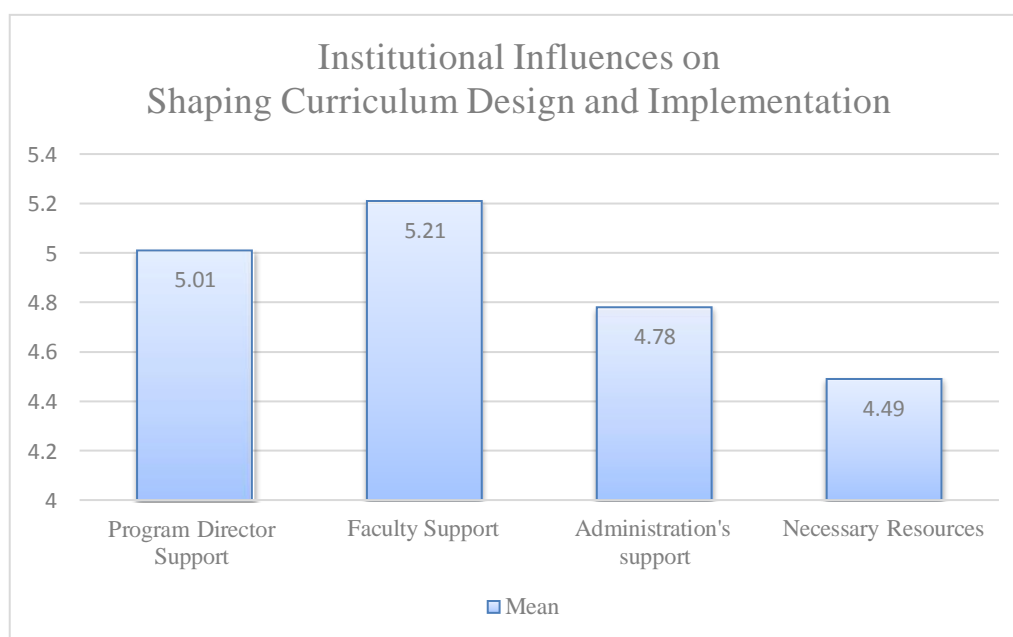


Figure 7. Mean Level of Agreement for Institutional Influences.

Spearman's rho testing was conducted to determine whether there was a significant relationship between survey items related to Institutional Influences to Curriculum Design, and the level of importance for each of the 10 Educational Concepts related to the specific Dental Hygiene-based Dental Therapist Curriculum. Table 8 demonstrates the summaries of the Spearman's rho analysis of the relationship between Institutional Influences to Curriculum Design and Curriculum Concepts. Institutional Influences are represented through survey items 18, 19, 20, and 21. Curriculum Concepts

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are represented by the 10 educational concepts represented in survey item 17 (See Appendix C).

Table 8

Spearman's Rho Correlations for Research Question Four; Importance of Curriculum Areas and Institutional Influences

	Dental Hygiene	Foundational	Business	Healthcare	Public Health	Communication	Customized	Critical Thinking	Cultural	Leadership and
<i>Institutional Mechanisms to host a dental hygiene-based dental therapy program</i>										
r_s	0.173	0.136	0.368	0.218	0.180	0.185	0.232	0.212	0.218	0.347
p	0.043 *	0.111	0.000 ***	0.010 *	0.035 *	0.029 *	0.006 **	0.013 *	0.010 *	0.000 ***
<i>Faculty Support for hosting a dental hygiene-based dental therapy program</i>										
r_s	0.216	0.104	0.269	0.197	0.115	0.150	0.186	0.200	0.199	0.206
p	0.011 *	0.225	0.001 **	0.020 *	0.179	0.078	0.029 *	0.019 *	0.019 *	0.015 *
<i>Administrative Support for hosting a dental hygiene-based dental therapy program</i>										
r_s	0.171	0.059	0.274	0.148	0.196	0.125	0.213	0.159	0.219	0.247
p	0.045 *	0.492	0.001 **	0.083 *	0.021 *	0.146	0.012 *	0.062	0.010 **	0.004 **
<i>Institutional Resources to host a dental hygiene-based dental therapy program</i>										
r_s	0.152	0.106	0.257	0.214	0.123	0.164	0.180	0.143	0.182	0.240
p	0.077	0.221	0.003 **	0.012 *	0.155	0.057	0.036 *	0.096	0.033 *	0.005 **

* indicates $p < .05$, ** indicates $p < .01$, *** indicates $p < .0004$

Critical value .197

There were two .0004 conservatively significant correlations between *Institutional Mechanism for hosting a Dental Hygiene-based Dental Therapy Program* and *Business Management* ($r_s = .368$ $n = 138$, $p < .000$), and *Leadership and Advocacy* ($r_s = .347$ $n = 137$, $p < .000$). There were three .01 moderately conservatively significant correlations between *Institutional Mechanism for hosting a Dental Hygiene-based Dental Therapy Program* and *Healthcare Collaboration* ($r_s = .218$ $n = 138$, $p = .010$), *Customized Patient Care* ($r_s = .232$ $n = 138$, $p = .006$), *Cultural Diversity* ($r_s = .218$ $n = 138$, $p = .010$). There was one .05 significant correlation between *Institutional Mechanism for hosting a Dental Hygiene-based Dental Therapy Program* and *Critical Thinking* ($r_s = .212$ $n = 138$, $p = .013$).

There was one .01 moderately conservatively significant correlation between *Faculty Support for hosting a Dental Hygiene-based Dental Therapy Program* and *Business Management* ($r_s = .269$ $n = 138$, $p = .001$). There were five .05 significant correlations between *Faculty Support for hosting a Dental Hygiene-based Dental*

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Therapy Program and *Dental Hygiene Diagnosis* ($r_s = .216$ $n = 138$, $p = .001$), *Healthcare Collaboration* ($r_s = .197$ $n = 138$, $p = .020$), *Critical Thinking* ($r_s = .200$ $n = 138$, $p = .020$), *Cultural Diversity* ($r_s = .199$ $n = 138$, $p = .019$), and *Leadership and Advocacy* ($r_s = .206$ $n = 137$, $p = .015$).

There were three .01 moderately conservatively significant correlations between *Administrative Support for hosting a Dental Hygiene-based Dental Therapy Program* and *Business Management* ($r_s = .274$ $n = 138$, $p = .001$), *Cultural Diversity* ($r_s = .219$ $n = 138$, $p = .010$), and *Leadership and Advocacy* ($r_s = .247$ $n = 137$, $p = .004$). There was one .05 significant correlation between *Administrative Support for hosting a Dental Hygiene-based Dental Therapy Program* and *Dental Hygiene Diagnosis* ($r_s = .213$ $n = 138$, $p = .012$).

There were two .01 moderately conservatively significant correlations between *Institutional Resources for hosting a Dental Hygiene-based Dental Therapy Program* and *Business Management* ($r_s = .257$ $n = 136$, $p = .003$), and *Leadership and Advocacy* ($r_s = .240$ $n = 135$, $p = .005$). There was one .05 significant correlation between *Institutional Resources for hosting a Dental Hygiene-based Dental Therapy Program* and *Healthcare Collaboration* ($r_s = .214$ $n = 136$, $p = .012$).

Open-ended question. “Is there anything else you would like to share with the researcher about the dental hygiene-based dental therapy curriculum?” The comments were analyzed using grounded theory design, in order to study emerging themes and related codes, that can be developed for study of developing theory and future research (Glaser & Strauss, 1967). Further, the purpose of grounded theory analysis serves to raise questions and highlight potential relationships between data sets that can

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be used to illuminate gaps in existing research (Glaser & Strauss, 1967). Table 9 summarizes the themes and codes that emerged from analysis of the open-ended comments portion of the survey. (See Appendix C).

Table 10

Themes and Coding for Open-Ended Question

Is there anything else you would like to share with the researcher about a dental hygiene based dental therapy curriculum?

Theme	Code	Quantity
Curriculum/Education	Advanced standing DH/combined DH/DT	13
	Terminal degree master's	4
	Terminal degree bachelor's	2
	Terminal degree Limited to Associate's	6
	One standard of care	2
	Modify state/regional curriculum	1
	Credibility	4
Access/Workforce	Future workforce	7
	Access/underserved	5
External Influences	Lack of support from dentists	10
	Less restrictive practice acts	4
	Need for legislative support	5
	Competition – with dentists	2
	Competition – with dental hygienists	1
	Fully utilize RDH before new provider type is developed	2
Institutional Influences	program director criteria	3
	faculty needs and concerns	3
	positive administrative support	2
	lack of administrative support	5

Note. $n=46$ responses

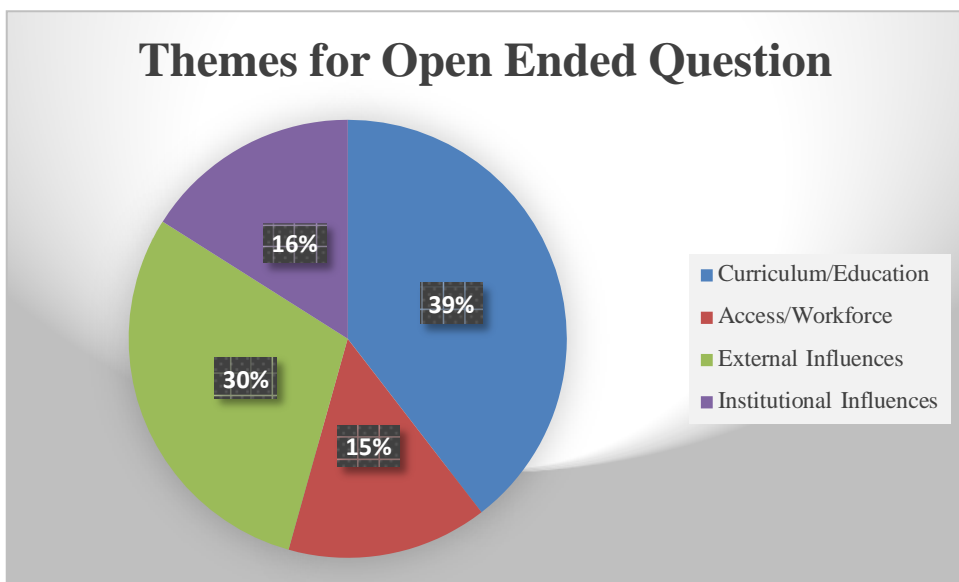


Figure 8. Theme Percentages for Open-Ended Question.

Summary

This section presented the results of the analysis using descriptive statistics, Spearman's rho testing, and coded analysis for the open-ended question. Survey findings supported the independent variable of curriculum importance, and each research question demonstrated significant relationships between select variables influencing curriculum development, along with the strength of each relationship.

Discussion

Summary of Major Findings

This quantitative correlational, descriptive research study utilized a theoretical framework developed specifically for understanding the influences surrounding the development of healthcare curriculum (Lee et al., 2013), and related to curriculum development and implementation for the dental hygiene-based dental therapist workforce model. For research question one, it was determined that the curriculum that should be specific to the dental hygiene-based dental therapist include *The new Transforming Dental Hygiene Education* domains should be used to provide a competency framework for dental hygiene-based dental therapist. Additionally, nearly all of the ten educational concepts for a dental hygiene-based dental therapist were very important in shaping specific dental hygiene-based curriculum. The results of the Spearman's rho tests lead to the rejection of the null hypothesis for the three remaining research questions. For research question two, results of the Spearman's rho tests imply there is a significant relationship between a specific dental hygiene-based dental therapist curriculum and considerations regarding future needs of the dental hygiene profession and workforce. Of particular significance were relationships between all curricular concepts and (the) *importance of a dental hygiene-based dental therapist to reflect dental hygiene patient's improved health outcomes*; and (the) *importance for a dental hygiene-based dental therapist to reflect an efficient, cost-effective, accessible workforce model prepared to meet current and future workforce needs*. Specific significant curricular concepts emerged among the individual workforce variables, such as *Dental Hygiene Diagnosis*;

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Foundational Knowledge; Business Management; Customized Patient Care; and Communications and Technology. For research question three, results of the Spearman's rho tests imply that there is a significant relationship between curricular concepts for the dental hygiene-based dental therapist and influences external to curriculum design. Of particular significance were relationships between curriculum and (the) *pre-requisite for entry into a dental therapy program including dental hygiene licensure from a CODA accredited program; and (the) completion of more than entry-level dental hygiene education.* Specific significant curricular concepts emerged among variables, such as *Dental Hygiene Diagnosis; Foundational Knowledge; and Business Management.* For research question four, results of the Spearman's rho tests imply that there is a significant relationship between curricular concepts for the dental hygiene-based dental therapist and institutional influences on curriculum design. Of particular significance were relationships between curriculum and (a) *mechanism for hosting a dental hygiene-based dental therapy program; and (the) faculty support for hosting a dental hygiene-based dental therapy program.* Specific significant curricular concepts emerged among variables, such as *Business Management; Healthcare Collaboration; Cultural Diversity; and Leadership and Advocacy.* In the final open-ended survey question, four separate themes and related codes emerged. (Table 10). The following discussion expands upon this analysis.

Research Question One. “What curriculum should be specific to the dental hygiene-based dental therapist?”

Support for the use of *Transforming Dental Hygiene Education* domains as a competency framework for a dental hygiene-based dental therapist curriculum was very

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strong among program directors and program chairs (84.48%, Table 2). The educational concepts of Dental Hygiene Diagnosis, Therapy, and Education; Foundational Knowledge; Inter-professional Collaboration with Healthcare Communities; Public Health Knowledge and Program Development; Communication and Technological Skills; Customized Patient Care; Evidence-Based Research and Critical Thinking Skills; Cultural Competency and Diversity; and Leadership and Advocacy were all rated as very important in shaping specific dental hygiene-based curriculum. Program directors and chairs did not rate Business Management or Leadership and Advocacy with quite the same level of importance as the other educational concepts (table 2). However, Business Management and Leadership and Advocacy are considered educational concepts with an overall solid range of support, rated somewhat important to very important .

The difference in rating for Business Management and Leadership and Advocacy were surprising, considering the more complex health issues a dental hygiene-based dental therapist workforce will be facing, with a rapidly aging population (ADEA, 2011). Additionally, the *Transforming Dental Hygiene Education* domains define Customized Patient Care (CPC) as one that incorporates the relationship between oral health systems and larger health care systems including advocacy, research, and business (ADHA, 2014b). Dental Hygiene program directors and chairs are accustomed to curriculum with scientific concepts with clinical applications and implications. Business Management, and Leadership and Advocacy are educational concepts that have not traditionally been in the dental hygiene curriculum, nor is it a standardized curriculum requirement through CODA for dental hygiene education (CODA: Dental Hygiene Standards, 2018). The relationship between curriculum development and workforce need may not always be

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represented through a curriculum assessment. The difference noted in the survey of educational concepts helps to support why the following relationship-related research questions are coupled with outside influences that help to further determine curriculum development and workforce need. The strong support for the proposed dental hygiene-based-dental therapy curricular framework and educational concepts established a solid basis for a comparison of curriculum to other non-curricular influences in the survey and was used as a basis for the study's dependent variables in research questions two, three, and four.

Research Question Two. *“What is the relationship between a specific dental hygiene-based dental therapist curriculum and considerations regarding future needs of the dental hygiene profession and workforce?”*

According to Lee et al., and the Four-Dimensional Curriculum Framework (Figure 1), a curriculum should respond to several factors, such as regulatory practices, an accrediting body, private and public workforce needs, healthcare needs, and the values and mission of the profession that it represents (2013, Dimension One: The why?) *Why are we creating this workforce provider? Is there a need for this provider now, and in the future?* Specific patterns emerged from the research between curriculum and the future needs of the dental hygiene profession and workforce. The findings indicated a highly significant relationship between specific curricular concepts and three professional and workforce items (Table 5). The following details these relationships.

Importance for dental hygiene to define a contribution to dental therapy that specifically reflects dental hygiene patient's improved health outcomes. Those educational concepts most significantly related to dental hygiene patient's improved

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health outcomes were *Dental Hygiene Diagnosis; Business Management; Healthcare Collaboration; Customized Patient Care; and Communications and Technology*. Dental hygienists systematically apply the dental hygiene process of care (diagnosis), and customized patient care related to the treatment of periodontal disease in relation to overall health, that lead to improvements in patient oral health outcomes. In addition, treatment of periodontal disease related to overall health leads to implied improved patient health outcomes, through reductions in hospital admissions and medical costs (United Concordia Dental, 2014). Additionally, through increased public health, advocacy, and diversity development, workforce opportunities are enhanced when scope of practice and regulatory restrictions are lifted, leading to improvements in dental hygiene patient health outcomes (Langelier & Surdu, 2017). As a result, an emerging knowledge of Interprofessional collaboration and technology are becoming necessary if dental hygienists are to communicate, collect and report on data related to patient health outcomes and related improvements.

Competency domains should reflect an efficient, cost-effective, and accessible workforce model prepared to meet current and future workforce demands. Those educational concepts most significantly related to an efficient, cost-effective, and accessible workforce model were *Foundational Knowledge; Public Health Knowledge; and Communications and Technology*). Dental therapists result in cost-effectiveness in both salaries and reduced malpractice insurance rates as compared to dentists, while freeing dentist to provide more complex, higher production services (MDH, 2014; Pew, 2014, part I, Pew, 2014 part II). Additionally, in Minnesota, dental hygiene-based advanced dental therapists provide more accessibility than dental therapists (MBD &

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MDH, 2014). Dental therapists have demonstrated improved access to patients from underserved populations in Alaska and Minnesota (Alaska Native Tribal Health Consortium [ANTHC], 2015; Delta Dental, 2017a; Delta Dental, 2017b; MBD & MDH, 2015; Pew, 2014, part II), and require a solid foundational knowledge and public health knowledge in order to work within the safety-net system. Additionally, federally funded community health programs are data-driven, and stratify their data. This is very helpful for patient data collection and tracking; however would require a solid working foundation in communications and technology.

Importance for dental hygiene to define a contribution to dental therapy that specifically reflects the values and mission of dental hygiene. The educational concept most significantly related to future workforce needs reflective of dental hygiene's professional mission and values was (the) *Dental Hygiene Diagnosis*. The Dental Hygiene Diagnosis is a very specific diagnosis. It covers the entire process of dental hygiene care, including everything from medical and dental intake, to periodontal and caries risk assessment, patient education, and finally periodontal diagnosis and treatment considerations. This, coupled with the development of customized patient care during clinical practice and clinical rotations are a significant portion of dental hygiene clinician's professional identification and values. The complete dental hygiene diagnosis, dental hygiene process of care, and customized patient care are likely considered necessary in order to fulfill the preventive, and integrated health aspects of the dental hygiene-based dental therapist workforce. Additionally, dental hygienists identify professionally with the increasingly more complex needs required in the future of patients with an aging population, utilizing more advanced knowledge, technology, and skill. In

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order to best meet these needs, a new dental hygiene-based dental therapy provider is highly suited to represent the professional values, mission, and education able to addresses current and future oral health issues (ADEA: Position paper, 2011; ADHA, 2014b).

Curriculum must respond to the requirements of CODA while serving the workforce needs of the dental hygiene profession in charge of shaping the curriculum.

There were no highly significantly related curricular items related to this workforce variable. The educational concept moderately significantly related to the requirements of CODA while serving the workforce needs of the dental hygiene profession were (the) *Dental Hygiene Diagnosis; Foundational Knowledge; and Business Management.*

CODA has created minimum accreditation standards for dental therapy programs (CODA, 2015), and is tasked with developing and monitoring the accreditation standards for all dental and allied dental education programs (CODA, 2015). The curriculum for a CODA accredited dental hygiene based dental therapist would include a strong base in foundational knowledge, dental hygiene diagnosis *or* advanced standing in dental hygiene from a CODA accredited program, and a solid foundation in business management.

Regulation and scope of practice, and dentistry's limited services to underserved populations inhibiting dental hygiene-based dental therapy development.

There were no highly significantly related curricular items related to this workforce variable , which was an unexpected finding given the wealth of research related to a paucity of safety net services and benefits for underserved populations (American Dental Association, 2014; Bailit, Beazoglou, DeVitto, McGowan & Myne-Joslin, 2012; KFF,

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2016a; Hilton & Lester, 2010; Pew, 2012; Wall & Jujicic, 2015), and with the ACA Medicaid and the relationship between increased access in states where dental hygienists have more advanced scope of practice (Langelier & Surdu, 2017). The educational concept moderately significantly related to curriculum and dental hygiene regulation, scope of practice, and dentistry's limited services to underserved populations inhibiting dental hygienists and *Business Management*. With the addition of the dental therapist scope of practice to the dental hygienist, this provider would then have a more complete range of preventive and diagnostic, and restorative scope of practice to provide access-based services, thus greatly improving the ability to serve public and private populations (Figure 2).

Regulatory, scope of practice inhibitions, as well as dentistry's reluctance to treat underserved populations (KFF, 2016c) have all contributed to a growing oral health access disparity leading to a National Call to Action to "Increase oral health workforce diversity, capacity, and flexibility" (HHS: A National Call to Action, 2003). In order to support all three of these charges, it is important to recognize the public health message and component built in to such a goal. Dentistry is primarily structured as a private practice, fee-for-service system, with a very small population of dental safety-net providers offering little promise of more entering the workforce (Edelstein, 2010; Tomar, 2006). Expanding the capacity for a diverse and flexible workforce requires making changes to the way we currently structure our educational and curricular system from one that is currently organized primarily to accommodate the needs of private practice dentistry, to one more accommodating toward expanded public health opportunities,

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health policy, and technology. A dental hygiene-based dental therapist model would ideally include a combination of health policy and business content.

Research Question Three. *“What is the relationship between curriculum for the dental hygiene-based dental therapist and influences external to curriculum design?”*

According to Lee et al., curriculum must respond to the relationship between theory and practice (2013). Consequently, it is necessary to facilitate the development of providers that will enable growth and change. *What are the considerations for a qualified workforce, aside from curriculum content?* The study findings indicated that two of the three study variables demonstrated highly significant relationships as external influences on curriculum design. (Table 7). The following details these relationships.

Requirement for more than entry-level education. Just over eighty percent (81.6%; $n=120$) of dental hygiene directors and chairs agreed or strongly agreed that dental hygiene-based dental therapy education should require more than entry level dental hygiene education. (Table 6). The most significant study findings implied that curriculum items related to pre-requisite entry-level dental hygiene education program success were in *Foundational Knowledge*; and *Business Management*. Many Foundational Knowledge subjects and Business Management concepts represent more depth, length, and complexity when offered through dental hygiene bachelor’s degree education or degree completion programs. There were moderately significantly related curricular items to *Dental Hygiene Diagnosis*; *Interprofessional Collaboration*; and *Communications and Technology*. Most bachelor’s programs offer opportunities for customized patient care through advanced instrumentation, additional outreach

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experiences, practicums, and additional clinical oversight during education. Additionally, many bachelor's programs offer interprofessional education opportunities with other allied health programs, such as nursing, physical therapy, occupational therapy, pharmacology, and even public health. Each of these helps to ready the dental hygiene provider for an advanced workforce opportunity in dental hygiene-based dental therapy.

These results align with other results indicating that states with higher levels of education have more advanced practice acts, offering educational mobility and access opportunities for dental hygienists (ADHA, 2015a, ADHA, 2015b). Dental hygienists from states with more advanced scope of practice are likely to be familiar with public health and access issues related to dental hygiene-based dental therapy workforce needs, such as Minnesota, Maine and Vermont. These states passed dental therapy legislation after passing less restrictive scope of practice for dental hygienists, serving as a type of needs-based triage.

Each of these states offer bachelor's degree dental hygiene education programs. States pursuing legislation for dental hygiene-based dental therapy in 2018 are Kansas, Maryland, New Mexico, Ohio, Washington, Arizona, North Dakota, Wisconsin, Massachusetts, Connecticut, Michigan, and Florida (Pew, 2016: States Expand the Use of Dental Therapy, Updated 1/2018). Nine out of twelve of these states are rated excellent or favorable on the Dental Hygiene Professional Practice Index (DHPPI) for scope of practice (Langelier & Surdu, 2017), and all of these states offer dental hygiene bachelor's degrees and/or degree completion, while eight out of twelve offer Master of Science programs in Dental Hygiene (ADHA, 2017b). The implications of the DHPPI, and trends in state dental hygiene education levels suggests educational mobility for

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dental hygienist help contribute to enhanced scope of practice, increased workforce opportunities, and improved access to underserved populations.

The implication for educational mobility as related to enhanced access cannot be emphasized enough: While only 3% of U.S. dentists choose employment in the dental safety net, dental hygienists are routinely employed in the safety net system (Edelstein, 2010). Dental hygienists utilizing an expanded scope of practice are not a replacement for dental therapists. Rather, they serve to supplement the safety-net resources provided for those patients with limited resources. Researchers of oral health disparities have evaluated the complicated issue of improved access to care and removal of barriers. Several have suggested expanding the dental workforce size, and introduction of new provider types (ADHA, 2017; Edelstein, 2010; Hilton & Lester, 2010; NGA, 2014; Nash, 2008; Nash, 2009; Pew, 2010; Skillman, Doescher, Mouradian, & Brunson, 2010). The dental hygiene-based dental therapist provider must offer a diversity of knowledge and services that complements entry-level dental hygiene education, yet is more streamlined and less costly than dental education.

Requirement for licensed dental hygienists from CODA accredited institutions.

The most significant study finding implied that a curricular concept related to pre-requisite dental hygiene licensure, and coming from a CODA accredited program was in *Dental Hygiene Diagnosis*. In the CODA Dental Therapy Standards, there is an advanced standing allowance for dental hygienists and dental assistants who have completed coursework through CODA accredited programs (CODA, 2015). This provision potentiates a career ladder opportunity for licensed dental hygienists to expand upon an existing professional knowledge and skillset. Additionally, this enables

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licensed dental hygienists to abbreviate dental therapy education length. There were less significantly related curricular items related to *Foundational Knowledge*; and *Business Management*. Most states require dental hygiene licensure for practice; however, not all educational institutions are CODA accredited. CODA oversees that regulatory, educational, institutional, and professional guidelines are all satisfied for all dental and allied dental programs (CODA, 2017). CODA also ensures there is a minimum curriculum standard for dental therapy programs (CODA, 2015).

Standardization is important to the national dental therapy workforce design. We have the benefit of seeing dental therapy evolve from a sole dental therapy model into a combined dental hygiene-dental therapist model in many other nations (Coates et al., 2009; Luciac-Donsberger & Eaton, 2009; Rowbotham et al., 2009). A solid prevention base in the dental hygiene process of care will help with the educational and preventive needs of patients in combination with the diagnostic and restorative focus of a dental therapist model. Utilizing the existing education and knowledge of dental hygienists also creates important pathways for educational advancement of dental hygienists (ADEA, 2011).

Recently, the state of Oregon, a state with one of the most advanced dental hygiene practice acts, (Oregon.gov, 680.200 Dental Hygiene Expanded Practice) passed a pilot project for the use of Dental Health Aid Therapists (DHAT) on tribal lands. Washington and Alaska also both use Dental Health Aid Therapists on tribal lands only (Oregon.gov, Oregon Tribes Dental Health Aid Therapist Pilot Project). As more states pass legislation for dental therapy programs, and tribal commissions open programs for tribal communities, it becomes important for all groups to integrate the needs of their

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communities with the current CODA accreditation standards, so there are not differing quality levels of providers. There is concern for a non-standardized system. If tribal communities educate a non-accredited, certified dental therapist provider, and then a dental hygiene-based dental therapist is approved through legislation, a non-standardized provider system is created. Not only would a tribal DHAT be required to become a licensed dental hygienist in order to practice off of tribal land, they would additionally be required to have graduated from a CODA accredited program. Conversely, as the state approves dental therapy programs through the CODA accreditation process, graduates will be able to work in both tribal and state regions, thus expanding their workforce practice opportunities, and best meeting the needs of the underserved.

A dental hygiene-based dental therapy program, based upon a licensed, CODA accredited dental hygienist can ensure standardization related to foundational knowledge education. Additionally, dental hygienists from CODA accredited programs may also be considered more successful candidates for Business Management education. Any dually licensed dental hygiene-based dental therapist would be educated from a CODA accredited program in both dental hygiene and dental therapy, and licensed in both dental hygiene and dental therapy. Each of these processes would offer standardization of both education and licensure.

Program directors have the required knowledge and skill. A moderately significant study finding implied that a curricular concept related to program directors' possessing the required knowledge and skill to provide and direct dental therapy programs was in *Business Management*. CODA accreditation standards for dental therapy state that a program director must, "be a licensed dentist (DDS/DMD) or a

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licensed dental therapist, possessing a Master's or higher degree", and from a CODA accredited institution (CODA, 2015, p. 32). Any dental hygiene program director with a Master's degree, who also possesses a licensed DDS/DMD or Dental Therapist credentials would therefore be eligible to be a program director. CODA's intent behind specifying a DDS/DMD or dental therapist for the program director position was to include a combination of administrative, instructional and general dentistry experience (CODA, 2015). Study findings supported a relationship between program director's Business Management/Administration background, and the ability to provide and direct the necessary Business Management curriculum in a dental hygiene-based dental therapy program. This is fundamentally important finding. As dental hygiene-based dental therapy programs are developed and Business Management is integrated into the curriculum, instructors and dentists that have taught traditionally clinical topics may be inexperienced in business and administrative concepts. Program directors can prove to be highly instrumental in the development of necessary Business Management curriculum for new, efficient, and effective workforce practices and help to design data models for tracking patient health outcomes.

Patient Care; Public Health Knowledge; Evidence-based Research; Cultural Competency and Diversity, and Leadership and Advocacy that more consideration needs to be given to the development of public health workforce expansion and curriculum change within dental hygiene programs.

Research Question Four. *"What is the relationship between curriculum for the dental hygiene-based dental therapist and institutional influences on curriculum design?"*

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Lee et al. suggests institutional influences are those influences on curriculum design that can often be “overlooked” by curriculum design, yet are “largely influential” (Lee et al., 2013, p. 71, the where?) *What curriculum items would help to gain support from the institution?* One study variable indicated a highly significant relationship implied between curricular concepts and (the) mechanism for hosting a program. All four study variables indicated a moderately significant relationship implied between curricular concepts and (the) mechanism for hosting a program, faculty support, administrative support, and institutional support (Table 9). The following details these relationships.

Mechanism for hosting program. The most significant study findings implied a relationship between *mechanism for hosting a program* and educational concepts related to *Business Management*, and *Leadership and Advocacy*. From an institutional standpoint, both of these educational concepts can be more meaningful for meeting broader institutional goals, such as a need for general education courses education, business management education, and leadership training courses that may satisfy the needs of other departments other than a singular need related to dental therapy. While these educational concepts are specific to dental therapy, or even to allied health education, the topics are generalizable to the overall needs of institutional curriculum goals and outcomes. This implies it is very important to be inclusive of the institutions overall curriculum goals and needs when developing an allied health curriculum in order to bring the program into alignment with the overall institutional objectives. A dental hygiene-based dental therapy program may have components in the curriculum that are satisfied through other departments, such as nursing, math, or business. As a program director or chair, it is important to leverage cooperative opportunities that help ease

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budgetary constraints of the college, and facilitate interprofessional collaboration with other departments when proposing the development of a new workforce opportunity to an institution.

Moderately significant study findings implied a relationship between *mechanism for hosting a program* and educational concepts related to *Interprofessional Collaboration; Customized Patient Care; and Cultural Diversity*. Interprofessional collaboration and customized patient care both rely upon collaboration within other allied health departments, and more global integrated health approach to dental hygiene-based dental therapy education. From an institutional perspective, a new workforce program has more opportunities for success when able to network with other programs within the institution and when meeting the workforce and diversity needs of the community. Funding streams and resources can be more equitably shared. Additionally, working with the institutional cultural diversity needs and goals helps with recruit workforce opportunities and grant funding.

Support from faculty. A moderately significant study finding implied a relationship between *faculty support for hosting a program* and the educational concept related to *Business Management*. Strong faculty support is an incredible program asset, as lack of faculty support would greatly inhibit success of any new program. One of the unique benefits to faculty developing new curriculum would be the ability to acquire and share Business Management knowledge and skill with the greater dental and teaching community. As dental therapy programs are developed and research is performed, faculty will benefit from calibration and fine-tuning of their programs.

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Support from Administration. Three moderately significant study findings implied a relationship between *administrative support for hosting a program* and educational concepts related to *Business Management; Cultural Diversity; and Leadership and Advocacy*. Administration may be more inclined to look at new workforce curriculum from the perspective of meeting the learning outcomes of the students in overlapping departments, and funding justification. Broad subjects such as Business Management, Leadership and Advocacy, and Cultural Diversity meet institutional learning objectives and outcomes as well as individual program outcomes, thus they are easier to justify. Additionally, these areas fall under larger conceptual areas that can satisfy a large number of competencies for overlapping course content. In order to gain support for a new workforce model, it would be wise to place emphasis on the conceptual areas and overall all learning outcomes that satisfy overall institutional goals.

Institutional Resources. Two moderately significant study findings implied a relationship between *institutional resources for hosting a program* and educational concepts related to *Business Management; and Leadership and Advocacy*. Institutional resources are influenced by external factors such as workforce assessment, community and industry needs assessment, and competition for limited monetary resources (Lee et al., 2013). Both Business and Leadership are generally desirable areas of development for an institution, and during the recession years of 2010 to 2013, state support for colleges and universities decreased while federal grant money increased (Nelson, 2016). As the recession has faded, states have been encouraged to create public-private partnerships to help keep the costs of higher education stable and student lending costs stable (Nelson, 2016). When it comes to community and industry needs assessment, it is important to

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present a workforce concept that satisfies broad principles such as business and leadership. Business and leadership principles support industry effectiveness and efficiency, which are fundamental for justifying the costs related to a new workforce model.

Open-ended Question. *“Is there anything else you would like to share with the research about a dental hygiene-based dental therapy curriculum?”*

The most common themes and codes mentioned were related to four separate areas: Curriculum/Education, Workforce/Access, External Influences, and Institutional Influences. (Table 10). For the purposes of this study, the researcher elected to highlight any codes with five or more comments. The greatest portion of comments (39%; $n=32$ comments) were related to Curriculum/Education (Figure 8; Table 10). A significant portion of the respondents made comments related to dental hygiene advanced standing, and supported the combined dental hygiene-dental therapist model. Within this category, an equal portion of the respondents commented on the terminal degree awarded, with half favoring an associate’s degree, while the other half favored a bachelor’s degree or greater. This was significant, considering the majority of dental hygiene programs in the United States are community college programs conferring associate degrees. This would indicated increased support for baccalaureate degree dental hygiene education. This may have reflected the opinions of a select few who hail from colleges and/or universities, or may have reflected a more general opinion related to appropriate degree awarded for the dental hygiene-based dental therapy education. These perspectives are important, as states representing dental therapy legislation in 2018 were all from states with degree

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completion programs (Pew, 2016, updated 1/2018, ADHA, 2017b), and the majority of these states offer Master of Science programs in Dental Hygiene (ADHA, 2017).

Comments related to External Influences, specifically those related to regulation and practice were also significant in number (30%; *n=24 comments*). There was a strong perspective related to lack of support from local dentists preventing program directors from advancing their current programs, from developing new programs, and difficulties recruiting dentists to supervise students in the clinical education setting. A significant portion of comments were made in relation to lifting restrictive practice acts, or on how restrictive practice acts were preventing dental hygienists from working in access settings within their communities. (Figure 8; Table 10). External influences that specifically affect regulation and practice inhibit potential patient accessibility. A dental therapist helps to present cost-effective, effective, accessible solutions to inaccessible populations in terms salary and malpractice insurance reductions, and expanded capacity at the clinics for vulnerable populations, and increased production of the overall office team (MDOB & MDH, 2014).

Additionally, a significant number of comments were made in reference to a need for more legislative support in order to expand the dental hygiene scope of practice. Access/Workforce weighed in at 15% of comments (*n= 12*) and frequently overlaid External Influence comments related to restrictions on regulations and practice. (Figure 8; Table 10). This is important, as less restrictive practice acts, and supportive public health and legislative policy support are often tied to increased public health utilization rates of dental hygienists (Langelier & Surdu, 2017), and increased dental hygiene scope of practice can lead to improved health outcomes (Langelier & Surdu, 2017).

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Institutional Influences were also significant (*16%, n=13 comments*), particularly in the area of administrative support. Program Directors and Program Chairs mentioned their lack of administrative support on several occasions, expressing interest in hosting a dental therapy program, yet their reservation regarding the necessary support from their administrators (Figure 8; Table 10). Administrative support is fundamental to the success of any dental hygiene-based dental therapy program. Lee et al., mentions, (institutional influences) “often become the structural sticking points that shape attachment and resistances to curriculum renewal and initiatives” (2013, p. 73).

Limitations

This study had several limitations, including the sample selection, potential survey fatigue, and sensitivity level applied to the significance. This survey was composed of dental hygiene program directors and program chairs from dental hygiene programs across the country. Additionally, the survey was conducted at the end of September when most program directors have returned to their positions, regardless of quarter or semester system program design. This may have been a more convenient time for some, while a more inconvenient time for others to complete the survey.

Program directors and chairs with active or pending dental therapy legislation and/or more supportive dental hygiene practice acts may have been more compelled to complete the survey, based upon interest and perceived relevance to the study. Some program directors and chairs may have elected to forego the study based upon existing state practice act limitations and/or perceived ability to implement dental therapy-based education.

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The survey is limited to dental hygiene program directors, and does not intend to reflect the opinions of other providers of dental therapy education. Curriculum/education perspectives may be represented through non-dental providers, or non-dental hygiene based oral health providers. This study was intended to maintain the heterogeneity among dental hygiene-based curriculum developers through the use of dental hygiene program directors and chairs.

Survey length was of moderate length and complexity, and administered to a group who are routinely asked to perform surveys. This could have affected the survey in terms of potential survey fatigue (Lavrakas, 2008), especially as the survey neared the latter portion, and in terms of the open-ended question section.

There is still a lack of cohesive understanding among program directors regarding the dental therapist workforce model, partially due to several changes in dental therapy terms and definitions over the past 12 years. Additionally, there is great variability between states in terms of dental hygiene scope of practice, that directly and indirectly lead to enhanced workforce opportunities and workforce legislation (Langelier & Surdu, 2017; ADHA, 2017). A national survey of dental hygiene program directors may represent a spectrum of mixed understanding in terms of the dental therapist workforce model.

Spearman's rho testing was performed to determine significance level and strength of correlation. Given the number of dependent and independent variables (100 total), there was an increased risk of a Type I error, due to multiple comparisons. Consequently, "pseudo-Bonferroni" technique was applied, whereby a more rigorous alpha level of .001 rather than .05. A true Bonferroni would divide the .05 alpha level by

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the number of comparisons for the new alpha: .0005. (Vogt & Johnson 2011, p. 35).

For the purposes of this research, .001 sensitivity was applied.

Recommendations/Suggestions for Future Research

This study provides us with several future directions including measurable workforce variables such as cost-effectiveness, efficiency, accessibility, and improvements in patient health outcomes are all areas indicating a need for further research. A current dental therapist model could be analyzed against a dental hygiene-based dental therapist workforce model educated with the new educational domains, using a sensitivity analysis, and the range of different values could be compared (Vogt, 2011).

Institutions are sensitive to regulations and policy when developing new workforce models (Lee et al, 2013). An institution may benefit financially from a new workforce model. However, if the overall cost from a policy perspective is too great, the institution may choose not to invest in supporting the new workforce model (Bardach, 2011). Leveraging community, institutional and faculty relationships are important to new workforce success (Bardach, 2011). Equally as important, is sensitivity to core curriculum. Sharing courses within a curriculum that can be overlapped with other departments helps to support cross-disciplinary faculty relationships within health professions (McLaughlin, 2008). A study of cross-disciplinary faculty proposed curriculum versus curriculum specific to one allied health department could be an area of study.

This study found that Business Management was a significant educational concept represented across each variable within all three research questions. Future research

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related to a dental hygiene-based dental therapist educated in Business Management as compared to a dental therapist without Business Management education could be analyzed. Along with workforce efficiencies, correlations between scope of practice and education could be analyzed, as could be Business Management and organizational management efficiencies related to the overall business in which the dental hygiene-based dental therapist contributes.

As evidenced by the study's 43% return rate, there is notable interest in this area of research among dental hygiene program directors and program chairs. Each year additional states are expanding scope of practice and direct access opportunities for dental hygienists (ADHA, 2017), and more dental hygiene-based dental therapy programs are being legislatively approved (Pew, 2016). With approval of CODA accreditation standards (CODA, 2015), and dental therapy program approval, dental hygiene program directors and chairs recognize the need to adopt dental hygiene-based dental therapy curriculum standards to help enable program implementation.

The open comments indicated potential influences related to the development of a dental hygiene-based dental therapist that were not as uniquely expressed in the research questions. Curriculum development focuses on the intellectual aspect of workforce development performed in the best interest of the public. New workforce development also includes policy development. "All policy is political, whether the politics take place in the back room, or within a legislature, an organization, or a community" (Bardach, 2011, p. 159). A study comparison related to the attitudes of dentists and dental hygienists; dentists and physicians; and dentists and dental therapists regarding dental

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therapy workforce need may help present important stakeholder strengths and weaknesses.

Finally, the PI noted that there is no industry standard noted for entry-level dental hygiene education, as the CODA curriculum standards in 2-1 state:

The curriculum must include at least two academic years of full-time instruction or its equivalent at the post-secondary college-level...In a two-year college setting, the graduates of the program must be awarded an associate degree. In a four-year college or university, graduates of the program must be awarded an associate degree, post-degree certificate, or a baccalaureate degree (CODA, 2018).

Often baccalaureate programs offer additional courses and credits in advanced educational concepts beyond the minimum entry-level standards currently set by the CODA (ADHA, 2015a). The vast majority of dental hygiene programs in the US are associate programs (ADHA, 2015b). Use of the term entry-level in this study was intended to suggest associate degree education. However, this noted lack of degree clarity hopes to increase awareness that the profession of dental hygiene further specify the definition of entry-level education, both for future professional workforce growth, and for future research.

Conclusions

This study used a survey of program directors and program chairs to analyze relationships related to curriculum development for a dental hygiene-based dental therapist and the question of how external variables affect allied health workforce development and implementation. Curriculum was established through a Likert rating of each the Transforming Dental Hygiene Educational domains, and separate curriculum items, thus establishing a solid independent curriculum variable for comparison against outside influences on curriculum development and implementation. Using a curricular framework specifically designed to address the external influences that can affect healthcare curriculum development relationship between the influences of *future needs of the dental hygiene profession and workforce*; *external influences*; and *institutional influences* on curriculum were studied using Spearman's rho testing. Additionally, an open-ended question was studied, based upon grounded theory analysis.

While program directors and chairs rated the individual curricular concepts as important or very important, and rated dependent survey items as mostly important to very important on the Likert scale, specific relationships emerged between curricular concepts and the three outside influences: needs of the *profession and workforce*; *external influences*; and *institutional influences*, thus identifying a difference in perspectives between the perceived curriculum requirements of dental hygiene program directors and chairs for designing a new dental hygiene-based dental therapist curriculum, and study relationships that suggested consideration of external influences may place emphasis on specific curricular items. The most significant *workforce* variables were

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related to the values and mission of dental hygiene and its contribution to dental therapy, along with demonstration of improved dental hygiene patient outcomes, and the importance of an efficient, cost-effective, and accessible workforce model. The curriculum items most significantly related to these workforce variables were *Dental Hygiene Diagnosis; Foundational Knowledge; Business Management; Interprofessional Collaboration; Public Health, Customized Patient Care; and Communications and Technology*. The most significant *external* variables were pre-requisite requirements, such as licensed dental hygienists from a CODA accredited program; and more than entry-level dental hygiene education, for dental therapy program acceptance. The curriculum items most significantly related to these workforce variables were *Dental Hygiene Diagnosis; Foundational Knowledge; and Business Management*. The most significant institutional influence was (the) *mechanism to host* a dental hygiene-based dental therapy program. The curriculum items most significantly related to this variable were *Business Management; and Leadership and Advocacy*.

Across *all three areas* of influence, *Business Management* was a significantly related curriculum item, *followed by Dental Hygiene Diagnosis, Foundational Knowledge, and Communications and Technology*. As dental hygiene-based dental therapy curriculum is developed, these curricular relationships may be referenced in relation to how outside influences affect and facilitate workforce and program success.

Several themes emerged from the opened ended question. Program directors and chairs are focused on advancing workforce opportunities for dental hygienists to reach inaccessible populations. Advanced standing for dental hygienists, whether at the associates or bachelor's or greater level were all supported. Numerous boundaries were

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mentioned, such as a lack of support from dentists locally and nationally, preventing program directors from advancing programs, or from developing new programs.

Additionally, program directors advocated for lifting restrictive practice acts so dental hygienists could work in access settings, and so program directors would no longer struggle with the ongoing difficulty of trying to recruit new supervising dentists. Program directors advocated for enhanced legislative support in order to increase the dental hygiene scope of practice and improved patient health outcomes. Finally, program directors expressed concern gaining institutional support for new program development and implementation from administrators.

The implied outcomes of this study are important for several purposes. Dental hygiene program directors and chairs generally rated all curriculum items very highly; however, the relationships that developed between curriculum and external variables in this study are also important because workforce curriculum should be responsive to the actual needs of the population in which it serves. Curriculum should not be developed solely based upon the assumption of need. This analysis helped to develop curriculum guidelines for a dental hygiene-based dental therapist workforce model that is responsive to workforce needs, professional requirements, and institutional needs and influences. An accurate, need-based curriculum can be used to develop performance measures that can be measured, evaluated, and improved over time.

This analysis of this study provides opportunities to further research areas related to the study of the dental hygiene-based dental therapy curriculum, and how workforce models utilizing this curriculum perform in areas such as of cost effectiveness, efficiency, accessibility, and improvements in patient health outcomes. Additionally, comparisons

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between dental hygiene-based dental therapy models and dental therapy models could be studied, and models that utilize Business Management versus models without Business Management curricular education. Finally, divergent attitudes between various dental providers and medical providers as related to dental hygiene-based dental therapy could be studied.

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Appendix A

Survey introduction and Survey Instrument

Hello, my name is Heidi Desmarais, and I am an MSDH graduate student from Eastern Washington University conducting a study on curriculum *specific* to a *dental hygiene*-based dental therapist. This study requests opinions of U.S. dental hygiene program directors regarding different variables that shape curriculum design in the development of a new workforce model in oral health. Questions regarding curriculum for a new health care model are multi-dimensional, as they entail significantly more than routine curriculum, competencies and standards.

The American Dental Association Commission on Dental Accreditation (CODA) adopted standards for the practice of dental therapy in February 2015. Minimum standards for dental therapy education include, but are not limited to:

- Three academic years of full time instruction
- Curriculum in general education, biomedical science, and clinical and didactic dental sciences
- A range of procedures including, but not limited to: identification, referral, prevention, subgingival scaling and polishing, restorative, simple surgical extraction, emergency palliative, and administration of certain medications and local anesthetic
- Articulation agreements between programs and their sponsoring institutions that result in advanced standing for dental hygienists or dental assistants
- A full-time program director licensed in dentistry and/or dental therapy possessing a Master's or higher degree, including administrative experience, and professional experience in general dentistry (CODA, 2015, pp. 25-27, 30-31, 33).

These standards were adopted with the provision CODA eligibility criteria no. 2, and no. 5 are met. This study also specifically addresses questions pertaining to eligibility criteria no. 5:

“Is there evidence of need and support from the public and professional communities to sustain educational programs in the discipline?”

One of the eight specific elements to be addressed include:

“Documentation of current and emerging trends in the education area.”

(CODA: Evaluation and operational policies and procedures manual. 2014, p. 50).

The purpose of this study is to survey dental hygiene program directors, in order to help calibrate curriculum *specific* to the dental hygiene-based dental therapist educated and skilled for current and future professional needs. The new *Transforming Dental Hygiene Education: New Curricular Domains and Models*, have been designed specifically to address the need for transformative changes in dental hygiene health care

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education, in current and future dental hygiene workforce practices, and overall improved patient healthcare outcomes. The six domains include:

Foundation Knowledge: Includes integration of basic (including genetics and pharmacogenetics), behavioral and clinical science knowledge that can be applied to patient care and functioning in all six roles of a dental hygienist.

Customized Patient-Centered Care: Includes skills in patient assessment, dental hygiene diagnosis and dental hygiene therapies and counseling to foster oral and systemic health. Includes the dental hygiene process of care.

Health Care Systems: Works within the oral care system and with the broader health care system to promote and foster optimal health. Includes leadership, advocacy, research and business management skills as well as skills of a change agent to integrate oral health into health systems.

Communication and Collaboration: Communication skills with patients, peers, and other health care professionals and health care teams to foster health and health behavior. In addition to oral communication, the dental hygienist must possess a high level of written communication skill and the ability to effectively communicate with technologies. Includes intraprofessional and interprofessional communication and collaboration skills.

Professionalism: Inculcates the values and ethics needed to function as a leader in oral health care and oral health promotion.

Critical Thinking and Research: Use of knowledge of research methods, critical evaluation of the research, and evidence based skills in carrying out the roles of the dental hygienists in the clinic, community and health systems (ADHA: Transforming dental hygiene education: New domains and models, 2014).

These domains and models will be applied to this study.

After some baseline demographics, one section of this study will ask your opinion regarding factors that shape curriculum. Another section will focus on how curricular competencies ultimately shape the profession of dental hygiene. Lastly, you will be asked to share your opinion regarding influences to facilitation of program development and implementation for dental hygiene-based dental therapy.

Your survey will be completely confidential. This research is approved by the Eastern Washington University Institutional Review Board (IRB). If you have any questions or concerns about this project, please feel free to contact Heidi Desmarais, RDH, MA, MSDH(c), (509-670-2226), hdesmarais@eagles.ewu.edu. If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Ruth Galm, Human Protections Administrator at Eastern Washington University (509-359-7971/6567) rgalm@ewu.edu. You may omit any question you choose not to answer. We greatly appreciate your help in furthering this research endeavor.

Survey Questions: Thank you for taking the time to complete this short survey regarding your perspective, knowledge, and interest in curriculum specific to a *dental hygiene*-based dental therapist.

The purpose of these questions is to determine whether respondents are representative of population, and to make comparisons via statistical analysis.

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I. Demographics

1. What is your age?

30 and younger

31-40

41-50

51 and older

2. What is your gender?

Female

Male

Other

3. What is the highest educational degree you have earned?

Bachelor's degree

Master's degree

Doctoral degree

Other

4. How long have you been a program director/department chair?

0-5 years

6-10 years

11-15 years

16+ years

5. In what state is your dental hygiene program located?

(Drop down menu)

6. Are you a current member of the American Dental Hygienists' Association?

Yes

No

7. Please indicate your race/ethnicity.

Asian or Pacific Islander

Black/African American (Non-Hispanic)

American Indian/ Alaska Native

White (Non-Hispanic)

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Hispanic

Other: _____

II. orces shaping curriculum and defining graduates

Please rate your opinion on the following statements:

Strongly Agree	Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Disagree	Strongly Disagree
7	6	5	4	3	2	1

8. Variables outside of curriculum design, such as dental hygiene regulation and scope of practice, and dentistry's limited services to underserved populations have inhibited the dental hygiene profession's ability to develop dental hygiene-based dental therapy programs.

9. Selecting a curriculum for a dental hygiene-based dental therapist must respond to the requirements of CODA while also serving the workforce needs of the dental hygiene profession in charge of shaping the curriculum.

10. It is important for the profession of dental hygiene to define a contribution to the dental therapist model that specifically reflects the professional values and mission of dental hygiene.

11. It is important for the profession of dental hygiene to define a contribution to the dental therapist model that specifically reflects dental hygiene patient's improved health care outcomes.

12. Dental hygiene program directors have the knowledge and skill required to provide and direct dental therapy education programs.

13. A pre-requisite for entry into a dental therapy program should include dental hygiene licensure from a CODA accredited program.

14. Dental hygiene-based dental therapists should be expected to complete more than entry-level dental hygiene education.

15. Competency domains for a dental hygiene-based dental therapist should reflect an efficient, cost-effective, and accessible workforce model prepared to meet current and future workforce demands.

Transforming Dental Hygiene Education Domains:

Foundation Knowledge: Includes integration of basic (including genetics and pharmacogenetics), behavioral and clinical science knowledge that can be applied to patient care and functioning in all six roles of a dental hygienist.

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Customized Patient-Centered Care: Includes skills in patient assessment, dental hygiene diagnosis and dental hygiene therapies and counseling to foster oral and systemic health. Includes the dental hygiene process of care.

Health Care Systems: Works within the oral care system and with the broader health care system to promote and foster optimal health. Includes leadership, advocacy, research and business management skills as well as skills of a change agent to integrate oral health into health systems.

Communication and Collaboration: Communication skills with patients, peers, and other health care professionals and health care teams to foster health and health behavior. In addition to oral communication, the dental hygienist must possess a high level of written communication skill and the ability to effectively communicate with technologies. Includes intraprofessional and interprofessional communication and collaboration skills.

Professionalism: Inculcates the values and ethics needed to function as a leader in oral health care and oral health promotion.

Critical Thinking and Research: Use of knowledge of research methods, critical evaluation of the research, and evidence based skills in carrying out the roles of the dental hygienists in the clinic, community and health systems (ADHA: Transforming dental hygiene education: New domains and models, 2014).

16. The new Transforming Dental Hygiene Education domains should be used to provide a competency framework for a dental hygiene-based dental therapist.

Using a scale of 0=Not at all important to 7=Very important, please rate the following

Very Important	Important	Somewhat Important	Neutral	Somewhat Unimportant	Unimportant	Very Unimportant
7	6	5	4	3	2	1

17. Please rate the following educational concepts related to the Transforming Dental Hygiene Education domains according to level of importance for a dental hygiene-based dental therapist.

Dental Hygiene Diagnosis, Therapy, and Education

Foundational Knowledge, including behavioral and clinical science knowledge

Business Management Skills

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Inter-professional Education and Collaboration with healthcare communities

Public Health Knowledge and Program Development

Communication and Technological Skills

Customized Patient Care

Evidence-based Research and Critical Thinking Skills

Cultural Competency and Diversity

Leadership and Advocacy

III. Institutional influences shaping curriculum

Please rate your opinion on the following statements:

Strongly Agree	Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Disagree	Strongly Disagree
7	6	5	4	3	2	1

18. I can see a mechanism for a dental hygiene-based dental therapy program at my school.

19. If I were to obtain the necessary mechanism for a dental hygiene-based dental therapy program, my faculty would support hosting a program.

20. If I were to obtain the necessary mechanism for a dental hygiene-based dental therapy program, my school's administration would support hosting a program.

21. If I were to obtain the necessary mechanism for a dental hygiene-based dental therapy program, my school would have the necessary resources to host a dental therapy program.

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22. Is there anything else you'd like to share with the researcher about a dental hygiene-based dental therapy curriculum?

Email for drawing:

Thank you for your participation.

Appendix B

Theoretical Methodology Permission Correspondence

7/10/2015 7:55

Heidi,

Thank you for your email. Yes, you are more than welcome to use our four dimension framework to inform your research. The correct citing is as follows:

Lee. A., Steketee, C., Rogers, G., Moran, M. (2013). Towards a theoretical framework for curriculum development in health professional education.

Focus on Health Professional Education 14(3) 64-77

I wish you all the very best with your project and I look forward to reading about it in due course.

Best wishes

Carole

Carole **Steketee** PhD

School of Medicine

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Appendix C

Open-Ended Question Responses

Dental Hygiene-based Dental Therapist Curriculum

Qu: *Is there anything else you would like to share with the researcher about a dental hygiene-based dental therapy curriculum?*

Themes: Curriculum/Education, Access/Workforce, External Influences, Institutional Influences

Row Number	Comment	Theme	Code
Theme: Curriculum/Education			
1	Community College – advanced certificate a possibility	Curriculum/Education	Advanced standing DH/Combine DH/DT
7	Natural progression for a licensed dental hygienist to scope up and include dental therapy...if desired combine DH and DT...	Curriculum/Education	Advanced standing DH/Combine DH/DT
9	...any dental therapist model must include a traditional dental hygiene education as part of the curriculum with an option to take licensure exams for DH exams before completing...	Curriculum/Education	Advanced standing DH/Combine DH/DT
14	We will implement a DH/DT curriculum in the fall of 2016	Curriculum/Education	Advanced standing DH/Combine DH/DT
15	The dental hygiene-based dental therapy curriculum should be available to DH's that graduated from a CODA accredited entry-level program	Curriculum/Education	Advanced standing DH/Combine DH/DT
17	...dental therapists should first be dental hygienists...	Curriculum/Education	Advanced standing DH/Combine DH/DT
26	...the dental therapist should be trained to provide the important preventative	Curriculum/Education	Advanced standing DH/Combined DH/DT

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	services within the scope of dental hygienists.		
28	Entry-level RDH should be the associate's degree, with the dental therapy a bachelor's degree...	Curriculum/Education	Advanced standing DH/Combine DH/DT
29	...acceptance into the program requires a bachelor's degree (preferably in DH)...it (DH-based DT) must be at the Master's level of education...	Curriculum/Education	Advanced standing DH/Combine DH/DT
38	...in order to receive the therapy degree that the candidates need at least a B.S. degree in dental hygiene.	Curriculum/Education	Advanced standing DH/Combine DH/DT
41	The program should be at the graduate level.	Curriculum/Education	Advanced standing DH/Combine DH/DT
44	...this program would be appropriate to be offered with a dental hygiene program...	Curriculum/Education	Advanced standing DH/Combine DH/DT
45	...one should be a RDH 1 st !	Curriculum/Education	Advanced standing DH/Combine DH/DT
1	...a bachelor's or master's degree is essential...	Curriculum/Education	Terminal degree Master's
13	...it is my understanding that the DHBT (DHbDT) program would be on a masters level.	Curriculum/Education	Terminal degree Master's
29	...it (DHbDT) must be at the Master's level of education...	Curriculum/Education	Terminal degree Master's
41	This program should be at the graduate level.	Curriculum/Education	Terminal degree Master's
1	...a bachelor's or master's degree is essential...	Curriculum/Education	Terminal degree Bachelor's
28	An entry level RDH should be the associate's degree with the dental therapy a bachelor's degree.	Curriculum/Education	Terminal degree Bachelor's

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3	The present administration at my institution is content to keep the DH program as an Associate Degree.	Curriculum/Education	Terminal degree limited to AA
8	It depends on the degree offered, ...as we are a community college.	Curriculum/Education	Terminal degree limited to AA
21	Not sure if a community college would be able to grant the "degree" if the dental therapy program curriculum was over 72 contact hours. We could not grant a BA or BS.	Curriculum/Education	Terminal degree limited to AA
27	We are a community college and cannot add curriculum.	Curriculum/Education	Terminal degree limited to AA
30	As a community college, we are unable to provide Bachelor's level or higher programs as instructed by the administration.	Curriculum/Education	Terminal degree limited to AA
36	We are a technical associate degree program with no capability for educational advancement in the institution.	Curriculum/Education	Terminal degree limited to AA
2	Curriculum should involve the scope and depth of existing dental health professionals so that one standard of care can be applied for all patients...	Curriculum/Education	One Standard of Care
9	...private for-profit institutions have hurt the dental hygiene profession...dental hygiene curriculum may be diminished...they may not be the way to go with dental therapy programs...	Curriculum/Education	One Standard of Care
1	...bachelor's or master's degree is essential...viewed as having the credibility to provide direct client care in most health settings.	Curriculum/Education	Credibility

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14	We will implement a DH/DT curriculum in the fall of 2016	Curriculum/Education	Credibility
31	...therapists in Alaska. Very good program, competent people with good mentors in their practice of dental therapists...	Curriculum/Education	Credibility
38	...entry level B.S. would help the profession gain more acceptance by the dentists.	Curriculum/Education	Credibility
Theme: Access/Workforce			
6	It is the future!	Access/Workforce	Future Workforce
7	Combining dental hygiene and dental therapy curriculum...allows dental hygienists to work part time while completing the dental therapy program.	Access/Workforce	Future Workforce
11	It is a definite step forward for underserved populations and dental hygiene employment.	Access/Workforce	Future Workforce
24	This concept could work in a rural state such as SD.	Access/Workforce	Future Workforce
25	...if we are going to impact the underserved...training in clinical skills such as expanded functions...need to move toward having skills in place for when legislation allows hygienists to perform more service	Access/Workforce	Future Workforce
26	...the dental therapist should be trained to provide the important preventative services within the scope of dental hygienists.	Access/Workforce	Future Workforce
31	...therapists in Alaska. Very good program, competent people with good mentors in their	Access/Workforce	Future Workforce

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	practice of dental therapists...		
11	It is a definite step forward for underserved populations...	Access/Workforce	Access/Underserved
20	...the community would certainly benefit from this type of program in our area.	Access/Workforce	Access/Underserved
25	If we are going to impact the underserved, I feel that we need to move toward having skills in place for when legislation allows hygienists to perform more service.	Access/Workforce	Access/Underserved
26	...to increase access to care the dental therapists should be trained to provide the important preventative services within the scope of dental hygienists.	Access/Workforce	Access/Underserved
31	I believe in large group practices and very rural communities the dental therapist could thrive.	Access/Workforce	Access/Underserved
Theme: External Influences			
5	We know we need dentists to support us in the pursuit and delivery of this education, which at this time is not being made known due to the negative position of organized dentistry.	External Influences	Lack of support from dentists
9	Another concern is where these programs are taught through dental schools, that the importance of the dental hygiene curriculum may be diminished.	External Influences	Lack of support from dentists
10	At our last advisory meeting, our dentist brought literature stating dentists are underutilized and the market is saturated. He stated the Florida Dental	External Influences	Lack of support from dentists

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	Association is in opposition to the dental therapist because of competition for same patients.		
20	In our area, we have a difficult time getting dentists to help with our dental hygiene program...	External Influences	Lack of support from dentists
22	Unfortunately, in our state, the state board dentists are extremely opposed to this model.	External Influences	Lack of support from dentists
24	I would not have support from the State's dental professional organization and likely not from the state Board of Dentistry.	External Influences	Lack of support from dentists
33	Dental hygiene programs within dental schools have the additional challenge of support from the administration, who is composed primarily of dentists.	External Influences	Lack of support from dentists
36	Our state would not allow a dental therapy program. We can't even do anesthesia.	External Influences	Lack of support from dentists
38	...entry level B.S. would help the profession gain more acceptance by the dentists.	External Influences	Lack of support from dentists
42	In NM we have a collaborative practice (for dental hygienists) which isn't supported – how will dental therapists be supported.	External Influences	Lack of support from dentists
22	Unfortunately, in our state, the state board dentists are extremely opposed to this model. They are also opposed to local anesthesia and general supervision for Registered Dental Hygienists.	External Influences	Less restrictive practice acts

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36	Our state would not allow a dental therapy program. We can't even do anesthesia.	External Influences	Less restrictive practice acts
43	We are ready, willing and able to provide the curriculum, but state law (lack of state law) makes the administration unlikely to allow this to happen.	External Influences	Less restrictive practice acts
45	Would like to see less restrictive practice acts.	External Influences	Less restrictive practice acts
11	You might consider a tele-dentistry component...	External Influences	Need for legislative support
24	...it is not likely to be supported by dentists or legislators	External Influences	Need for legislative support
25	...we need to move toward having skills in place for when legislation allows hygienists to perform more service.	External Influences	Need for legislative support
36	Our state would not allow a dental therapy program. We can't even do anesthesia.	External Influences	Need for legislative support
43	We are ready, willing and able to provide the curriculum, but state law (lack of state law) makes the administration unlikely to allow this to happen.	External Influences	Need for legislative support
10	(our dentist) stated the Florida Dental Association is in opposition to the dental therapist because of competition for same patients.	External Influences	Competition- with dentists
16	It is also necessary to convince dental...practitioners that this will be nonthreatening to them professionally...	External Influences	Competition- with dentists
37	If dental therapists become reality, the two professions (dental therapy and dental	External Influences	Competition- with dental hygienists

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	hygiene) will be in competition in regards to employment opportunities...something to consider, but rarely discussed.		
40	(In Colorado) the dental therapy model is less useful here as many dentists already have expanded practices with a minimally trained assistant workforce. Hygienists will be allowed to perform decay removal with hand instrumentation...	External Influences	Fully utilize RDH before new provider type is developed
42	Important to use models of dental hygiene we currently underuse. In NM we have a collaborative practice which isn't supported – how will dental therapists be supported.	External Influences	Fully utilize RDH before new provider type is developed
Theme: Institutional Influences			
18	Directors should be knowledgeable of restorative techniques and materials.	Institutional Influences	DT Program Director criteria
20	In our area, we have a difficult time getting dentists to help with our dental hygiene program, and don't feel we have enough resources in our area for this.	Institutional Influences	DT Program Director criteria
26	Although I do strongly agree that a director or chair of a dental hygiene program has the knowledge and skill to direct these programs, he/she would likely employ dentists and/or dental therapists to educate in those areas outside of the scope of dental hygiene.	Institutional Influences	DT Program Director criteria

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16	It is also necessary to convince dental faculty...that this will be non-threatening to them professionally and academically.	Institutional Influences	Faculty needs and concerns
17	My school would need several more faculty to expand our offerings to include any type of mid-level practitioner.	Institutional Influences	Faculty needs and concerns
33	It would take resources, both time, money and faculty cooperation (rising to the occasion).	Institutional Influences	Faculty needs and concerns
5	Our program is in support of providing a mid-level provider program at our school. We know we need dentists to support us, which at this time is not being made known, due to the negative position of organized dentistry.	Institutional Influences	Positive administrative support
24	While I may have support from my school administration, I would not have support from the state's dental association.	Institutional Influences	Positive administrative support
3	The present administration is content to keep the DH program as an Associate degree.	Institutional Influences	Lack of administrative support
9	I have concerns that many hygiene programs sponsoring institutions do not have the monies or the desire to set up these programs.	Institutional Influences	Lack of administrative support
17	...we are currently battling with administration just to get enough adjunct faculty to adequately cover the clinic, I doubt they would be on board with this type of expansion.	Institutional Influences	Lack of administrative support

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30	As a community college, we are unable to provide Bachelor's level or higher programs as instructed by the administration.	Institutional Influences	Lack of administrative support
34	Dental hygiene programs within dental schools have the additional challenge of support from the administration, who is composed primarily of dentists.	Institutional Influences	Lack of administrative support

Note. n=46 responses.

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Curriculum Vita**Heidi Desmarais, RDH, BA, MSDH (c)**

P.O. Box 156

Chelan, WA 98816

509-670-2226

hdesmaraisrdh@gmail.com**Educational Background**

2013 –present Eastern Washington University, Spokane, WA – MSDH in Dental Hygiene (Honors, Sigma Phi Alpha Dental Hygiene Honor Society Awarded)

1995 Shoreline Community College, Shoreline, WA – A.A.S. in Dental Hygiene

1988 University of Washington, Seattle, WA – Bachelor of Arts in Sociology (Magna Cum Laude)

Prevention-based Program Consulting

9/17 – present Columbia Basin Accountable Community of Health, Pasco, WA

Teaching Appointments

9/15 – 9/17 Columbia Basin College, Pasco, WA
 Assistant Professor, Dental Hygiene
Senior Clinical Lead, Community Dental Health and Research Instructor
 FTE: Senior Clinic Lead – Lab, Senior Clinic Class, Community Dental Health and Research Class and Outreach Rotations

2014/2015 Eastern Washington University, Spokane, Washington (Health Sciences)
Student Teaching Practicum:

- DHYG 351 The Medically Compromised Patient: Didactic & Clinic
- DHYG 352 The Medically Compromised Patient II: Didactic & Clinic

Administrative Practicum: Curriculum Development, BSDH Online Degree Completion: Contributed to Introduction to Dental Public Health Course

Most Recent Annual Teaching Responsibilities

Columbia Basin College, Pasco, WA

Fall:

DHYG 214 Clinical DHYG Techniques V	Senior Students/11 contact hours/year
DHYG 216 Clinical DHYG Lab V	Senior Students/165 contact hours/year

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DHYG 111 Embryology & Histology Junior Students/22 contact hours/year

Winter:

DHYG 224 Clinical DHYG Techniques VI Senior Students/11 contact hours/year

DHYG 4218 Clinical DHYG Lab VI Senior Students/165 contact hours/year

DHYG 217 Comm. Oral Health Research Senior Students/22 contact hours/year

Spring:

DHYG 234 Clinical DHYG Techniques VII Senior Students/11 contact hours/year

DHYG 219 Clinical DHYG Lab VII Senior Students/165 contact hours/year

DHYG 221 Comm. Oral Health Research Senior Students/22 contact hours/year

Other courses taught:

DHYG 121 Medical Emergencies Junior Students/11 contact hours/year

DHYG 131 Oral Pathology Junior Students/22 contact hours/year

DHYG 136 Special Needs Patients Senior Students/24 contact hours/year

DHYG 126.1 Pain Control Clinic Junior Students/33 contact hours/year

DHYG 144.1 Clinical DHYG Tech IV Junior Students/120 contact hours/year

DHYG 126.1 Restorative Lab Junior Students/66 contact hours/year

Program and Faculty Development

Presenter, Alliance of Dental Hygiene Practitioners:

Integrated Medical Dental Health: Mega Issues Forum

Heidi Desmarais, RDH, MSDH(c) 4/2018

Program Development for CBC Dental Hygiene:

Development of new BASDH mission statement, goals, domains, and competencies for
CBC Dental Hygiene 11/2016

3- Year Curriculum Management Plan for Columbia Basin Dental
Hygiene Department 6/2017

Competency Development for Columbia Basin Dental Hygiene Department

Course Development for BSDH: DHYG 455 Educational Methodology and Research
(online) 11/2015

Faculty Development Instruction for CBC Dental Hygiene:

Curriculum Planning and Evaluation, Heidi Desmarais RDH, MSDH(c) 6/2017

Competency-based Syllabus Development, Heidi Desmarais RDH, MSDH(c) 8/2016

Presenter, Columbia Basin Accountable Community of Health:

A Mechanism for Integrating Oral Health into Overall Health,
Heidi Desmarais, RDH, MSDH(c) 11/2016

Keynote Speaker, Washington State Dental Hygienists' Association:

Your Dental Hygiene Profession: Staying Ahead in an Environment of Rapid Change,
Heidi Desmarais, RDH, MSDH(c) 4/2014

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Committees

Columbia Basin Accountable Community of Health

- *Oral Health: Co-Chair* 2015 - 2017

Washington State Oral Health Coalition 2016 - present

Benton Franklin Oral Health Coalition 2015 – 2017

Columbia Basin College Presidential Search Committee 2017

Associations

Association of State and Territorial Dental Directors 2015 – present

American Dental Hygienists Association 1995 – present

- *Trustee* – Columbia Basin Component – 2017
- *Member Services Chair* – 2014 - 2016

American Academy for Oral Systemic Health – 2017 - present

American Dental Education Association 2013 – present

Alliance of Dental Hygiene Practitioners

- *Board of Directors* – 2017 – present

Northwest Regional Primary Care Association – 2017 – present

Washington Rural Health Association – 2017 - present

Licensure & Credentialing

RDH, Washington 1995 - current

CPR, Washington 1995 – current

RDH, Oregon 2015 - current

RDH, Utah 2015 - current

Select Related Educational Methodology Courses (2017 – 2018)

12/2017	Human Papillomavirus: Joining the Effort in Increasing Vaccination Rates (Community/Public Health), Jennifer Domagalski, DDS
11/2017	Understanding the Importance of Pediatric Airway in Orofacial Development, Marie McElderry, RDH, BSDH
10/2017	Increasing Patient Engagement: Efficacy of Educational Interventions, Ann Eshenaur Spolarich, RDH, PhD
9/2017	OSHA, Bloodborne Pathogen AIDS Training, CDC Infection Control and Waste Management Update, Sam Barry, DMD
8/2017	CRDTS Board Examination Training
8/2017	Lating Health Symposium: Regional Latina Community Health Conference
4/2017	Adhesives, Composites & Etch – Oh My! , Mark Konings, PhD, MBA
4/2017	Hands-On Restorative Workshop, Mark Konings, PhD, MBA
4/2017	Fostering Student Self-Awareness in the Clinical Environment, Lorie Spear, RDH, MSDH & Sarah Jackson, RDH, MSDH
2/2017	Forgotten Populations: Dental Hygiene in an Era on Change (Community Health), Ana Karina Mascarenhas, BDS, MPH, PhD
1/2017	Oral Health Care for Patients Undergoing Cancer Therapy, Joanne Gurenlian, RDH, PhD

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Most recent related CE courses (2017 – 2018)

4/2018	Washington State Healthcare Workforce Study Results, Holly Andrilla, UW
4/2018	Regulation and Practice Update, Melissa Bogart-Johnson
4/2018	ADHP Mega Issues Forum, Theresa Marks, RDH, MS and Heidi Desmarais, RDH, MSDH(c)
4/2018	Caring for Patients with Dementia, Doreen Naughton, RDH, BSDH
4/2018	Aspiration Pneumonia Update: Etiology, Techniques, Prevention, Jacqueline Juhl, RHD, MS
3/2018	Tri-Cities Medical/Dental Conference: Cardiovascular Disease, as Explored from Dental, Endodontic, Periodontic and Cardiology's perspectives (numerous dentists, surgeons, host: Lee Ostler, DDS)
1/2018	Name It, Claim It, Treat It: CDT 2018 update for Dental Hygienists: Teledentistry, HbA1c testing, and more, Patti DiGangi
9/2017	Communication, Growth, and Empowerment, Wendy Lippard
9/2017	Legal Strategies for Washington State Dental Hygiene Practitioners, Eric Hsu, JD
4/2017	Dental Hygienists: Essential Primary Care Providers, Lancette Van Guilder, RDH
4/2017	Improving Oral Health Using Virtual Dental Homes, Paul Glassman, DDS
4/2017	Direct Access Dental Services Interactive Panel Discussion: Practice & Care Topics: Nursing Home, DD Patients, Oncology, Hospital Care, SBSP, Senior Center Practices – Alliance of Dental Hygiene Providers
3/2017	Comprehensive Treatment Planning, Robert Gottlieb, MSD, PS
3/2017	Tri-Cities Medical/Dental Conference: Airway Issues, as Explored from Dental, Oral Surgeon, and Medical perspectives (numerous dentists, surgeons, host: Lee Ostler, DDS)

Clinical Practice Experience

Steve Harrop, DDS Winthrop, WA	Clinical Dental Hygienist	3/2006 – present
Adriene Tomarere, DDS Brewster, WA	Clinical Dental Hygienist	10/2018 - present
Lloyd White, DDS Brewster, WA	Clinical Dental Hygienist	9/2008 – 11/2012
Laura Williams, DDS East Wenatchee, WA	Clinical Dental Hygienist	4/2003 – 7/2009
Carl Rutherford, DDS Kirkland, WA	Clinical Dental Hygienist	1999 - 2001

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Michael Cohen, MDS, PS Seattle, WA	Periodontal Dental Hygienist	1995 - 2000
John Triller, MDS, PS Seattle, WA	Periodontal Dental Hygienist	1995 - 1995
Dorie White, DDS, and Patiricia Rothwell, DDS Seattle, WA	Dental Assistant, Manager	1992-1993, 1985
Dental Fill-Ins Seattle, WA	Dental Assistant	1988 - 1989
Donald Shurts, DDS Wenatchee, WA	Dental Assistant	1981 - 1982