Research

Interest in Dental Hygiene Therapy: a study of dental hygienists in Maine

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Abstract

Purpose: The purpose of this study was to assess the awareness of registered dental hygienists (RDHs), licensed in the state of Maine, regarding the midlevel dental hygiene therapist (DHT) provider model and to gather data regarding the degree of interest in enrolling in a DHT program.

Methods: A quantitative cross-sectional study design with a non-probability purposive sampling of actively practicing RDHs in the state of Maine (n=1,284) was utilized for the web-based survey. Survey questions included awareness in the passage of DHT legislation, level of interest pursuing education and licensure in this midlevel provider model. Data was collected over a three-week period. Descriptive statistics and thematic analysis were used for data analysis.

Results: Response rate was 21% (n=268). Sixty-five percent of respondents expressed interest in enrolling in a DHT program and 40% of those respondents stated a willingness to enroll in a DHT program within the coming year. Although willing to travel 25-50 miles, a majority of respondents preferred programs incorporating online components combined with clinical training completed in nearby communities. Themes emerging from the open-ended question regarding DHT program feasibility and appeal included: convenience, flexibility, cost/affordability, and independent or collaborative practice.

Conclusion: Study outcomes indicated interest exists among Maine RDHs regarding the DHT provider role and enrollment in a DHT program. Although there are no DHT programs currently being offered in the New England states, results suggest further investigation is warranted regarding the development of a DHT program in the Northeastern United States.

Keywords: dental hygiene, dental therapist, dental hygiene therapy, access to care, underserved populations

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Introduction

Global access to dental care continues to be a challenge due to the lack of availability and disproportionate distribution of dentists.[1-5] An estimated 47 million residents in the United States (U.S.) are currently living in Dental Health Professional Shortage Areas (D-HPSAs).[1-5] Despite dental caries being a preventable disease, 18% of children aged 5-19 years, 27% of adults aged 20-44 years, and 19% over age 65 in the U.S. were found to have untreated dental caries between the years of 2011-12.[6] Disparities related to untreated dental caries increased in those aged 65 and over to 41% in Black or African Americans, and 48% in Mexican Americans.[6] Health disparities have also resulted in Hispanic adults lacking the most in accessing dental care, with 40% of those living below the poverty level having untreated dental caries.[6] Current dental workforce models are not meeting the needs of all Americans as demonstrated by these statistics.

PEW Charitable Trusts (PEWCT) reports from 2014, identified dentist shortages in the state of Maine, with an estimated 180,000 residents unable to access oral health care due to a lack of dentists in 15 out of 16 counties.[7] Most of the state, with the exception of the major metropolitan areas of Portland, Augusta, and Bangor, has been designated as Dental Health Professional Shortage Areas (D-HPSAs).[8] Concerns regarding an insufficient dental workforce in Maine dates back to 2010–11, when the state's dental licensing board reported 92 dentists had either withdrawn or not renewed their expired licenses.[7] While 96 new dental licenses were

issued during that period, the resulting gain of 4 dentists was insufficient to meet the needs of the state's residents.[7] In 2013, Maine was ranked among the top 12 states having greater than 15% of its residents living in underserved areas due to dental workforce shortages,[7] and was ranked 6th in the nation in regards to the percentage of low income children (62.4%) who did not receive dental care in 2011.[7]

Alternative dental workforce models to meet the oral health needs of their respective populations have been developed internationally to address dental workforce shortages, similar to those found in rural areas in the U.S.[1] New Zealand was one of the first countries to develop an alternative workforce model with the introduction of the dental nurse in 1921. The New Zealand dental nurse was created as a response to a dentist shortage and poor oral health; a public health issue that led to high rejection rates for military recruits during World War I.[1,2] The first school for dental nurses was two academic years in length and focused on preventive and restorative care delivered primarily in school-based settings for children up to age 12.[1,2]

Approximately 30 developed and developing countries including the United Kingdom, Australia, Canada, Nigeria, Italy, and Costa Rica began to use dental nurses by the 1970's.[9] Dental nurses were referred to as a dental therapists (DT) during the 1980's and since then, DTs have provided oral care in over 54 countries.[2,3] In some countries, the DT scope of practice requires that the care to be limited to children, however, others allow DTs with additional training to also care for adults.[3] New Zealand and Australia, DTs are dually trained as dental hygienists.[3] The scope of practice for DTs in most countries includes: preventive services, preparation and placement of amalgam and composite restorations, stainless steel crowns, pulpotomies, and scaling.[3] Some countries limit dental care to atraumatic restorative treatment (ART), a minimally invasive care approach that does not require drilling or anesthesia and simple extractions.[2, 10] Supervision for the dental therapist varies from practicing independently with a collaborative relationship with a dentist, to direct supervision by a dentist.[3]

The history of midlevel dental providers in the U.S. dates back to 1949, when the Forsyth Dental Infirmary in Boston, Massachusetts obtained permission from the state legislature to conduct a five year research project to train dental hygienists to prepare and fill simple cavities.[11] However, the law was repealed the following year due to objections from the dental profession.[11] Another attempt was made in 1972 at the Forsyth Center with a grant funded experimental program to teach dental hygienists to administer local anesthesia, and to prepare and place dental restorations.[12] The project was discontinued after two years due to legal action from the Massachusetts Attorney General and pressure from the state board of dental examiners.[3, 13]

Midlevel dental providers did not emerge again in the U.S. until 2003, when the urgent need to respond to the oral health needs of underserved native Alaskans was identified. Native American Alaskans were sent to New Zealand by their Tribal Health Consortium for training in culturally competent, emergent, and restorative care.[3] Care from the Alaska Dental Health Aid Therapists (DHATs) is limited to members of Alaskan tribal communities. The two-year training program was initially established at the University of Washington and is currently affiliated with Iḷisaġvik College, an Alaskan Tribal college and offers a certificate and an associate degree in Dental Health Therapy.[3,14]

Following initial education, DHATs complete a preceptorship under the direct supervision of a dentist.[15] Certified DHATs are able to practice under general supervision with the supervising dentist visiting the treatment sites to monitor the standard of preventive, basic restorative, and urgent care provided by DHATs.[15] Re-certification and 24 hours of continuing education are required of the DHAT biannually along with continual evaluation of competency.[15]

While the midlevel provider title varies, the scope of practice for Minnesota's advanced dental therapist (ADT), Maine's dental hygiene therapist (DHT) and Vermont's dental therapist (DT) allows for restorative care procedures similar to Alaska's DHAT.[3,4,16,17] However, differences exist in the level of education required, practice requirements and type of supervision, depending on the legislation enacted within each state.[3,4,16,17]

In 2009, Minnesota passed legislation to enable two types of dental therapists: a DT educated at the bachelor level and working under the direct supervision of a dentist, and an ADT initially educated as a dental hygienist and completion of dental therapy at the master's degree level.[3] The DT bachelor's degree program was discontinued in 2016; currently only the dual degree, masters level ADT program is available at the University of Minnesota School of Dentistry in Minneapolis, and at Metropolitan State University in St. Paul.[4] ADTs in Minnesota practice under general supervision, in accordance with a collaborative agreement with a dentist specifying the treatment settings, the populations being served, the scope of practice and allowable procedures, case selection criteria, assessment procedures and imaging protocols.[3] ADTs also work with low-income, uninsured, and underserved patients, or in dental health professional shortage areas.[3]

Maine has developed several alternative dental provider models, including the independent practice dental hygienist (IPDH), a specially qualified licensed dental hygienist.[18] IPDHs can deliver preventive dental hygiene treatment without a dentist's supervision, however, licensure is provided only to those who have completed 2,000 hours of clinical practice under the supervision of a dentist.[18] A written practice agreement with a dentist is also required for the IPDH to expose radiographs on patients.[18]

Licensed dental hygienists can also be given public health supervision (PHS) status authorizing practice in a public health setting.[18] Dental hygienists with PHS status, may provide preventive care to patients in public health clinics, provided there is a written supervision agreement from a dentist and approval for the planned treatment.[18] A third provider, the expanded function dental assistant (EFDA) performs duties under the direct supervision of a dentist including taking impressions, cementing crowns, coronal polishing, fitting orthodontic brackets, and placing pit and fissure sealants.[18] Although these providers are licensed to provide a range of services to patients in Maine, direct supervision by a dentist is required.[18]

Maine passed legislation (LD1230) DHT in 2014 establishing a midlevel oral health care provider, the Dental Hygiene Therapist (DHT).[16] DHT must hold a bachelor's degree in dental hygiene and complete an additional 4 semesters of training from a Commission on Dental Accreditation (CODA) accredited dental therapy program.[16] Unlike Minnesota's ADT, Maine's DHT must work under the direct supervision of a dentist and DHTs may not provide restorative care independently.[16]

Vermont passed legislation (S. 20) enabling dental therapists (DT) to practice in their state in 2016.[17] The Vermont DT, after completing 1000 hours of patient care under direct supervision, would be able to deliver care independently, while under a collaborative agreement with a dentist.[17] Vermont's DT is dental hygiene-based, DTs must hold a license to practice in the state and complete their DT training from a CODA accredited program.[17]

Legislation enabling dental health aide therapists (DHATs) to provide care to underserved residents and members of tribal lands and organization was passed by Washington state's House of Representatives and Senate in 2017.[19] DHAT providers are required to complete a two- year training program, as well as a 400-hour preceptorship with a supervising dentist, prior to becoming licensed providers.[20]

A number of states have legislation pending for midlevel dental providers including: Connecticut, Kansas, Massachusetts, Michigan, North Dakota, and Ohio.[21,22] In spite of the increasing number of states enacting legislation, little is known about the knowledge or interest of registered dental hygienists (RDHs) in enrolling in a dental therapy program, most specifically those licensed in the state of Maine. While legislators and oral health advocates were successful in creating the DHT license category, no academic programs for dental therapy exist in Maine or in New England. Maine state legislators and supporters of LD1230 requested assistance in producing evidence of RDHs interest to justify the launch of a dental therapy program in Maine, or regional program in New England. The purpose of this study was to assess the awareness of RDHs in the state of Maine, regarding the DHT provider model and to gather data regarding the degree of interest in enrolling in a DHT program.

Methods

A quantitative cross-sectional design, using a non-probability purposive sample of registered dental hygienists (RDHs) licensed in Maine was utilized for the study. Exempt status was granted for the study by the MCPHS University Institutional Review Board (IRB102815S).

The survey instrument consisted of nineteen items including the following categories: demographic (8 items), preferred program characteristics (5 items), interest in pursuing DHT (5 items), and additional comments (1 item). Item formats included: Likert-type scale, multiple choice, and open-ended questions. The survey questions asked Maine RDHs if they were aware of the passage of their state's legislation (LD1230) and assessed the level of interest in becoming a DHT. Survey questions also examined various aspects of a DHT program feasibility such as: online vs. face-to-face courses, part-time or full-time enrollment, and manageable travel distances for didactic classes or pre-clinical lab courses. A panel of five dental and dental hygiene experts reviewed the survey and pilot tested it for readability and clarity.

Inclusion criteria were RDHs in Maine holding active licenses. A list of Maine RDHs (n=1,284) with e-mail contact information was obtained from the Maine Dental Hygienists' Association. All RDHs on the e-mail list were invited to participate with a link to the survey provided in the e-mail invitation. Web-based survey software (Qualtrics®) was used to secure informed consent and to collect data over a three-week period in November 2015. After the initial email request to participate, a reminder email was sent 2 weeks later.

Descriptive statistics were used to report the respondents' demographic data, practice history, and responses to survey questions regarding preferred DHT program characteristics. A thematic analysis was performed on the data collected from the open-ended questions; common words and phrases were identified in the responses and codes created.[22] The codes were used to form a list of themes and direct quotes gathered to illustrate the dimensions of each theme.[22]

Results

The survey response rate was 21% (n=268). Ninety-eight percent of the Maine RDHs respondents were female, and the majority of the participants were Caucasian (88%). Respondent demographics and characteristics are shown in Table I. Eighty seven percent (n=232) were aware of the legislation creating the DHT midlevel provider in Maine.

Sixty-five percent of respondents expressed interest in enrolling in a DHT program with 40% indicating a willingness to enroll in a DHT program within the coming year (Table II). A majority of respondents preferred enrolling in a program on a part-time basis (51.8%), with 47.4% strongly agreeing that online delivery of lecture or didactic content was preferable to provide flexibility. Approximately 45% of the respondents were willing to travel up to 50 miles one way for preclinical courses, as well as the clinical practice portion of a dental therapy program. Respondents from each county in Maine expressed interest in practicing as a DHT in their county of residence. The most populous counties in Maine were the predominant locations chosen by respondents as counties where they would choose to practice, i.e., Cumberland (15.3%), Penobscot (8.2%), and York (6.3%).

Table I. Participant Demographics (n=268)

Variable	Frequency (%)
Age*	
20-24	7 (2.6%)
25-34	62 (23.1%)
35-44	56 (20.9%)
45-54	54 (20.1%)
55-64	53 (19.8%)
65-74	5 (1.9%)
* n= 31 (11.6%) of the participants did not report their age	
Gender	
Male	6 (2.2%)
Female	262 (97.8%)
Race/Ethnicity*	
African American	1 (.4%)
Caucasian	237 (88.4%)
Hispanic	3 (1.2%)
Native American	3 (1.2%)
Two or More Races	3 (1.2%)
* n= 21 (7.8%) of the participants did not report their race/ethnicity	
Year of Graduation from DH Program*	
1970-1979	36 (13.4%)
1980-1989	37 (13.8%)
1990-1999	53 (19.8%)
2000-2009	66 (24.6%)
2010-2016	35 (13.1%)
* n=41(15.3%) of the participants did not report their year of graduation	
Highest Education Level*	
Associate Degree	139 (51.9%)
Bachelor's Degree	85 (31.7%)
Master's Degree	14 (5.2%)
Other	10 (3.7%)
*n=20 (7.5%) of the participants did not report their highest education level	

Variable	Frequency (%)
Years of Dental Hygiene Practice*	
0-5	46 (17.1%)
6-10	41 (15.3%)
11-15	31 (11.6%)
16-20	29 (10.8%)
21-25	26 (9.7%)
26-30	22 (8.2%)
30+	47 (17.5%)
* n=26 (9.7%) of the participants did not report their highest education level	
States Where You Actively Practice as RDH	
Maine	249 (92.9%)
Massachusetts	3 (1.1%)
New Hampshire	4 (1.5%)
Vermont	0
2 New England States	8 (3.0%)
Other	4 (1.5%)
States Where You Are Currently Licensed as an RDH	
Maine	196 (73.2%)
Massachusetts	3 (1.1%)
New Hampshire	22 (8.2%)
Multiple New England States	43(16.0%)
Other	4 (1.5%)
Were You Aware of Passing of DHT Legislation?	
Maine	231 (86.19%)
Massachusetts	37 (13.81%)

Major themes identified from the open-ended questions regarding DHT program feasibility and appeal included: convenience, flexibility, cost/affordability, and independent or collaborative practice.

Convenience

Respondents reported convenience of the DHT program was a key factor in pursuing a DHT program. Sample quotes illustrating this theme include:

"The more convenient the better. I would need to work 2 days a week and I have children, so convenience is key."

"Being able to still work while in school."

"Minimal travel and time away from work and family."

"As much online as possible and clinicals all over the state."

"Having a variety of locations available for any internships. Only having to attend classes 1 or 2 days a week."

Flexibility

Flexibility was also a central component in making a DHT program feasible and appealing. Responses relating to this theme include:

"Flexible scheduling. Online classes. Weekend classes."

"Anything that is flexible, distance learning, close to home is much more appealing for me!"

"The more flexible the program the better. Lots of online courses would be a huge plus."

Table II. DHT Program Preferences (n=268)

Variable	Frequency (%)
Are You Interested in Enrolling in a DHT Program?	
Yes	175 (65.3%)
No	91 (34.0%)
Unsure	2 (.07%)
When Would You Be Interested in Starting a Program? *	
Summer 2016	45 (16.8%)
Fall 2016	62 (23.1%)
Spring 2017	5 (1.9%)
Summer 2017	4 (1.5%)
Fall 2017	19 (7.0%)
Spring 2018	2 (.07%)
Summer 2018	2 (.07%)
Other	22 (8.2%)
* n=107 (40.0%) of participants did not respond to the question	
Do You Prefer a Full or Part-Time Program*	
Full-time *(9+ credits/semester)*	25 (9.2%)
Part-time *(6-8 credits/semester)*	136 (51.8%)
* 40% (n=107) of participants did not respond to the question	
How Many Days Do You Anticipate Needing to Work While Enrolled? *	
0 days/week	10 (3.7%)
1-2	27 (10%)
3-4 days/week	114(42.5%)
5 days/week	7 (2.6%)
* 41% (n=110) of participants did not respond to the question	
Would online lecture courses be acceptable to provide flexibility? *	
Strongly Agree	127 (47.4%)
Agree	26 (9.7%)
Neither Agree or Disagree	6 (2.2%)
Disagree	1 (0.03%)
Strongly Disagree	1 (0.03 %)
* 40% (n=108) of participants did not respond to the question	

Variable	Frequency (%)
For preclinical courses, how far would you be willing to travel for a period of 1-2 semesters approximately 2 times weekends per month? *	
<25 miles	40 (15%)
25-50 miles	80 (29.8%)
50-75 miles	30 (11.1%)
75+ miles	11 (4.1%)
* 40% (n=107) of participants did not respond to the question	
In the clinical phase of the program, how far would you be willing to travel one way for clinical practice experience? Check the furthest distance you would be willing to travel a minimum of 2 days/week in this final year of the program.*	
<25 miles	32 (12%)
25-50 miles	99 (37%)
50-75 miles	22 (8.1%)
75+ miles	7 (2.6%)
* 40% (n=108) of participants did not respond to the question	
If working as a licensed DHT, where would you choose to practice in Maine? (County)*	
Androscoggin	7 (2.6%)
Arrostook	8 (3.0%)
Cumberland	41 (15.3%)
Franklin	2 (0.07%)
Hancock	5 (1.9%)
Kennebec	10 (3.7%)
Knox	4 (1.5%)
Lincoln	2 (0.07%)
Oxford	9 (3.3%)
Penobscot	22 (8.2%)
Piscataquis	7 (2.6%)
Sagadohoc	4 (1.5%)
Somerset	4 (1.5%)
Waldo	3 (1.1%)
Washington	5 (1.9%)
York	17 (6.3%)
* 44% (n=118) of participants did not respond to the question	

Cost and Affordability

A significant feasibility issue raised was cost and affordability, in addition to the need for the state to provide loan forgiveness for DHTs working with vulnerable and underserved populations. Examples of these comments include:

> *"Cost is a huge factor."*
>
> *"A loan forgiveness program, scholar-ship, or a student aid program."*
>
> *"For the benefit of the state of Maine I feel there would need to be some sort of reimbursement for a skillful practitioner...It appears to me that the state is forgiving loans to many recently graduated dental students and not getting longevity from them. Dental therapists trained in the state of Maine and current residents in the state of Maine are more likely to stay long term and finally get the benefit of consistency for patients."*

Level of Practice Supervision

Several respondents were IPDH (Independent Practice Dental Hygienist) providers and recommended the DHT should be able to work independently from a dentist. In Maine, the IPDH can perform many procedures within their scope of practice, but without general supervision by a dentist.[19] Sample quotes related to this theme include:

> *"I'm an independent hygienist and currently operate my own practice. I would need to be able to practice as a DHT back in my own practice."*
>
> *"DHT needs to be independent of the dentist to be successful. The intent of a DHT was to help the underserved."*

Discussion

Survey results indicated significant interest exists among Maine dental hygienists in pursuing a dental therapy education program. DHT Program curriculum design should take into consideration the stated needs of the potential participants: flexibility, convenience, and affordability. Advances in delivery of synchronous and asynchronous content with distance education increase the feasibility for delivering didactic content through an online format. Programs in advanced practice nursing often use online learning in addition to clinical practice sites to meet students' learning needs. Dental therapy programs can adopt this model to provide access to potential students living in rural areas, and those needing the flexibility to work while continuing their education.

Although respondents were willing to travel for some aspects of the program, limiting required travel was consistently reported to be of high importance to RDHs in Maine. Those interested in enrolling in a DHT program also indicated preference for having clinical sites nearby, with this finding consistent of the need to keep these future providers in the communities where they will practice. Given dental therapy legislation has passed in Maine and Vermont, and nearly passed in Massachusetts in 2016, a regional dental therapy program consistent with the CODA Standards for Dental Therapy Programs may be a good way to meet the needs of potential midlevel dental providers in the New England states.

Cost was another finding reported to be a factor in pursuing a DHT education program. This is consistent with previous findings of financial concerns being a barrier to entry and completion of graduate dental hygiene education.[25,26] Respondents suggested Maine provide loan forgiveness opportunities for DHTs practicing in Dental HPSAs and/or with underserved populations. Minnesota has loan forgiveness program specifically designated for ADTs working in rural areas for a minimum of 3 years.[27] Maine currently has opportunities for loan repayment for primary care physicians, dentists, and veterinarians, and this program could be extended to the DHT.[28]

The dental therapy model adopted by the Maine legislature requires the DHT to practice under direct supervision from a dentist thus limiting the provision of care in D-HPSAs.[16] The identified shortage of dentists and dental practices in D-HPSAs provides a rationale for allowing for DHTs to provide dental care independently to D-HPSAs residents.[4] Evidence for dental therapists to practice independently has already been demonstrated. Minnesota's DT model, developed to practice under the supervision of a dentist, was recently discontinued while ADT training and licensure continues with outcomes assessments demonstrating the ADTs' versatility in providing quality care and expanding services to underserved populations.[14]

Limitations of this study include the cross-sectional research design, non-probability sampling technique, and low response rate, preventing generalization of the results to states outside of Maine. Another limitation was the lack of questions regarding respondents' knowledge of the DHT's scope of practice, which may have influenced the level of interest in entering a DHT program. Since 13% of the participants were unaware that DHT legislation had been enacted in Maine, they may also have not be aware that there are no DHTs practicing in Maine, and that the timeline for DHTs to begin practicing in Maine is unknown.

Conclusion

Although most of respondents expressed interest in practicing as DHTs populous areas where there are higher numbers of practicing dentists, workforce shortages continue to be reported in many areas within these more populated counties. The documented quality of care delivered by dental therapy providers in other states, along with dental therapists' ability to access underserved populations, suggests DHTs in Maine could successfully meet the needs of the state's D-HPSA residents. Results of this study indicate interest exists among Maine RDHs regarding the DHT provider role and subsequent enrollment in a DHT program. Future studies should expand inquiries regarding the dental therapist's scope of practice and provide participants with more background information regarding the unique aspects of the state's model for a better understanding of their level of interest in entering a dental therapy program. Although there are no DHT programs currently being offered in the New England states, results suggest further investigation is warranted regarding the development of a DHT program located in the Northeastern United States.

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