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## Feature Article

## An oral health baseline of need at a predominantly African American Program of All-Inclusive Care for the Elderly (PACE): Opportunities for dental-nursing collaboration

Matthew M. Oishi, DMD, MPH, MS<sup>a,\*</sup>, Joan I. Gluch, PhD, RDH, PHDHP<sup>a</sup>,  
Robert J. Collins, DMD, MPH<sup>a</sup>, Greta R. Bunin, PhD (Retired)<sup>b,c</sup>, Ingrid Sidorov, MSN<sup>e</sup>,  
Boryana Dimitrova, DMD<sup>a</sup>, Pamela Z. Cacchione, PhD, CRNP, BC, FGSA, FAAN<sup>d</sup>

<sup>a</sup> University of Pennsylvania School of Dental Medicine, 240 S. 40th Street, Philadelphia, PA 19104, United States

<sup>b</sup> University of Pennsylvania School of Medicine, 3400 Civic Center Blvd, Philadelphia, PA 19104, United States

<sup>c</sup> Children's Hospital of Philadelphia, 3401 Civic Center Blvd, Philadelphia, PA 19104, United States

<sup>d</sup> University of Pennsylvania School of Nursing, 418 Curie Blvd, Philadelphia, PA 19104, United States

<sup>e</sup> LIFE UPenn, University of Pennsylvania School of Nursing, 4508 Chestnut St, Philadelphia, PA 19139, United States



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## ABSTRACT

This descriptive study sought to establish an oral health baseline of need for enrollees at a Program of All-Inclusive Care for the Elderly (PACE) and identify opportunities for nursing interventions. The Oral Health Assessment Tool (OHAT) was applied to a random sample of 120 enrollees, 64 of whom met inclusion criteria, agreed to participate to assess their oral health status, and were included in the analysis. The mean OHAT score was 4.4 (SD = 2.6; range 0–12). Higher scores indicate poorer oral health. The oral conditions found needing the most attention were gums, saliva, natural teeth, dentures, and oral cleanliness. Oral cleanliness scored the worst on the OHAT, highlighting opportunities for nursing interventions and the necessity for oral hygiene routines. This study also identifies the need for nurses to address enrollees' oral health and relay information back to the PACE interdisciplinary team (IDT) to initiate referrals to the dentist as needed.

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## Introduction

There is a growing population of older adults who are dually eligible for Medicare and Medicaid. This population, more commonly known as “dual eligibles” (DEs), is generally in poor health, requires more medical and social supports than other Medicare or Medicaid beneficiaries, and consumes a significant amount of Medicaid resources.<sup>1</sup> As described in the 2000 Surgeon General's Report, “Oral Health Care in America”, many dual eligibles have poor oral health due to racial and ethnic disparities in accessing dental care. It was this report that alerted Americans to the importance of oral health care to general health and well-being.<sup>2</sup> Since then, other reports<sup>3,4</sup> have highlighted the need for all health professionals to be involved in oral health promotion and disease prevention, and the importance of interprofessional based care to improve both general and oral health.

Nursing care involves meeting patients most basic needs including oral care.<sup>5</sup> However, oral hygiene care is not always recognized as a priority<sup>6</sup> and, in nursing facilities, it is often crowded out by other nursing and caregiver tasks, such as bathing and dressing.<sup>7</sup> Nurses are responsible for developing plans of care for their patients across health care settings. Understanding the extent of the oral hygiene care need within their health care setting and the population they serve is essential, particularly because frail older adults are not usually concerned with their oral health and complain or seek help for oral problems only when in pain.<sup>8</sup>

Older adults who are minorities or have low incomes suffer disproportionately from oral diseases.<sup>9–11</sup> Individuals in nursing homes or those who receive home care tend to have poorer oral health when compared to independent, community dwelling older adults.<sup>12</sup> For African Americans, these disparities are related to low dental care utilization, limited oral health knowledge, and seeking only problem-focused dental care.<sup>13–16</sup>

These disparities are significant because poor oral health can negatively impact older adults not only causing local pain and infection, but also putting them at risk for aspiration pneumonia. Dental

\* Corresponding author: Currently at the University of Iowa College of Dentistry; 801 Newton Rd, DSB N329, Iowa City, IA 52242, United States.

E-mail address: [matthew-oishi@uiowa.edu](mailto:matthew-oishi@uiowa.edu) (M.M. Oishi).

plaque is a reservoir for multiple pathogens.<sup>17</sup> Multiple medications for chronic diseases can also contribute to poor oral health and quality of life as these drugs often cause xerostomia, significantly increasing the risk for rapid oral health deterioration among older adults.<sup>18</sup>

Dual-eligibles (DEs), in particular, have low utilization of preventive dental services, such as examinations and cleanings.<sup>19</sup> Medicare does not cover preventive dental services. Therefore, DEs receive their dental benefit from Medicaid. Adult dental care under Medicaid varies by state with limited coverage contributing to lower utilization.<sup>20</sup> A program that is composed of mainly DEs<sup>21</sup> and provides and finances dental care regardless of the state's adult Medicaid benefit is the Program of All-Inclusive Care for the Elderly (PACE),<sup>17</sup> where nurses play an expanding role in enrollees' health care.<sup>22</sup>

PACE began in the early 1970s in San Francisco when a public health dentist and a social worker recognized a need for long-term care (LTC) services that kept individuals in the community and focused on maintaining their quality of life.<sup>23</sup> In 2018, there were 124 programs with 255 centers in 31 states serving 45,000 older adults.<sup>24,40</sup> Enrollees must be deemed nursing home eligible and are typically frail with almost half of the enrollees (49%) having a diagnosis of dementia.<sup>25</sup> PACE is an opt-in, capitated program where care is coordinated by an Interdisciplinary Team (IDT); however, oral health professionals are not required by the Centers for Medicare and Medicaid Services (CMS) to participate in the team. PACE services include the full spectrum of long-term services and supports (LTSS) and include but are not limited to medical care, therapies, noon meals, socialization, home care, nursing care, optometry, podiatry, mental health, transportation, and dentistry.<sup>26</sup> Many of the services occur at the PACE day health center. PACE enrollees are expected to complete their daily hygiene at home prior to coming into the center, including oral care. This may be done independently or with the assistance of home care nurses or caregivers. At the center, the caregivers and nursing staff can provide oral hygiene care as needed and ensure it is part of their interdisciplinary care plan. Historically, oral care has been described as a basic nursing intervention.<sup>5</sup> Since nurses play a wide variety of vital roles at PACE, from mental health specialists to diabetes educators and foot care providers,<sup>22</sup> they are a natural choice to monitor oral health status, identify any points of intervention, adjust the care plan, and relay information between the IDT and oral health professionals.

Thorne et al.<sup>27</sup> found that the effectiveness of a dental program in long-term care was contingent on three pillars: dental care, routine and continual oral hygiene, and assessment. In particular, they found routine oral hygiene and assessment were most important to a program's success and that simply providing dental services is insufficient to having an effective dental program. They suggested that a program's ability and willingness to address these components is linked to the values and communication patterns of an organization that promotes quality of life and supports interactions among staff.<sup>27</sup> This is pertinent to PACE as it is required by CMS to provide dental care and routine assessments of dental status (although who is required to provide this assessment and what specifically is to be assessed have not been defined). In particular, the IDT is uniquely positioned to address the coordination of dental care and ongoing oral hygiene and assessment because it provides an established philosophy of care and built-in communication to coordinate all necessary services for enrollees in a care plan.<sup>26</sup>

No previous studies have documented the oral health status of PACE enrollees or explored the role of nurses in oral care in PACE. This study aimed to establish a baseline of oral health of PACE enrollees, compare oral health among the PACE participants with that of those in other LTSS, and explore the role of nurses in oral health care in order to direct future interprofessional oral health

interventions. In addition, this study tested the hypothesis that oral health does not differ by age, sex, or dentition status in this group of PACE enrollees.

## Methods and materials

### Setting

This descriptive study was conducted at one PACE center in Philadelphia. At the time, it was operated by the University of Pennsylvania School of Nursing (SON) and was the first PACE program in the country to be operated by a SON.<sup>28</sup> Dental students in their final year at the University of Pennsylvania School of Dental Medicine provided dental care one to two days per week only to those members who expressed interest in receiving dental care.<sup>29</sup> At the Philadelphia PACE, prior to this study, nurses conducted most of the oral assessments but did not use a formalized screening tool.

### Participants

As of May 2014, there were 426 enrollees in this Philadelphia PACE, with an average of 230 enrollees coming to the center daily. At the time of the study, 72.4% of enrollees were female and 27.6% male. The majority of enrollees were African American (95.2%) with the remaining identifying as Caucasian or other. The mean age of the enrollees was 79.0 years with a mean number of years enrolled in this PACE being 3.6 years. Approximately 40% of enrollees in this program had some degree of cognitive impairment.<sup>30</sup>

### The sample selection

A systematic random sample of 120 enrollees from this PACE center was selected. The sample size of 120 was chosen based on power calculations using OHAT scores and sample sizes from previous studies.<sup>31,32</sup> The systematic random sample of enrollees was completed to avoid the bias of only enrolling members who were conveniently at the PACE center, those who had dental problems, or those interested in oral health thus, would presumably have better oral health and as a result would want to participate in this study. One hundred and twenty enrollees were randomly selected and those who scored 24 or greater on their last routine Mini Mental Status Exam (MMSE) were contacted either by phone or in person at the PACE center, and a time was scheduled to conduct the oral assessment. Those with cognitive impairment (MMSE < 24) were excluded ( $n = 39$ ). Each participant who consented was able to describe the risks, benefits and purpose of the study to demonstrate their ability to provide informed consent. Inclusion criteria included having an MMSE score of  $\geq 24$  and being able to come to the PACE center. Among eighty-one remaining enrollees, two died prior to consent. This left seventy-nine enrollees (65.8%) who were approached, of which 13 declined. Those who declined did so due to factors such as weather, illness, and family commitments, thereby affecting consistent attendance at the PACE center. Sixty-six enrollees (55%) participated in the study with a final sample of sixty-four ( $n = 64$ , 53.3%) after two participants were removed for incomplete scoring. IRB approval was granted through a full review by the Human Subjects Committee at the University of Pennsylvania (Protocol #820468).

### Oral Health Assessment Tool (OHAT)

The OHAT is a screening tool to identify and document any major oral issues. It is specifically indicated for use by non-dentists in patients with cognitive impairment, xerostomia, chronic health problems, and swallowing and/or feeding issues, as well as patients who require assistance with self-care.<sup>33</sup> The OHAT evaluates the

**Table 1**  
OHAT categories and the corresponding descriptions for scores of 0, 1, or 2.

Category	0 = Healthy	1 = Changes	2 = Unhealthy
Lips	Smooth, pink, moist	Dry, chapped, or red at corners	Swelling or lump, white/red/ulcerated patch; bleeding/ulcerated at corners
Tongue	Normal, moist roughness, pink	Patchy, fissured, red, coated	Patch that is red &/or white, ulcerated, swollen
Gums and tissues	Pink, moist, smooth, no bleeding	Dry, shiny, rough, red, swollen, one ulcer/sore spot under dentures	Swollen, bleeding, ulcers, white/red patches, generalized redness under dentures
Saliva	Moist tissues, water and free flowing saliva	Dry, stick tissues, little saliva present, resident thinks they have a dry mouth	Tissues parched and red, very little/no saliva present, saliva is thick, resident thinks they have a dry mouth
Natural teeth	No decayed or broken teeth/roots	1–3 decayed or broken teeth/roots or very worn down teeth	4+ decayed or broken teeth/roots, or very worn down teeth, or less than 4 teeth
Dentures	No broken areas or teeth, dentures regularly worn, and named	1 broken area/tooth or dentures only worn for 1–2 h daily, or dentures not named, or loose	More than 1 broken area/tooth, denture missing or not worn, loose and needs denture adhesive, or not named
Oral cleanliness	Clean and no food particles or tartar in mouth or dentures	Food particles/tartar/plaque in 1–2 areas of the mouth or on small areas of dentures or halitosis	Food particles/tartar/plaque in most areas of the mouth or on most of dentures or severe halitosis
Dental pain	No behavioral, verbal, or physical signs of dental pain	Are verbal &/or behavioral signs of pain such as pulling at face, chewing lips, not eating, aggression	Are physical pain signs (swelling of cheek or gum, broken teeth, ulcers), as well as verbal &/or behavioral signs (pulling at face, not eating, aggression)

condition of eight specific categories: lips, tongue, gums and tissue, saliva, natural teeth, dentures, oral cleanliness and dental pain (Table 1). For each of the eight areas, patients are given a score of 0 = healthy, 1 = changes, or 2 = unhealthy; thus, lower scores indicate healthier oral conditions and higher scores indicate poor conditions. The total OHAT score is calculated by adding the eight individual category scores. Total possible scores range from 0 to 16 and there are no cut-offs based on points to determine severity or significant score. However, if the total score is different from zero, the patient should ideally be referred to a dentist. While the total score is important, the scores of each category should also be considered individually. The OHAT provides some quantitative information but it was not intended to measure oral health. It has mostly been used to evaluate interventions that improve oral health and identify individuals who need an examination by a dentist.

Chalmers et al.<sup>32</sup> tested the reliability and validity of the OHAT over a 12-month period in a residential care facility and found the mean total OHAT scores to be between 2.4 and 2.7. Jablonski et al.<sup>31</sup> used the OHAT to assess the efficacy of an intervention to reduce care resistant behaviors in nursing home residents with moderate-to-severe dementia. They found the baseline mean total OHAT score to be 7.2. With the intervention and twice daily mouth care for 14 days, the score decreased to 1.0, demonstrating the OHAT is sensitive to change. Similarly, Amerine et al.<sup>34</sup> applied the OHAT to a convenience sample in three LTC facilities in Arkansas and found improved OHAT scores for tongue health, denture status, and oral cleanliness when oral health interventions were conducted by nurses and a dental hygienist who served as an oral health champion. Although these studies were conducted in different populations of older adults, they suggest that the OHAT is valid and reliable in establishing oral health status and evaluating oral health interventions.

Four dental students in their final year of school conducted the assessments and were trained using the University of Iowa's Geriatric Education Center website which provides an online training module for individuals who will administer the OHAT.<sup>35</sup> After obtaining informed consent from each study participant, oral assessments were conducted with gauze and tongue depressors. Data collection occurred between November 2014 and March 2015.

#### Data analyses

Age, sex, and dentition status were categorized and summarized with counts and percentages and corresponding mean total OHAT scores. ANOVA was used to assess differences in mean total

OHAT score by age group and dentition status. Post hoc comparisons were conducted with Scheffe tests. A *t*-test was used to assess differences in mean OHAT scores between males and females. For all tests, statistical significance was noted at the  $p < 0.05$  level. SPSS Version 25 was used for data analyses and summary statistics.

#### Results

A total of 66 enrollees met the inclusion criteria and agreed to participate in the study. Sixty-four participants were included in the final analysis of which 70% were female and 30% male, with a mean age of 74.1 years (SD = 8.9; Range 60–95 years). All study participants were African American. The descriptive characteristics can be seen in Table 2. No statistically significant difference could be detected in mean total OHAT scores by age group ( $p = 0.56$ ) or sex ( $p = 0.27$ ). A statistically significant difference was noted by dentition status ( $p = 0.001$ ). Post hoc tests showed that no statistically significant relationship could be detected between participants who had teeth only and those who had teeth and dentures, but that those with natural teeth only ( $p = 0.004$ ) or natural teeth with dentures ( $p = 0.005$ ) had significantly higher mean total OHAT scores than those with only dentures.

The mean total OHAT score for the 64 participants was 4.4 (SD = 2.6; Range 0–12) out of a possible score of 16. The OHAT score distribution for individual categories is presented in Fig. 1. A majority of participants had healthy lips (95%), tongues (66%), and did not report any dental pain (89%) at the time of assessment. Scores were

**Table 2**  
Descriptive statistics of sample ( $N = 64$ ).

Demographics	N (%)	Mean OHAT Score	SD	P-Value
Age				
60–69	24 (37.5)	4.4	2.7	0.56
70–79	23 (35.9)	4.0	3.1	
80≥	17 (26.6)	4.9	1.6	
Sex				
Male	19 (29.7)	5.1	3.6	
Female	45 (70.3)	4.1	2.0	0.27
Dentition				
Natural teeth (a)	17 (26.6)	5.3	2.0	
Dentures (b)	16 (25)	2.4	2.2	0.001*
Dentures and natural teeth (c)	31 (48.4)	4.9	2.6	

\*  $p < 0.05$  ANOVA- Post Hoc Scheffe test revealed statistical difference natural teeth (a) and dentures with natural teeth (c) different from dentures only (b).

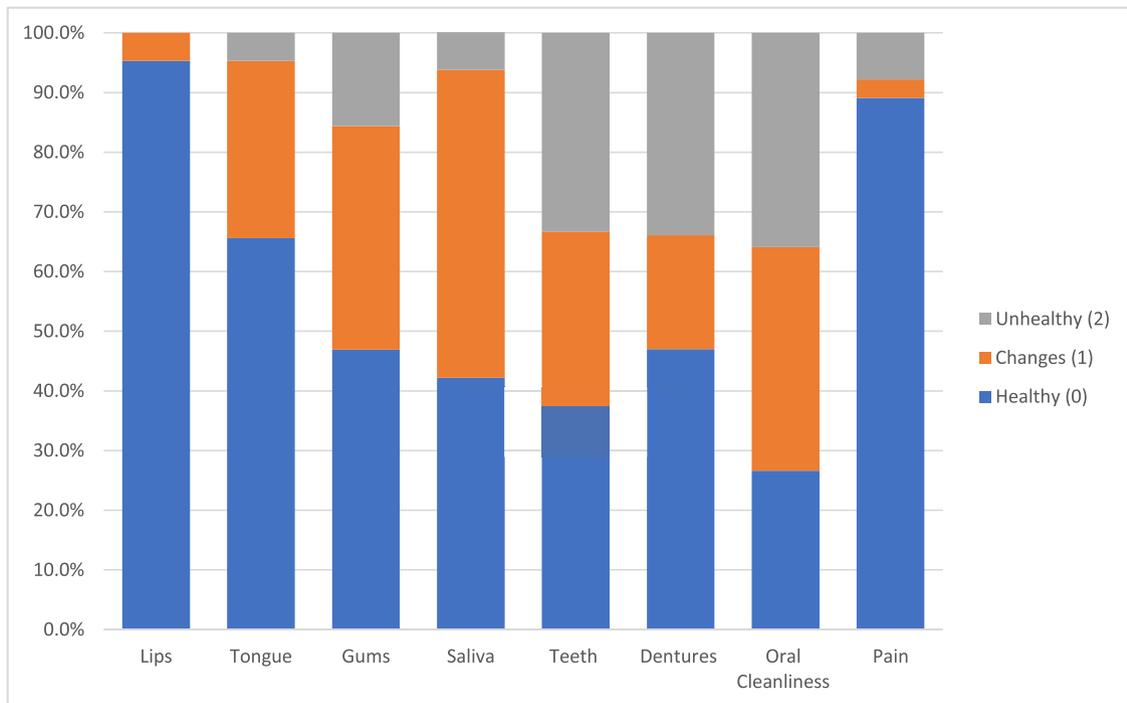


Fig. 1. Percentage of individuals receiving 0, 1, 2 score for each of the eight categories of the OHAT.

distributed differently for the categories of gums, saliva, teeth, dentures, and oral cleanliness. Over 40% of participants had a score of 0 for gums and saliva, with 37–51% having a score of 1 and approximately 6–15% a score of 2. For the categories of natural teeth, dentures, and oral cleanliness, between 26 and 47% of participants had a score of 0, 19–37% a score of 1, and 33–35% a score of 2. Oral cleanliness (1.09, SD = 0.79) and teeth (0.72, SD = 0.84) scored highest among the eight items on the OHAT with condition of lips (0.05, SD = 0.21) and presence of oral pain (0.19, SD = 0.56) scoring the lowest, (Table 3).

## Discussion

This is believed to be the first study to document the oral health status of individuals in a PACE program. This unique program for LTSS serves the needs of the growing population of DEs who are nursing home eligible and desire to age in place. Medicare does not cover dental services, and Medicaid dental coverage varies by state; however, PACE provides and finances dental services regardless of each state's adult Medicaid dental benefit and provides access to dental care for the dual-eligible, PACE population. By evaluating the health of this population, nurses can assist PACE in identifying areas of need and developing collaborative interventions to improve the health and quality of life for those under its care.

Table 3  
Mean OHAT scores for each of the eight categories.

OHAT category	Mean OHAT score	SD
Lips	0.05	0.21
Tongue	0.39	0.58
Gums	0.69	0.73
Saliva	0.64	0.60
Teeth	0.72	0.84
Dentures	0.64	0.86
Oral cleanliness	1.09	0.79
Pain	0.19	0.56

The mean total OHAT score of the 64 participants in this sample was 4.4, which is higher than that which was reported by Chalmers et al. in a residential care facility<sup>32</sup> (mean total OHAT score = 2.7) but lower than reported by Jablonski et al. in nursing home individuals with moderate-to-severe dementia (mean total OHAT score = 7.2).<sup>31</sup> It appears that enrollees at this Philadelphia PACE may have better oral health than those in nursing homes but poorer than those who live in residential care facilities. However, this must be interpreted cautiously since the participants in this study and the Chalmers and Jablonski studies cannot be matched on cognitive impairment or difficulties in activities of daily living, which may bias oral health status.

This study could not detect a statistically significant difference in mean total OHAT scores by age or sex but found that those with natural teeth only or dentures with natural teeth had higher mean total OHAT scores than those with dentures alone. However no difference could be detected between those who have natural teeth only and those with natural teeth and dentures. These results only partially supported our hypothesis.

### Clinical implications for nursing staff

The areas of need identified in this study included saliva, gums, teeth, dentures, and most importantly, oral cleanliness. These findings reflect the previous difficulties that this African American and DE population may have had in accessing dental care prior to entering the program.<sup>19</sup> This limited previous access to dental care suggests a large unmet dental need and places stress on this PACE's oral health resources to address the needs of those who elect to receive dental treatment. It reinforces that, in addition to providing dental care on site only to interested individuals, enrollees require routine oral hygiene care.<sup>27</sup>

Addressing basic hygiene for individuals is a basic nursing role<sup>5</sup>; however, nurses, dentists and dental hygienists must work together to address oral cleanliness. Fig. 2 presents a conceptual model for an oral health program at PACE and the roles for nurses and nursing

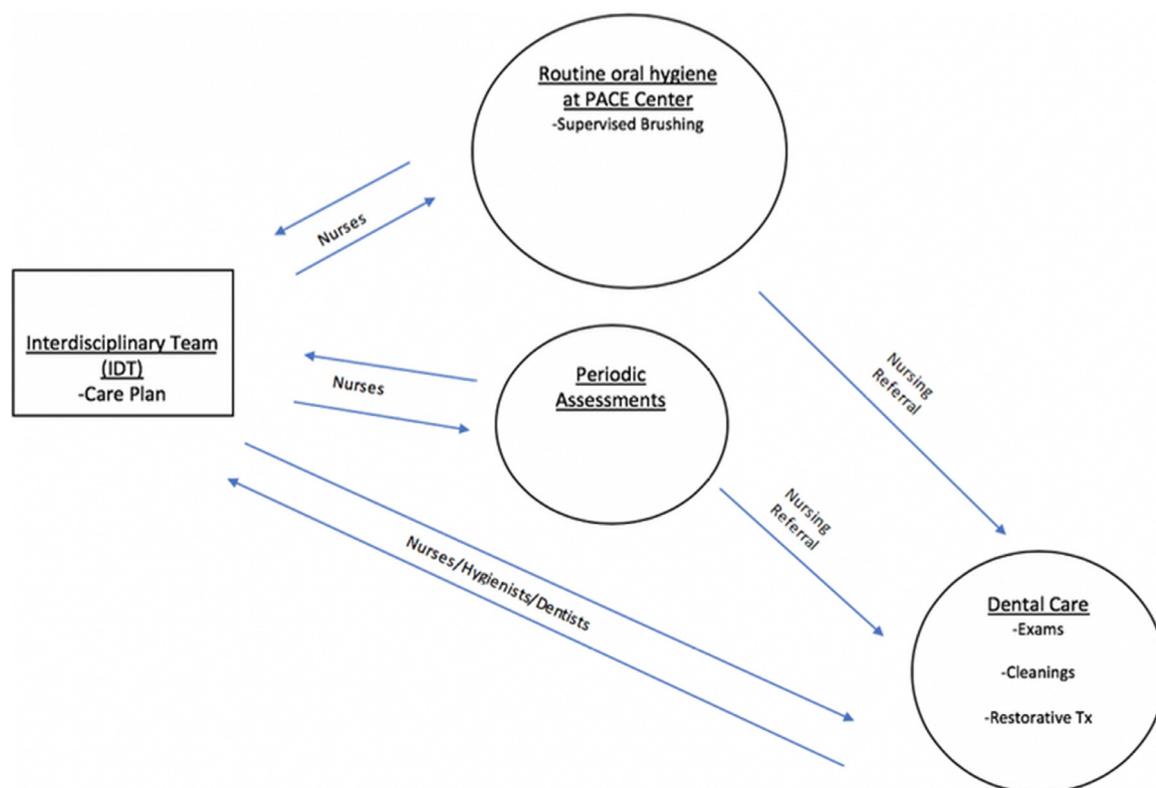


Fig. 2. Conceptual model for an oral health program at PACE.

assistants. The model suggests that nurses can play a key role in providing routine oral hygiene, assessing oral health, relaying information back to the IDT, adjusting the care plan, and initiating referrals for dental care. Oral hygiene in LTC is often crowded out by other priorities of nurses and caregivers such as bathing and dressing.<sup>7,36</sup> However, PACE has great potential to be able to incorporate daily oral hygiene routines, such as mid-day supervised brushing programs, into the activities at the PACE center because unlike LTC facilities, many of the time consuming basic hygiene tasks that are typically delegated to nursing staff in an LTC facility are minimized at PACE. If there is emphasis on routine oral hygiene care and periodic assessments, more enrollees will be referred for dental care.

Perhaps the most important implication of this study and the proposed model (Fig. 2) is the need for oral health education for nurses and nursing assistants so that they can adequately assess the oral health of members, relay that information back to the IDT, and initiate referrals for dental care.<sup>37</sup> In this program, many nurses interact with enrollees on a regular and frequent basis. Nurses have an opportunity to encourage oral hygiene and dental care for enrollees' overall health. Studies have suggested that many African Americans do not seek out dental care unless they have a problem, and thus they may never be examined by a dental professional or receive preventive dental care.<sup>13–16</sup> Therefore, an in-service program would be an inter-professional educational opportunity for the IDT to help PACE to continue to be a pioneer in the coordinated care of DEs.

While the focus of this study is on community dwelling older adults who are eligible for nursing care, nurses outside of PACE and in the full continuum of care such as home care, nursing home care, and hospital care, can adopt this model from PACE. The frailty or cognition of the population may necessitate a modification of the proposed model based on previously documented methods to implement oral health programs and reduce care-resistant behavior.<sup>7,31,38</sup> However at the very least, nurses should ensure daily oral

hygiene to remove debris and plaque. For those with natural teeth, daily oral hygiene care with a soft bristled toothbrush<sup>39</sup> and fluoridated toothpaste is one of the most basic preventive modalities for the prevention of dental decay.<sup>40</sup>

#### Limitations

There were a few limitations in this study. Almost all PACE enrollees receive transportation to the PACE center as medically necessary and determined by the IDT and the enrollee; however, this did not necessarily lead to predictable attendance. Factors such as weather, illness, and family commitments interfered with consistent attendance and complicated enrollment of participants. This contributed to a smaller than expected sample size. It also limited the ability to test for inter- and intra-rater reliability among screeners, highlighting some of the challenges in conducting clinical research in PACE. However, the simple and straightforward descriptions of the OHAT, along with the University of Iowa's Geriatric Education Center's OHAT module, helped to ensure the best possible standardization between and within examiners.

This study was also limited to a specific population of DE older adults. PACE currently has a nationwide enrollment of over 45,000 individuals,<sup>41</sup> and thus makes it difficult to compare these results directly to those from other populations such as the 1.4 million older adults<sup>42</sup> in nursing homes. The specific demographics, urban African American, of this program and this study's sample also make it difficult to generalize these results to all PACE centers across the country given that this is a population that faces significant disparities in oral health status and dental utilization. Nonetheless, all PACE programs can adopt a comprehensive oral health program and modify it as necessary to the specific needs of their population with the resources that are available to them.

Lastly, due to difficulties in the integration of medical and dental records, this study was unable to acquire medical records. Future research should include diagnoses and medications to help explain the variation seen in the OHAT categories, particularly the tongue, gums, saliva, and the condition of natural teeth, which are most likely to be affected by medications.

#### Implications beyond PACE

Despite the limitations of the study, with nursing home utilization declining and a greater desire to age in place, there are a number of general implications of this study to other LTSS that keep older adults in the community. The results of this study suggest that similar programs that care for the growing population of older adults who prefer to remain in the community should place an emphasis on routine oral hygiene care and should not make providing onsite dental care a sole focus of their programs. In addition, programs should have a standardized screening tool, such as the OHAT, and a coordinated system of referral to a dentist. The proposed model suggests the important role that nurses and an interdisciplinary team can play as communicators and facilitators in this process. Lastly, a communal gathering location, such as the PACE center, is necessary to ensure a common location where members regularly congregate and health providers and nurses have access to individuals. This is where older adults can receive routine medical and dental assessments and obtain preventive homecare products, such as fluoridated toothpaste and toothbrushes.

#### Conclusion

This study found that the oral conditions needing the most attention at this predominantly low socioeconomic status, African American PACE center were gums, saliva, natural teeth, dentures, and oral cleanliness. While the mean total OHAT score of this study was lower than that reported in a nursing home population,<sup>30</sup> the results suggest that an effective dental program requires routine assessment and an oral hygiene program, not only the provision of dental care. Oral cleanliness scored the worst on the OHAT in this population. This suggests that, developing a program to engage nurses in assessing the oral health of this population, providing mid-day oral hygiene, relaying their assessments to the IDT, and initiating dental referrals will greatly enhance the oral health of PACE enrollees. Future work should look to incorporate continued and routine oral hygiene care and assessment by the nurses and evaluate the program with the OHAT. In addition, future studies should focus on other elements of oral health, such as physiological function (the ability to speak, chew, swallow) and psycho-social function (the capacity to be in social situations without feeling uncomfortable or embarrassed),<sup>43</sup> which are equally crucial to the overall health and well-being of PACE enrollees.

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