Research

Access to Preventive Oral Health Services for Homebound Populations: A pilot program

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Abstract

Purpose: Certified Public Health Dental Hygienists (CPHDH) perform traditional dental hygiene scope of practice duties, along with caries stabilization (interim therapeutic restorations) through collaborative agreements with a dentist, in the state of New Hampshire. The purpose of this pilot study was to assess the oral health status, dental needs, including referral and utilization, and satisfaction of care received by homebound individuals in their place of residence when provided by a CPHDH.

Methods: A purposive sample of homebound individuals participated in a mixed methods study that included quantitative data from an intake survey, a retrospective chart review, and qualitative in-depth interviews.

Results: Study participants (n=15) had an average of 22.4 natural teeth; 44% of participants had not seen a dentist for two or more years. Forty-three percent of participants required a referral to a dentist due to dental needs beyond the scope of the CPHDH. Themes from the interviews included: difficulty in accessing a traditional dental care delivery model despite a high value placed on oral health and a high need for dental care. In general, participants expressed satisfaction with care received by the CPHDH.

Conclusion: Participants reported a positive experience and satisfaction with care received from a CPHDH suggesting that this is a viable approach to provide preventive oral health services and caries stabilization to populations with complex access to care challenges.

Keywords: homebound patients, vulnerable populations, access to care, direct access dental hygienist, caries stabilization, silver diamine fluoride, interim therapeutic restoreations

This manuscript supports the NDHRA priority area: **Population level: Access to care** (vulnerable populations).

Submitted for publication:1/4/18; accepted:7/21/18

Introduction

Homebound populations are comprised of non-institutionalized, dependent or semi-dependent individuals, who due to physical, psychiatric and/or social determinants, have restricted ability to leave their place of residence.[1] According to the Centers for Disease Control, about one in every five Americans have some type of disability, making them more disposed to becoming homebound.[1-2] Disabilities are estimated to impact 13% of the population of the United States (U.S.) increasing to 35% in those 65 years of age or older.[2] As new technology and medicine continue improve life expectancy, the risk of becoming homebound or institutionalized increases.[2-3]

The elderly population (65 years of age and older) in the U.S is estimated to rise to 98 million individuals by 2060, far surpassing any other age group in the population.[3-6] The percentage of the very old (85 years and older) is also expected to triple, drastically increasing risk of dependency and becoming homebound,[3-6] along with the complexity of medical conditions.[4-5,7-13] Research has also shown that homebound populations experience multiple chronic health conditions including diabetes, obesity, hypertension, coronary heart disease, and congestive heart failure.[4-5, 7-13]

In addition to chronic disease co-morbidities, there are also substantial unmet dental needs among homebound populations.[14-20] While restorative needs and periodontal treatment needs are high, a large proportion of homebound individuals have not even seen a dentist in two or more years.[14-20] The consequences of disregarding the unmet oral health needs of the homebound population is magnified by

the oral-systemic health connection.[21] Additionally, the U.S. Surgeon General's report on oral health highlights that those with low-incomes, physical disabilities, or illness are at high risk for poor oral health, with homebound populations at highest risk of all.[22]

Evidence of poor oral health and its effects on systemic health is extensive; however, gaps in the literature exist pertaining to the oral health status and dental needs of homebound populations.[22] Prevention and advancement in dentistry have made it more common for an individual to retain their natural teeth longer,[23] however, oral disease becomes more likely once an individual is no longer able to access dental care, resulting in needless suffering, health complications, and diminished quality of life.[22] More research is needed to identify the dental needs, barriers, and possible solutions, especially given the rapid growth of this high risk population.

Complex barriers have contributed to inadequate access to dental care for many low-income, physically disabled, and other high risk individuals in the U.S.[21] Barriers to dental care include lack of dental insurance, including Medicaid programs; economic barriers; low health literacy; and inability to access dental offices due to travel or physical ailments.[24] The current oral health model in the U.S. does not support the ability to meet the needs of the homebound population.[21] Expanding the role of the dental hygienist or creating a midlevel dental provider would likely provide benefits to improve access to dental care, such as but not limited to: lowering costs, improving access to care for those at a high risk of poor oral health, and providing education and improving the overall quality of life.[24]

Alternative approaches to preventive dental care through the expanded scope of practice of the dental hygienist or a midlevel dental provider have been shown to have positive outcomes.[24] Non-traditional dental models of delivery of care using Advanced Skills Hygienist and Dental Assistant (ASH-DA) teams**,** Dental Health Aide Therapists (DHAT) and Registered Dental Hygienist in Alternative Practice (RDHAP) have been demonstrated to have high rates of satisfaction, acceptable quality of care, and appropriate safety of treatment.[25-33] In the state of New Hampshire, legislation creating the Certified Public Health Dental Hygienist (CPHDH) was passed in 2015 to add another direct access model. CPHDHs are able to work in non-traditional settings such as schools, hospitals, or other institutions, in addition to caring for those who are homebound through a collaborative agreement with a dentist. The CPHDH scope of practice includes traditional services provided by a dental hygienist in addition to allowing the CPHDH to perform caries stabilization with interim therapeutic restorations (ITR) upon completion of an approved course.

The purpose of this pilot study was to assess the oral health status, dental needs, including referral and utilization, and satisfaction of care received by homebound individuals in their place of residence when provided by a CPHDH.

Methods

Massachusetts College of Pharmacy and Health Sciences University's Institutional Review Board (IRB) granted this study "exempt" status in accordance with 45 CFR 46.101(B)(2). A mixed-methods study design was used including an intake survey, retrospective chart review and qualitative data consisting of in-depth interviews.

The Oral Healthcare at Home (OHH) pilot project was conducted by Crotched Mountain Community Care (CMCC) of New Hampshire beginning in August 2015, to help meet the oral health needs of a community of low income, Medicaid-eligible adults, many of whom were considered homebound.[36] The aim of OHH was to utilize and evaluate a model of accessing preventive dental care delivered by a Certified Public Health Dental Hygienist (CPHDH). The CPHDH served a total of 27 clients in two counties during the period of the pilot project.

A purposive sample of individuals who had received dental care through OHH was used. Inclusion criteria included: Medicare defined homebound status, the ability to communicate with the interviewer or a translator, and the ability to participate in the pilot project for three months. Exclusion criteria included: inability/ unwillingness to provide consent, or inability to remain in the program for three months. Potential participants were likely to have Medicaid and/or Medicare without dental benefits; therefore, they were unable to seek regular dental care except for emergency treatment.

Recruitment was initiated by CMCC case managers who selected the homebound clients with the highest needs for oral health services; potential participants included those who were medically compromised or limited from seeking dental care due to access challenges. Interested participants provided informed consent to allow review and use of de-identified data from the intake survey and dental charts, along with agreement to participate in an interview at the end of the project.

Intake survey

An intake survey was completed by each participant prior to or during the first appointment with the CPHDH. The survey included demographic information, number of medications taken, physical barriers, medical diagnosis, living

situation (alone or with spouse or family members), ability to communicate, emergency room visits related to dental pain, dental pain, number of teeth present, last dental visit, any current dental or oral pain. Retrospective review of intake surveys was completed by the primary investigator (PI) following the final interview sessions in order to avoid bias.

Retrospective Chart Review

Data related to the oral health status of each participant prior to and at the end of the program was gathered by the PI through a retrospective chart review. Chart data included the initial and follow-up oral assessments; decayed missing and filled teeth (DMFT) at baseline and program completion; treatment provided including interim therapeutic restorations (ITR); silver diamine fluoride (SDF) and fluoride varnish application; prophylaxis/non-surgical periodontal therapy; number of CPHDH visits; dentist referrals and rationale; and any treatment completed by a dentist.

In-depth interviews

In-depth interviews were used to gain personal perspective on experiences related to access to dental services and satisfaction with care by the CPHDH. Interviews were completed by the PI in the absence of the CPHDH, to eliminate possible coercion or feeling the need to provide a socially acceptable response.

The investigators developed a set of interview questions based on the purpose of the evaluation; questions were pilot-tested for clarity and relevance by two individuals who were homebound. Revisions were made based on feedback provided by the pilot testers and included the following:

- Please tell me about how you got dental care, including dental cleanings, before participating in the OHH program? Please tell me about your oral health before beginning this program?
- Please tell me as much as you can about the experience of the Oral Healthcare at Home program and working with the dental provider.
- Please tell me how you felt about the care you have received from the dental provider in this program (CPHDH)? Do you want to continue receiving dental care in your home from the dental provider (CPHDH)? Tell me about the treatment that was done and tell me about how you feel about your oral health now?

Interviews were primary conducted in the participant's residence and took place face-to face, except in cases where participants preferred to be interviewed by phone. Permission was gained prior to audio recording of interviews. Upon completion of the session, the PI asked for permission for subsequent contact for clarification, verification, and further questions if needed. Each interview was transcribed immediately following the session and a summary of the word-processed transcript was offered to the interviewee for review as part of the peer debriefing process to aid in accuracy and validity of the qualitative data.[35]

Data Analysis

A coding dictionary was developed for the intake survey and the initial and follow-up assessment chart review data. Coding consisted of classifying categorical data in a numeric format, i.e. presence of full dentures was no=0 and yes=1, to allow descriptive analysis. Statistics were organized into tables showing frequencies to describe the characteristics of the study population. Due to the small sample size, the mean and mode were reported only for ordinal items such as age, number of medications, years since last dental visit, number of teeth present, and number of missing teeth.

A thematic analysis of the in-depth interview transcripts was conducted by the PI to identify common themes related to the purpose of this program evaluation.[37] Each transcript was evaluated and reviewed several times to find common themes and words/ideas, creating codes. Themes emerged from the codes and gave insight to common perceptions of the homebound population. These codes and themes were offered to the participants for review as part of the peer debriefing process. A second external auditor independently conducted a thematic analysis to enhance accuracy and validity of the findings.[35]

Results

Of the 27 OHH pilot project CMCC clients, a total of 15 homebound individuals consented to participate in the program evaluation (n=15). Participants ranged in age from 32 years to 85 years; the mean age was 59.87 years. A majority (73%) of participants suffered from co-morbidities and reported taking an average of 11.4 medications, demonstrating a medically complex population. Common medical findings were diabetes (38%), multiple sclerosis (25%), and gastroesophageal reflux disease (25%). Participants reported an average of 2.5 years since their last dental visit and 69% reported an existing dental concern. Demographic characteristics of the participants are displayed in Table I.

Data from the initial oral assessment showed the mean number of teeth present in the study population was 22, over two-thirds were at high risk for dental caries, nearly one-third reported pain while chewing and one participant had a fistula present. The mean and mode for coronal and root caries was skewed due to the small number of participants having the

Table I. Intake Demographic Survey Descriptive Statistics (n=15)

	Frequency	Percent (%)
Gender		
Male	4	26.7
Female	11	73.3
Living Situation		
Alone	5	33.3
Spouse/Family	9	60
Residential Care/Assisted Living	1	6.7
Client able to communicate need?		
Yes	12	80
No	3	20
If No, caregiver available?		
Yes	3	100
No	0	0
Cognitive ability to understand evaluation procedure		
Yes	15	100
No	0	0
Are there physical barriers to evaluation?		
Yes	10	66.7
No	5	33.3
Do you smoke?		
Yes	1	6.7
No	14	93.3
Have there been any emergency room visits due to dental or mouth pain?		
Yes	2	13.3
No	13	86.7

majority of the caries. Comprehensive periodontal assessments were difficult to complete due to the constraints of the home environment. Descriptive statistics from the initial oral health assessment are shown in Table II.

The CPHDH provided program participants access to care through the provision of 46 home visits with high rates of completion for oral prophylaxis and fluoride treatments. Over half the participants (n=8) had silver diamine fluoride (SDF) placed to prevent or arrest caries; three of these participants were receiving palliative care only. Thirty-six interim therapeutic restorations (ITR) placed during the evaluation period; problems with ITRs (47%) occurred primarily in the client with rampant caries due to difficulties in caries stabilization prior to referral to the dentist. Results may also have been skewed due to the newness of the procedure at the beginning of the pilot program. Early ITR challenges may have been

Table II. Initial Oral Health Assessment Descriptive Statistics (n=15)

	Frequency	Percent (%)
Presence of Partial Prosthesis		
Yes	3	20.0%
No	12	80.0%
If Yes, Upper, Lower, or Both?		
Upper	1	33.3%
Lower	2	66.7%
Both	0	0.0%
Presence of Full Denture		
Yes	0	0.0%
No	15	100.0%
Presence of Abscesses/Fistula		
Yes	1	6.7%
No	14	93.3%
Any pain while chewing		
Yes	5	31.3%
No	11	68.8%
Caries Risk		
Low	2	13.3%
Moderate	3	20.0%
High	10	66.7%
Recession		
Low	0	0.0%
Moderate	3	20.0%
Severe	3	20.0%
Unable to assess	9	60.0%
History or Active Periodontal Disease		
No	0	0.0%
Yes	4	26.7%
Unknown	11	73.3%
Degree of Periodontitis (if applicable)		
Low	0	0.0%
Moderate	4	26.7%
Severe	1	6.7%
Unable to tolerate examination	10	66.7%
History or Presence of Oral Cancer		
No	15	100.0%
Yes	0	0.0%
Continuous Measures	Mean	SD
Number of Teeth Present	22.2	6.8

related to material choice, technique, and retention. Oral infections that could not be treated by the CPHDH, occurred in 43% of all home visits. CMCC Case Managers made the referrals for individuals needing additional restorative care and ensured that the clients' dental needs were met. The number of decayed teeth at the follow-up assessment decreased from the DMFT score from the initial assessment. Patient care data is summarized in Table III.

Qualitative Findings

The most prevalent themes identified from the interview data included: lack of dental care, oral health status, resources (costs and transportation), experiences with the program, satisfaction of care from the CPHDH and access (convenience, comfort).

Table III. Initial and Follow-Up Assessment Dental Status and Treatment Provided by CPHDH (n=15)

Client	Dental Home	Years Since Dental Visit	Initial DMFT*	Follow- up Assessment DMFT	# Visits During Evaluation Period	ITR**	SDF***	Prophy/ SRP	# Fluoride Varnish	Referral to DDS	Reasons for Referral	Treatment Completed by DDS
#1	No	3+	0-11-15	0-12-14	4	0	0	4	4	Yes	Perio abscess	Extraction #3
#2	No	2 (palliative care only)	26-5-0	3-8-19 (ITR's)	9	20 (13 repairs)	1	5	5	Yes	Rampant caries, retained roots and abscesses	Extractions #21, 22, 15
#3	Yes	2	0-1-2	0-1-2	4	0	0	4	4	No		
#4	Yes	2	2-0-0	0-0-0	4	2	0	4	4	No		
#5	No	4	3-11-9	0-11-10	8 (URPD repair and OHI visits)	1	2	4	4	No		
#6	No	Unknown	1-0-0	0-0-0	3	1	0	2	2	No		
#7	Yes	1	3-8-9 (Root Caries)	0-8-11 (2 Implants)	5	0	3	5	5	Yes	Loose bridge	Implant, fixed bridge repair
#8	No	Unknown	7-9-0	4-9-3	4	4 (1 repair)	0	3	3	Yes	Caries	Restorations
#9	No	1	0-21-5	0-21-5	4	0	0	4	4	No		
#10	Yes	1 (palliative care only)	5-8-8	2-9-9	6	2	4	5	4	Yes	Abscess, caries and periodontal disease	Extract #20, exam, x-rays and tx plan
#11	Yes	1 (palliative care only)	3-16-10	1-16-10	5	2 (1 repair)	3	5	4	Yes	Loose fixed bridge, lost crown, caries and periodontal disease	Exam, x-rays and tx plan
#12	No	Unknown	3-18-7	0-18-7	7	2	3	5	5	No		
#13	No	2	1-7-7	0-7-7	6	1	1	5	5	No		
#14	No	Unknown	1-16-4	0-16-4	3	1	1	2	2	No		
#15	No	Unknown	0-21-2	0-21-2	6	0	0	4	3	Yes	Soft tissue pain, exam, x-rays	Exam, x-rays - no treatment

* Decayed, Missing, and Filled Teeth ** Interim Therapeutic Restoration ***Silver Diamine Fluoride

Theme 1. Lack of dental care

The majority of participants reported not having any dental care for two or more years. Examples of the participant's claims are the following:

"I did not get any dental care before this program. I haven't seen a dentist in several years."

"Basically, there wasn't any dental care."

"It was 10 years ago that I saw a dentist and I haven't had a chance to go."

"No, I did not have dental care before, it had been years."

Theme 2. Oral Health Status

The majority of participants stated that they were content with their oral health status while about one-third reported feeling bad about their oral health prior to beginning the program. Examples of how the participants felt about their oral health include the following:

"I was not happy with my oral health – I was desperate for a cleaning and I was kind of stuck. I couldn't find anyone to help me and I just wanted to find someone for a cleaning and there wasn't all this funding for these programs."

"All teeth were painful and I hadn't gotten a cleaning so they were very dirty. I was looking at other people with nice white teeth and I got upset because I had dark teeth."

"She was very unhappy with her mouth. She tried not to open her mouth and tried not to show her teeth when talking with other people. Her teeth were black and small and her gums bled a lot." (Interpreter's translation)

Theme 3. Resources

Similarities were seen among resources (costs and transportation) being a major barrier to accessing dental care. Money was discussed in every interview with some examples included in the following:

"I ran out of money and just found it too difficult so I stopped going there but at the time I was going I had really bad oral health because I didn't have any dental insurance and didn't have any money so I was in bad shape."

"I had almost no dental care because dental insurance did not cover."

"I'm on Medicaid and dentist didn't take Medicaid and I was not able to get much of anything."

"Going here was inconvenient and hard because I always had to find a ride. I'm in a wheelchair and don't drive so it was difficult to get there for me and very inconvenient."

"It was difficult to get into the office even with the wheelchair but it is impossible to get in there now. She has to be transported by ambulance due to her current condition." (Husband translating interview)

Theme 4. Positive experiences

All participants reported positive experiences with the OHH program as shown in the following responses:

"My experience with the program has been great. It's very convenient and so easy."

"I am so happy she is very professional and patient and she changed my mouth health and I am so happy with this. It is very good because it makes me afraid to go out but this is done in the home so it makes me more comfortable."

"I find it helpful that someone is able to come to my home and provide care for me here. The best part of the program is that she is competent and thorough and she makes house calls and I just like the fact that I don't need to find transportation."

"I love it I just love it because I'm in a more comfortable spot then a dental office, I definitely want to keep getting care because I'm more at ease- more comfortable."

"She is so thankful to God and America about this program and she hopes it can help other people too. She is a mom from 11 kids and nobody takes care of moms but here they take care of us older people and that's good I'm so thankful." (Interpreter's translation)

Theme 5. Satisfaction of care from the CPHDH

All participants expressed satisfaction with the convenience, comfort, access and care received by the CPHDH as expressed by the following responses:

"Oh, I'm thrilled to death and I am very satisfied with the care and I definitely want it to continue the care, it is so much easier for me considering all the transportation I have line up and I can't walk far so I have to have a wheelchair."

"I was satisfied with the care that I've received, she comes and does cleanings and it's much easier for us to get cleanings at home."

"If I was a teacher, I would give her an A+ I am very satisfied with my care and I would like to continue to receive care in my home."

Discussion

The majority of the participants (73%) had a number of co-morbidities including diabetes, MS, obesity, hypertension and other chronic diseases commonly identified in the literature,[13] making this an especially vulnerable population. According to the U.S. Surgeon General's report on oral health, those with physical disability or illness restricting their access to dental care, may also experience a negative impact to their overall health.[22]

Women comprised over half of the study's homebound population (68%), which is consistent with the literature.[7-13], [38-39] The mean age of participants was 59.87 years of age, with an age range of 32 to 85 years of age. Gaps in the literature are evident concerning the demographics of the homebound population; much of the current focus of research is on elderly homebound populations and does not include the individuals who are homebound due to disabilities.[13] The CMCC services a unique population of homebound individuals providing an expanded picture of the diverse age range within this population beyond the elderly.

A collaborative, interprofessional approach to care resulted in regards to the ability of the program participants to access and utilize dental care. The CPHDH made from 3 to 9 home visits per participant during the evaluation period and provided regular oral evaluations and preventive care in addition to silver diamine fluoride treatments[40] and placement of ITRs[41] for caries stabilization for those receiving palliative care only or until a dental visit could be arranged. Over 46% of the participants who received dental referrals were able to obtain needed dental care. Findings from the intake DMFT scores indicate fewer DMFT at the follow-up assessment at the pilot program conclusion, suggesting the value of the CPHDH services in providing access to care in preventing and stabilizing oral disease in a medically complex homebound population.

Major themes emerging from the in-depth interviews showed 100% satisfaction with dental care received through the CPHDH and the overall experience with the program was positive. Similar studies have shown a high degree of acceptance and satisfaction with dental care received through non-traditional methods.[25-33] While most participants stated that they were content with their current state of oral health prior to the start of the program, they also recognized the lack of dental care options available to them. Participants also demonstrated an interest in receiving dental care at home, indicating that they valued oral health. Disparities in accessing and receiving dental care within this study population are similar to those found within the literature.[11-12,15-16] Cost of care and transportation were the major barriers identified by the study population, including one participant who had to be transported by ambulance for any care outside the home, supporting the need for more affordable, accessible dental care through advancement of direct access dental hygienists with an expanded scope of practice along with the creation of midlevel provider models.[26-31]

The many challenges faced by homebound individuals in trying to obtain dental care in the traditional delivery model, requires further qualitative research so dental professionals and policy makers are better informed regarding the factors impacting access to care. Policy changes in adult Medicaid to expand beyond palliative care for adults are needed to in order to sustain alternative approaches to oral health care such as the OHH in New Hampshire. Other types of home health care assistance are covered by Medicare and Medicaid for homebound populations; oral health needs to be added to these services. Growth in the disabled population will provide opportunities to create diverse ways of obtaining oral health care.[23]

Limitations of this study include the small sample size with non-random, purposive selection, which may have led to bias or skewed results. This grant-supported program was free of charge for participants, which could have skewed their overall satisfaction rating. Other limitations include the qualitative research study design which can limit the generalization and possible misinterpretation of the findings. To minimize this limitation, peer debriefing and the use of an external auditor were used. Future research should be conducted with a larger, randomly selected sample to fully understand the multifaceted characteristics of the homebound population and to explore the impact of the various types of direct access dental hygiene and mid-level providers on health outcomes. Teledentistry is another area where research could enhance understanding of how to increase access to quality oral health care in a more cost-effective manner.

Conclusion

The purpose of OHH pilot program was to meet the preventive and therapeutic oral health needs of a homebound population through the use of a direct access dental hygienist, CPHDH, with expanded functions in caries stabilization. Program participants ranging in age from 32 to 85 years of age, with dental needs including caries, pain, infection and lack of access to care, received preventive and therapeutic care in their residences from a CPHDH; nearly 50% of the participants were referred to a dentist and were able to receive the necessary dental care. All of the pilot program participants reported a positive experience and satisfaction with care received from a

CPHDH, suggesting that this is a viable approach to provide preventive oral health services and caries stabilization to populations with complex access to care challenges.

Acknowledgements

Special thanks to the program participants and to Crotched Mountain Community Care (CMCC) of New Hampshire.

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