AN EVALUATION OF ORAL HEALTH TRAINING FOR LONG-TERM CARE FACILITY

STAFF AND ITS RELATION TO RESIDENTS' DENTAL PLAQUE LEVELS

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A

PROJECT REPORT

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By

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Abstract

The overall goal of this project was to decrease dental plaque scores of residents living at Wild Flower Court (WFC) facility through improved oral health education of staff members. The examiner evaluated WFC nursing staff's knowledge on providing patients with oral care and denture maintenance both before and after oral care training. The staff knowledge levels were correlated with residents' plaque levels to determine if a relationship existed. The hypothesis was that WFC residents would have lower dental plaque levels after nursing staff received the oral health and denture maintenance training. Twenty-seven full-time WFC staff members received the oral health and denture maintenance training and were given a knowledge pre-test and post-training test. The same test was given at one and two month follow-ups to determine levels of retained knowledge. A baseline plaque index (PI) was collected on thirty-six WFC residents 65 years of age and older using a modified version of the Simplified Oral Hygiene Index (OHI-S) and a modified Budtz-Jorgensen PI. The PI was collected from residents prior to staff receiving training, and then again at one and two months after staff training. Among the staff that received oral health and denture maintenance training, the post-test revealed a statistically significant increase in knowledge from the pretest ($\alpha \leq .05$). Decreased resident PI levels were observed at the one and two month follow-ups. The study provides evidence that educational training to the staff can effectively reduce the PI levels of WFC residents.

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Chapter 1 Introduction and Background

A significant relationship exists between oral health and general quality of life for older adults. Some of the adverse effects of poor oral health can include dental pain, tooth loss, dental decay, periodontal disease, xerostomia (dry mouth), stomatitis (inflammation of the mouth and lips), candidiasis (fungal infection of the mouth), and oral cancer (Dempster, Le, Limeback, & Locker, 2012). These negative impacts can affect older adults' ability to speak, chew, and swallow properly. The inability to swallow, in particular, can increase the risk of choking (Malkin, 2009). If oral diseases are left untreated, they may contribute to chronic conditions, including heart disease, diabetes, malnutrition, and stroke [Centers for Disease Control and Prevention (CDC), 2011]. Additional public health concerns include loss of self-esteem due to full or partial edentulism (Emami, Feine, Freitas de Souza, & Kabawat, 2013). Older adults are also more likely to be prescribed chronic medications for various health problems (Burt, Dillon, & Gu, 2010). Some of these medications include: analgesics, anticholinergics, antidepressants, antihistamines, antipsychotics, calcium channel blockers, diuretics, muscle relaxants, and angiotensin-converting enzyme inhibitors. These medications can lead to an array of dental problems such as dry mouth, soft tissue reactions, enlarged gum tissue, reduced blood clotting, and taste-alterations (Gonsalves, Henry, & Wrightson, 2008; American Dental Association, 2005).

In addition to the potential adverse health effects of poor oral health, members of the elderly population are more likely to experience unique barriers to accessing health care, and may have special circumstances that affect the amount and type of dental treatments that can be administered (CDC, 2003). By 2050, experts predict that the U.S. population will have 48

million Americans over the age of 65 (CDC, 2003). The individuals in this rapidly growing population are maintaining their natural teeth longer, resulting in epidemiologic trends of increased demand for dental services. The CDC estimates that approximately one in five adults 65 years of age and older are affected by untreated dental decay, compared to 27% of adults 20-64 years old (CDC, 2015).

Although the need for dental services is prevalent, utilization rates are lower in the elderly population than in the general population (Nasseh & Vujicic, 2014). Some of the major barriers to accessing dental care include the lack of perceived need for care, transportation problems, and dental anxiety (Fiske, Gelbier & Watson, 1990). It should not come as a surprise that economically and socially disadvantaged older adults, along with physically-impaired adults, are more likely to experience higher rates of oral disease (Dolan & Atchison, 1993).

Gaps in dental insurance coverage for the older adult are also concerning. Adults over the age of 65 years experience the lowest proportion of dental expenses reimbursed by private dental insurance, while having the highest percentage of out-of-pocket dental expenses (Dolan & Atchison, 1993). Many elderly individuals have no dental insurance, and others have lost coverage since retiring (CDC, 2013). For older women, gaps in coverage can be worse because women statistically have lower incomes and/or may have never been covered by dental insurance (CDC, 2003). Programs such as Medicaid, a jointly funded Federal-State health insurance program to assist in health coverage for low-income and disadvantaged people, have helped to fund health care for disabled elderly individuals in some states, but reimbursements for dental care are low (CDC, 2013). Although this program does provide some health insurance for adults

65 years of age and older, it was not designed to provide routine dental care (CDC, 2013). This

disparity suggests that policymakers may need to consider adding dental benefits to Medicare

coverage or expanding Medicaid dental coverages.

There is a rising demand for Long Term Care Facilities (LTCFs) and nursing staff support due to

the surging increase in the older adult population. Nursing homes and LTCFs are designed to

provide residents with general healthcare by professional, qualified staff. Residents living in

these facilities may have staff for their daily needs, but these caregivers may lack knowledge on

oral disease, be overworked, or not understand the importance of dental care (Barber, Gosney,

Kearns, & Preston, 2006). Studies have revealed that often oral care is considered one of the

more unpleasant nursing activities to provide to residents. As a result, it becomes dismissed or

placed low on caregivers' priority lists (Simons, Brailsford, Kidd, & Beighton, 2001).

Chapter 2 The Community Partner - Wildflower Court (WFC)

Wildflower Court is a Long Term Care Facility (LTCF) in Juneau, Alaska. Wildflower Court nursing staff members are focused on improving the quality of life for disabled residents through rehabilitation and assistance returning to community living. This facility is able to accommodate 57 residents and during the study was home to 36 female and 21 male residents. At the time of the study, WFC consisted of 30 full time staff members, six activity specialists, and 15 itinerate staff members. Wildflower Court staff members have multiple responsibilities, including meeting residents' physical and emotional needs. The staff members are focused on maintaining residents' overall comfort, while also providing regular activities. Some of these activities include art classes, exercise classes, sing-alongs, gardening, field trips, pet therapy, and readings of poetry and literature. Some WFC residents require the specialized training of therapists to help them recover from serious illnesses and injuries. Through physical therapy and strength training, staff members assist residents in regaining their former strength and independence and improving their daily living capabilities. Residents may require further assistance from staff with everyday hygiene activities, such as using the bathroom, bathing, dressing, oral hygiene, feeding, and administering medications. The direct care nursing staff members are responsible for providing numerous responsibilities including oral hygiene for residents and therefore need a solid knowledge base on the importance of oral care and education on techniques for providing this service.

Chapter 3 The Public Health Problem

Although oral health is a key component to overall health at any age, the oral health of older adult individuals is often overlooked (Mullen, 2013). As individuals age, their ability to manage personal oral health can decrease (Elswick, Grap, Jablouski, & Munro, 2005). Due to the increased vulnerability associated with an aging population "the majority of nursing home residents lack the functional ability or the mental capacity to perform their own mouth care" (Elswick, Grap, Jablouski, & Munro, 2005). Several risk factors, such as access to dental care, physical frailty, functional dependency, use of multiple medications, cognitive impairments, weakened immune system and likelihood for concomitant disease, can contribute to increased risk of poor oral health (Chalmers & Johnson, 2011). The impact of poor oral health on quality of life is a significant public health concern. Studies have reviewed the relationship between poor dental health and poor general health in the elderly population living in nursing homes (Aalboe, Bright, Housley, Skelton, & Stein, 2012). Although daily oral healthcare for those living in LTCFs is often the responsibility of nursing staff, research reveals that this patient need is not always met (Mullen, 2013). Unfortunately, many nurses lack the oral health training and education required to effectively treat older adults' oral health needs (Bottrell et al., 1999). Studies reveal that when dental professionals have provided oral health education for nursing staff, improvements have been shown in LTCF residents' plaque levels (Forsell et al., 2010).

In 2002, researchers Berven, Samson, & Strand began studying the long-term effects of an oral healthcare program on nursing home residents (Berven, Samson, & Strand, 2009). Their

program method included use of picture-based oral-care procedure cards and provided staff with oral-care supplies for residents. The mucosal-plaque score (MPS) was used to assess residents' plaque levels prior to staff receiving oral health training. Plaque is sticky film on teeth that contains bacteria. When not removed properly with brushing and flossing, plaque can harden into a deposit called calculus (ADA, 2005). Plaque levels were measured after oral health training at month three and again after six years. Because this study revealed that residents' plaque levels improved after staff received oral health training, this knowledge may be used for future research on how to increase staff oral health knowledge and reduce resident plaque levels. In Berven, Samson, & Strand's study (2009), new staff members were not taught by the original dental providers, but rather by previously trained nursing staff. This inconsistency in instructors may have influenced the appropriateness and consistency of lessons being taught. In addition, new LTCF residents did not start with the same baseline as original residents, and rater collaboration error with recorded MPS levels could have occurred, since the original rater was not the same person as the rater measuring the final scores.

In a similar long-term study conducted by (Sjogren, Kullberg, Hoogstraate, Johansson, Hebst, & Forsell, 2010) the investigators wanted to evaluate the effects on oral hygiene status of older nursing home residents after dental hygiene education had been provided for nursing home staff. This study educated staff members and the residents' main caregivers on individual instructions for the residents' oral care needs. Incorporating the main caregiver or family member into the oral care training may have beneficial influences in providing additional access to care. This study did not account for any positive influences residents may have received from their main caregiver delivering oral care. Staff received a lecture and hands-on training for providing oral

care to residents. Discussion on modifying negative attitudes with providing oral care services was also covered in the training. The study failed to document how often staff members provided daily oral hygiene services. After the 1½ year study, results revealed that residents' plaque levels had not changed since the dental hygiene education was provided to nursing staff. When reviewing results, it is important to consider factors such as staff turnover and the small sample size of residents in this study. There were 60 residents in the original data collection and after 1 ½ years there were only 41 residents that fulfilled the inclusion criteria. The investigators failed to reveal if this was due to resident death, loss of teeth, resident relocation, resident refusal or illness. The study was also limited to only residents with natural dentition, possibly making it a much smaller sample.

While there are some limiting factors in assessing nursing staff training and dental plaque scores of residents, it is clear from the research that improvements need to be made in how this is evaluated and accessed. In the study conducted at WFC, one might assume the residents' plaque index (PI) levels would automatically decrease if nursing staff have oral health training; however, several factors must be considered. Dental needs may not be a top priority for WFC nursing staff with numerous other medical concerns to manage. Nursing staff often have large patient-to-staff ratios, making it challenging to find adequate time to meet patient oral hygiene needs. In addition, uncooperative residents, as well as individuals with challenging physical conditions, may prevent oral care assistance from being properly provided (Young, Murray, & Thomson, 2008).

The primary aim of this project was to assess the effectiveness of educating WFC nursing staff on older adults' oral care by characterizing PI levels in WFC residents before and after staff training. The goals were to increase oral care knowledge of WFC nursing staff and decrease plaque index scores of WFC residents. Objectives for this study included demonstrating and reviewing how to brush natural dentition and removal appliances. Showing staff and residents how to use dental aides such as soft bristle toothbrushes, three headed toothbrushes, power toothbrushes, slip on

large foam handles, floss, and interdental soft picks, were also objectives that would strengthen oral health care knowledge.

Currently, staff members record whether or not personal hygiene assistance was provided in each patient's daily electronic chart. Unfortunately, this notation is not sectioned into categories to decipher if personal hygiene included daily oral hygiene care. Personal oral hygiene can include brushing natural teeth or prosthetic appliances, assisting with flossing, soaking a prosthetic appliance, insuring nightly removal of appliance, and recording any dental anomalies. Wildflower Court staff members are responsible for insuring that oral health supplies are available and care for individuals is implemented when needed.

For this study, an oral care and denture maintenance training was provided for nursing staff in an effort to implement proper toothbrush techniques for residents with natural teeth, dentures, and removable partial dentures (RPDs); to increase education about oral diseases; and to inform staff about referral procedures for identified conditions needing a dental provider. Just as in Berven, Samson and Strand's study (2009), this project captured the PI of individuals with natural

dentition, those wearing dentures, and RPDs. When a denture or RPD is not cleaned regularly, plaque build up can lead to infections and irritations, including denture stomatitis, candidiasis or apthous ulcers (Budtz-Jorgensen, 2000). The oral program presenter, the specific residents being evaluated, nursing staff participants, and the clinical evaluator remained constant in an effort to avoid any methodological weaknesses.

Chapter 4 Materials and Methods

Study Design

As a dental hygienist, the Investigator is aware of what oral hygiene services need to be provided and wanted to teach this for all learning levels. A pre-test was developed that would assess nursing staff's understanding of topics and skills subsequently covered in oral health and denture maintenance training. Individuals with minimum knowledge on providing oral health services would be trained to provide such care. In addition, a post-test was designed that would measure residents' PI scores following nursing staff's oral health and denture maintenance training. A single sample, pre-post study design was used to determine if there was a relationship between educating WFC nursing staff on oral health and PI in WFC residents 65 and older. Quantitative data were collected and analyzed using a paired t-test, with the independent variable being "the oral health training status of nursing staff" and dependent variable being "resident's PI before and after staff received oral health training".

Protection of Human Subjects

Because this project involved human subjects, the investigator sought approval from the International Review Board (IRB) prior to conducting any research. The IRB is "a committee established to review and approve research involving human subjects. The purpose of the IRB is

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to ensure that all human subject research be conducted in accordance with all federal, institutional, and ethical guidelines" (American Public University System, 2016). Approval status was received by the IRB for study #827604-2.

Oral Hygiene Education Program

Fliers were dispersed throughout WFC in an attempt to recruit all nursing and CNA staff members to participate in the oral health and denture maintenance training. Two trainings were held after working hours but resulted in low turnouts. After low attendance the nursing director agreed to allow staff to be trained during working hours as long as enough employees were on hand to cover resident needs. Collaborating with the nursing director and staff was essential in determining when to schedule oral health and denture maintenance training in order not to disrupt resident care.

A total of 27 out of a potential 30 full time staff members were recruited. As a licensed registered dental hygienist, the Investigator provided a one-hour lecture and hands-on training to 23 Certified Nursing Assistants (CNAs) and 4 nursing staff members on how to provide oral care services for residents with natural dentition and those wearing dentures or RPDs. Questions were created that would best assess understanding of topic and skills covered during training. Table 4.1 illustrated the test used for nursing staff at the baseline, one month, and two month follow ups. Nursing staff completed a 10-question pretest on oral health and denture maintenance immediately prior to receiving oral health training in an effort to capture base knowledge on performing oral care. The utilization of a posttest at the initial training may have been beneficial in capturing any immediate retained knowledge but was not implemented in this study. Each

question was worth ten points for a maximum score of 100. Class size was kept to fewer than five participants in order to provide more individualized training and create a less intimidating environment for staff questions. Staff members were not allowed to share answers or discuss test material until all tests had been completed and collected. The same oral health and denture maintenance test was given at one and two months following training to assess retained knowledge. Staff members were debriefed on

the answers to all ten questions immediately following completion of exam, and any follow up questions were addressed at that time.

Nine, one-hour training sessions were scheduled in order to capture day, night, and weekend nursing staff shifts. Each one-hour lecture and hands-on training reviewed staff's role in providing oral health services for elderly and disabled residents at WFC. Staff members were taught how to properly clean and carefully handle dentures, RPDs, and natural dentition, while maintaining aseptic techniques, and wearing personal protective equipment (PPE) that included mask, gown, eye protection, hair net and gloves. A dental simulation manikin was used to help staff develop tooth-brushing skills that are necessary for residents with natural dentition. Numerous dental aids, including adult soft bristle toothbrushes, three-headed toothbrushes, mouth props, tongue brush, interdental soft picks/brushes, and floss were also used on the manikin to improve staff members' confidence for future use on residents. The simulation manikin was used to allow staff to become familiar with the mouth and practice until they felt confident, without disturbing actual residents. Denture and RPD models were used to practice careful prostheses hygiene care. Staff were presented with techniques on how to control denture

plaque by brushing acrylic prostheses using a denture brush and denture paste. Staff members were advised during denture and RPD cleaning to place a towel in the sink to avoid cracking or fracturing the prostheses if dropped. Training also focused on the importance of nightly removal of dentures and RPDs.

Through the use of clinical photos, staff reviewed common oral anomalies found in patients living in LTCFs and were informed on the proper procedures for patient referrals when any dental concerns arise. Staff who completed the training received their own soft bristle toothbrush, floss
and fluoridated toothpaste. Staff that completed trainings were also entered to win one of three Sonicare power toothbrushes for personal use and a demonstration on proper operation.

Sampling

Convenience sampling was used to recruit WFC residents aged 65 years and older. At the time of the study, 57 individuals were living at WFC and were considered as possible candidates for the study. Inclusion criteria were that the resident had to be 65 years of age or older, and have at least six teeth (one tooth from each sextant of the mouth), wear a denture, or wear an RPD. Written consent was required of each resident prior to being placed into the study. The Ward Clerk at WFC escorted the Investigator throughout the facility to distribute and explain the consent form and study to the residents. Participants were informed that the study was completely voluntary, and they could opt out at any time during the study. Although consent had been acquired prior to the collection of residents PI score there were occasions when residents refused immediately preceding the examination.

Data Collection

As a licensed, registered dental hygienist, the Investigator administered, obtained and recorded the PI of residents at WFC one week following the initial nursing staff oral health training. Participants with natural dentition had their PI measured with the use of the Modified Simplified Oral Hygiene Index (OHI-S), which is a variant on a diagnostic dental screening already utilized by the American Dental Association (ADA) and the American Dental Hygiene Association (ADHA). A modified Budtz-Jorgensen PI was used to assess and measure the plaque levels in edentulous (without teeth) or partially edentulous individuals who wore dentures or RPD prostheses (Budtz-Jorgensen, 1977). This same PI was again collected on the same residents at a one month and two month follow up. The PI was based on recording both soft debris and mineralized deposits on the teeth or prosthesis to identify how much bio-film and plaque were present (Sjogren et al., 2010). The PI score can help determine the effectiveness of home care regimen and health of soft tissue (National Institute of Dental and Craniofacial Research, 2015). The PI scores were measured in residents' personal rooms in order to maintain confidentiality and eliminate complications involved in transporting patients to the nearest dental facility. The quantitative data collected during each patient's exam included whether or not they had natural dentition, wore a denture or RPD, along with PI score before and after oral health education had been completed by nursing staff.

The OHI-S is a standardized dental measurement to determine the amount of dental deposits on natural dentition (Greene & Vermillion, 1964). Through the use of a disposable dental mirror, cotton tip applicator, and temporary disclosing solution, the Investigator performed the in-field

clinical examination to determine the amount of plaque present on natural dentition, denture, or RPD. The disclosing solution, made up of blue violet liquid, was temporarily painted on natural teeth, rinsed off the teeth and then examined for biofilm. The disclosing solution is designed to temporarily highlight older plaque blue and newer plaque red. This plaque otherwise would be too difficult to visualize on a tooth. Participants with natural dentition had their maxillary (top jaw) and mandibular (bottom jaw) arches divided into sextants. A sextant is one of the six divisions of the dentition, the teeth of the upper and lower jaws being divided into right posterior, left posterior, and anterior. Participants had one tooth from each sextant of their mouth chosen to be disclosed, making a total of six teeth to be disclosed. In order to eliminate research error, the same six teeth were disclosed each time for that participant. The buccal and lingual surfaces of each selected natural tooth were given a score from 0-3. A higher score indicates more biofilm on the surface of the tooth. The sum total of the scores was then divided by twelve in order to give the PI for the entire mouth. Unlike the OHI-S, which also scores hard calculus deposits this modified OHI-S only accounted for soft deposits and plaque. The values for the PI range from 0-3, which distinguishes one as having excellent, good, fair, or poor oral health, respectively. Table 4.1 and Figure 4.1 exhibit how the modified OHI-S was used to determine residents' plaque levels. See Figure 4.2 for demonstration of disclosing solution being painted on dentition. Refer to Figure 4.3 to view where the plaque was present on tooth surface, after disclosing solution has been rinsed off.

plaque   3   2   1   0

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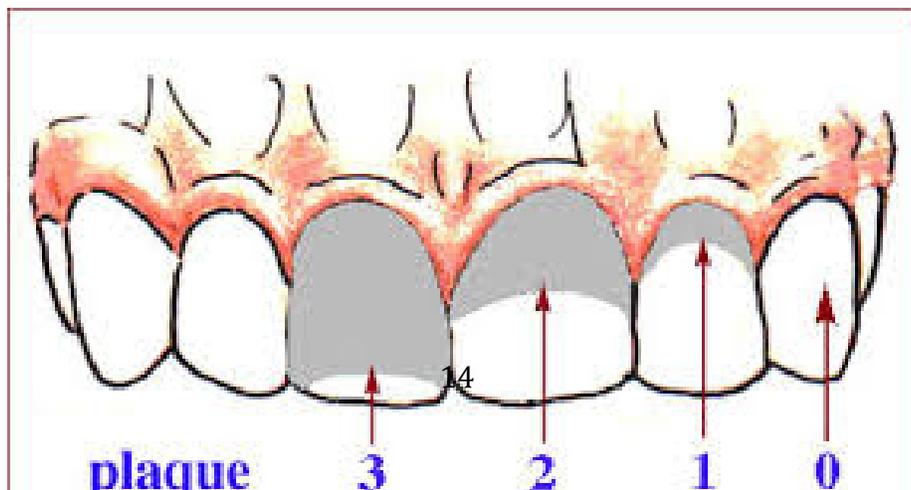
Figure 4.1 Simplified Oral Hygiene Index Plaque Scoring.

Table 4.1 *Simplified Oral Hygiene Index Scoring Criteria*

Score	Criteria
0=Excellent	No debris or stain present
0.1-0.9=Good	Soft debris covering not more than one third of the tooth surface
1-1.9= Fair	Soft debris covering more than one third, but not more than two thirds, of the exposed tooth surface.
2-3= Poor	Soft debris covering more than two thirds of the exposed tooth surface

Figure 4.2 Painting Disclosing Solution.

Figure 4.3 Disclosed Plaque.

See Table 4.2 as an example of how the plaque index is calculated using six teeth.   Total of all

teeth: 21/12=1.75, Fair (because soft debris are covering more than one third, but not more than

two thirds of the exposed tooth surface).

Table 4.2 *Plaque Index Calculation*

Tooth #2	Score	Tooth #8	Score	Tooth #12	Score	Tooth #22	Score	Tooth #24	Score	Tooth#30	Score	Total
Buccal	2	Buccal	1	Buccal	2	Buccal	2	Buccal	2	Buccal	3	
Lingual	1	Lingual	1	Lingual	2	Lingual	1	Lingual	1	Lingual	3	
Totals:	3		2		4		3		3		6	21

The modified Budtz-Jorgensen PI captured plaque scores for edentulous individuals in this study (Paranhos, Pontes, Silva, & Souza, 2010). Dentures and RPDs accumulate plaque and calculus (calcified plaque) very similarly to natural dentition. The removal of such deposits is essential in maintaining the health of oral tissues (ADA, 2015). Harmful bacteria can be reduced and oral hygiene improved through daily brushing and flossing. The modified Budtz-Jorgensen PI is similarly calculated using the same disclosing staining method as the OHI-S, but the denture's entire surface is evaluated as opposed to only six teeth. These quantitative data determine if patients have excellent, good, fair or poor overall oral health.

After examination was complete, the dental evaluator informed participants of their PI score in order to educate individuals on their present oral health condition. Nursing staff and residents were informed if any residents needed additional evaluations to be addressed by a dentist. Table 4.3 represents the criteria used for measuring the amount of dental plaque on the fitting surface of dentures and RPDs.

Table 4.3 *Buntz-Jorgenson Criteria for Plaque Score*

Score	Criteria
0=Excellent	No debris or stain present on denture or RPD
1=Good	Soft debris covering not more than one third of the denture or RPD
2=Fair	Soft debris covering more than one third, but not more than two thirds, of the denture or RPD
3=Poor	Soft debris covering more than two thirds of the denture or RPD

PI Score=0, Excellent

Because there are no debris or stains on the denture the PI score is 0, which is equal to excellent.

Occlusal View of Denture Plaque   Intaglio View of Denture Plaque

Figure 4.4 PI Score=0, Excellent.

PI Score=1, Good

Because the soft debris are not covering more than 1/3 of the entire denture the PI score is 1, which is equal to good.

Occlusal View of Denture Plaque   Intaglio View of Denture Plaque

Figure 4.5 PI Score=1, Good.

PI Score=2, Fair

Because soft debris are covering more than 1/3, but not more than 2/3, of the entire denture the

PI score is 2, which is equal to fair.

Occlusal View of Denture Plaque   Intaglio View of Denture Plaque
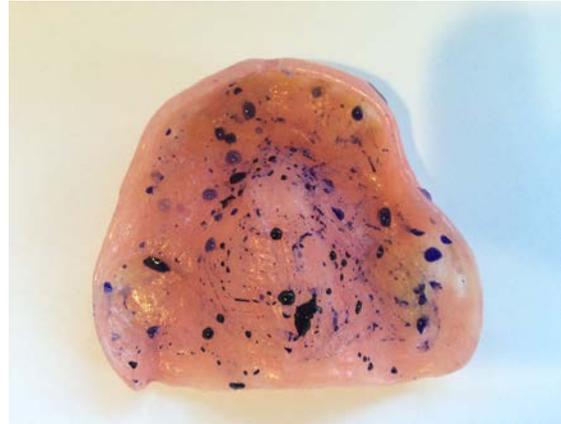

Figure 4.6 PI Score=2, Fair.

PI Score =3, Poor

Because soft debris are covereing more than 2/3 of the denture the PI score is 3, which is equal to

poor.

Occlusal View of Denture Plaque   Intaglio View of Denture Plaque
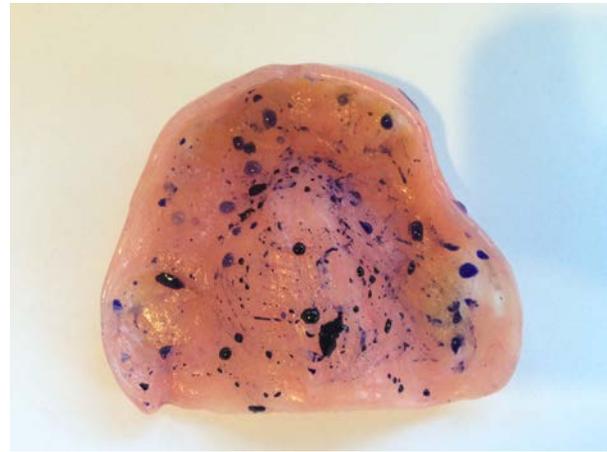
Figure 4.7 PI Score =3, Poor.

Analysis Plan

All analyses were performed using Excel and a paired t-test.   The paired t-test allows for

comparison between the nursing staff's training status and residents' plaque scores before and

after

staff members' oral health trainings. The significance was set at $\alpha \leq .05$. Mean and standard

deviations between nursing staff member's pre- and post-test were also calculated through Excel.

Chapter 5 Results

Process Evaluation Results

Twenty-seven WFC nursing staff members received and completed the pre- and post-oral health and denture maintenance test to determine knowledge prior to and following training. The activity specialist and 15 itinerants were not included in the training due to time constraints and work schedules. Participation from staff increased when training was conducted during paid working hours. The same ten-question test was used to evaluate retained knowledge one and two months post-training. An immediate post-test was not conducted following initial training because the focus was on retained knowledge as opposed to immediately gained knowledge. Nursing staff had relatively high base knowledge on providing oral care with a mean pretest score of 84.44 and a standard deviation of 11.88 (Appendix B). The standard deviation and variance was less at the one and two month follow-ups, compared to the pre-test. The one and two month post-test results significantly improved ($\alpha \leq .05$) from pre-test results, which suggests that staff gained additional oral health care knowledge following oral health and denture maintenance training. The mean difference is significant at the 0.05 level.

Outcome Evaluation Results

Of the 57 WFC residents, 36 (63%) met the inclusion criteria and consented to the pre- and post-examinations. Factors that resulted in non-participation included: unreturned consents from residents' power of attorney, resident refusals, residents currently on feeding tubes, and residents

lacking the mental capacity to understand procedure. Nineteen residents (53%) had natural

dentition, 16 (44%) were edentulous and wore dentures, and the remaining resident (3%) wore an

RPD. Figure 5.1 illustrates the dentition breakdown of residents that participated in this study.
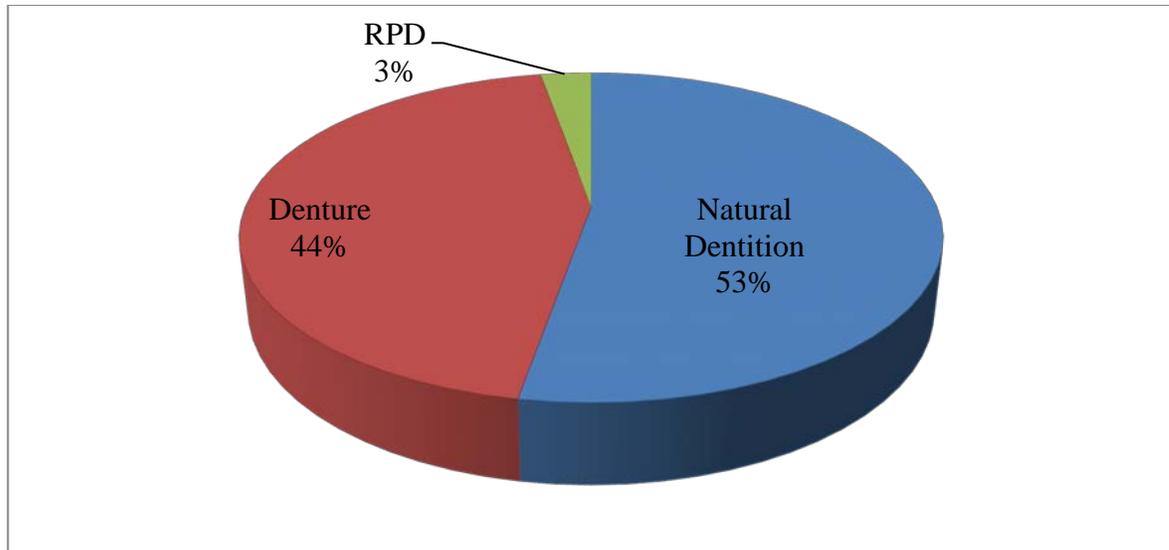

Figure 5.1 Residents That Participated in Plaque Index Score.

Figure 5.2 reveals residents' baseline PI scores in addition to one and two month scores,

following nursing staff oral health and denture training.
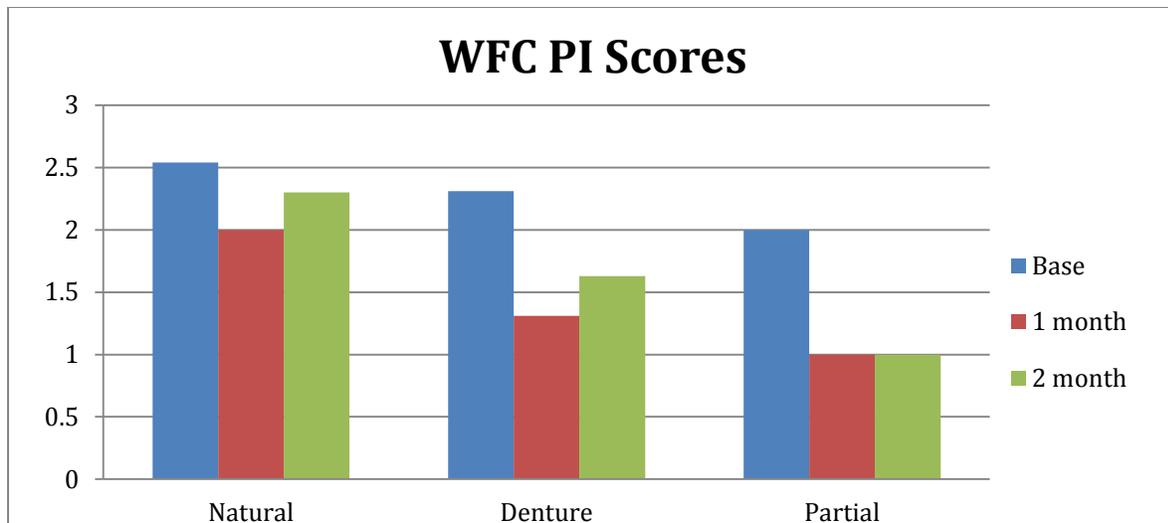
Figure 5.2 Residents' Baseline, One and Two Month PI Scores.

In Appendix C, RPD has been excluded from analysis because sample size was only one. During the project all original baseline residents were able to participate at the one and two month follow ups. Appendix C illustrates an apparent difference between denture and natural teeth types in the baseline, one month, and two month mean scores, but the sample size was too small to look at dentures and natural teeth separately. Appendix D illustrates three paired t-tests using Excel that compares all 36 residents: baseline compared to one month; baseline compared to two months; and one month compared to two months. In each test, the two sample means were significantly different, and mean one month and two month scores improved over baseline. A small but significant increase occurred between one month and two month mean scores.

Chapter 6 Discussion

In the study described herein, the participants assessed were WFC nursing staff members that completed oral health and denture training and residents described as 65 years of age and older, living at WFC. The results reported in this project may be specific to WFC nursing staff and residents and should not necessarily be interpreted as generalizable to other LTCF nursing staff and residents. In this project, after the introduction of oral care and denture maintenance training for nursing staff, a significant increase in retained knowledge was captured from baseline, to one month, and two month follow ups. A decrease was recorded in plaque levels for those residents with natural dentition, at the baseline to one month follow up but not significant at the baseline to two month or one month to two month follow ups. Significant decreases in plaque scores were recorded in denture wearers at the baseline to one and two month follow ups but not between the one month and two month follow up. PI scores for the single RPD wearer were a two at baseline (fair oral hygiene) and remained a one (good oral hygiene) at the one and two month follow ups. Participants wearing dentures had a baseline average of 2.31 (fair oral hygiene), and at the one month follow up scores decreased to 1.31 (good oral hygiene). By the two month follow up, the

PI score slightly increased to 1.63, but is still considered an indicator of good oral hygiene. Although participants with natural dentition had a significant decrease in the one and two month follow ups compared to the baseline PI score, these scores remained within poor oral hygiene standards. Natural dentition PI scores had a baseline average of 2.54 (poor oral hygiene). At the one month follow up scores decreased to 2 (poor oral hygiene) and by the two month follow up scores increased to 2.3 (poor oral hygiene).

Although baseline PI scores decreased with all participants during the one and two month follow-ups, the results were not as profound in those with natural dentition. This lack of improvement may be the result of several barriers when brushing someone's natural teeth, including staff members' fear, time constraints, residents' attitudes, and residents' physical and mental disabilities (Simons, Brailsfor, Kidd, & Beighton, 2001; Barber, Gosney, Kearns, & Preston, 2006). Often there is a negative connotation involved with brushing older adults' teeth due to halitosis, residents coughing or gagging, and the possibility of the residents spitting or biting while the oral care services are being provided (Young, Murray, & Thomson, 2008). Although staff members were able to utilize a dental simulator manikin to practice techniques, real world scenarios may have become more intimidating.

Staff members were educated on the importance of donning proper PPE, but staff reported that often the necessary equipment was not available for their use. This too may have been an inhibiting factor when delivering care. Residents suffering from mental and physical disabilities may have been more resistant to staff brushing their natural teeth. Those suffering with dementia

can be challenging and may express pain through agitation or resistance (Elswick, Grap, Jablouski, & Munro, 2005).

Wildflower Court is home to patients with a range of needs, and some of these needs take precedence over daily hygiene care. Coordinating around a resident's schedule may be cumbersome due to sleeping patterns, meal times, activities, and multiple therapy sessions. One obvious barrier observed in this study was the lack of time qualified staff had to provide all necessary daily hygiene tasks including: washing, dressing, combing hair, assisting with the bathroom, cutting nails, feeding, delivering medications, escorting to physical therapy, and activity programs. Often staff members were disrupted from individualized care due to answering phone calls, placing calls for residents, and addressing resident call buttons. Occasionally, residents attempt to leave the LTCF without permission, which also require the staff to immediately assist the individual safely back inside.

While observing the staff's daily work schedule it became obvious that numerous barriers result in staff's limited time to provide daily oral hygiene care. Daily tasks that staff are responsible for in addition to the comfort and care of residents include escorting individuals to physical and speech therapy sessions, administering medications, and addressing residents call buttons. Due to numerous daily responsibilities that staff members provide, sometimes oral hygiene is placed lower on the priority list.

Confounders

The LTCF, residents and nursing staff that participated in this study represented a convenience

self-selected sample, as they were not randomly selected. Having a staff member assigned to a resident would have allowed for better assessment if a particular resident PI levels were improving due to the oral care received by that staff member. Due to the realities of nursing staff duties and schedule, it was not feasible to randomly assign a nursing staff member that had received the oral care and denture maintenance training to a specific resident. Unfortunately, this and other confounding factors may have played a role in skewing the results of resident PI scores.   Although there were nine, one-hour training sessions provided in order to capture day, night, and weekend

nursing staff shifts, the Investigator was unable to account for activity specialist and itinerant staff schedules. This project was free of any negative confounding results due to staff turnover.

The LTCF was not able to commit to implementing this training as mandatory, and this resulted in some lack of staff participation. Additionally, this resulted in the likelihood that PI scores might have been the result of cleanings conducted by staff that did not receive training. Another potential confounding factor is that family members may have taken a lead role in providing oral care to resident. After each resident's PI score was collected (baseline, one month and two month), the investigator did educate individuals on their oral health and provided participants with personalized dental aides that included a soft bristle toothbrush, floss, denture brush, and toothpaste. It is possible that this education provoked and motivated residents to take a lead role in their personal daily oral hygiene care. Trained staff members were also not required to report how many residents received or how often they provided oral care. Staff members were not required to document if a patient refused care or were unable to have hygiene services due to

illnesses.

Limitations

Nursing staff received their post-test one and two months following the oral care and denture maintenance training. The one and two month follow-up post-test was delivered to capture staff's retained oral health and denture maintenance knowledge. Accommodating each staff member's working schedule presented a challenge when trying to schedule the post-tests. Multiple visits throughout the week were necessary to administer the post-test to each staff member. The investigator was unable to control for possible discussion between staff members who had taken the post-test earlier in the week. This made it impossible to determine if staff had higher scores due to possible test discussion between staff members. Post-test scores were relatively high. The investigator considered that the test was too easy, but perhaps high scores were the result of immediately covered material and any preceding questions from staff prior to handing out test. Prior to taking the post-test staff sometimes had questions regarding oral health and denture maintenance. Although each post-test was the same as the pre-test, the investigator reviewed and discussed any of these questions prior to administering each test. This immediately gained knowledge may have increased the nursing staff members' scores. During the two month follow up the investigator took a less hands-on approach and limited monitoring throughout WFC facility. This too, may have had an impact on the amount of staff cleanings provided to residents.

Nursing staff record residents' daily personal hygiene in their electronic chart record, but unfortunately, there is no specific category for daily oral hygiene care. This lack of

documentation makes it difficult to attribute decreased PI scores to nursing staff members' oral care training or residents' oral self-care.

The recruitment of WFC residents to participate in the study was a challenge due to several factors. Because numerous residents had mental and cognitive limitations, a personal Power of Attorney has been appointed to handle many residents' medical affairs. Several consent forms were mailed to the Power of Attorney and never returned. Occasionally residents who had given consent to participate later refused to have their PI score collected and stated to me that they had their "own dental provider", did not want to be bothered, or did not feel it was necessary to brush their teeth and or appliance. Other times residents were sleeping, attending an activity or therapy.

Discrepancies during the data collection may be due to the time of day the participant had their PI score taken. Due to the limitation of resident participation, it was not realistic to be able to collect each individual's follow up PI score at the same time as their initial baseline score; however scores where collected between the hours of 8am and 6pm. Consideration of meal times was regarded when collecting PI scores, and efforts were made to prevent collecting PI scores following scheduled meal times.

Chapter 7 Conclusion/Recommendations

As the older adult population continues to grow, it is essential to improve the advancement of oral care education to nursing staff in LTCF (CDC, 2003). Incorporating daily oral hygiene, providing access to dental care services, and providing oral health education are all factors that can promote oral health in the elderly population. The involvement of family members, patient advocates, and LTCF staff during the implementation of oral care needs is fundamental in creating a comprehensive and individualized oral care plan (Ebert, C., Helgeson, M.J., Johnsen, M., Smith, B.J., 2002). Promoting state requirements for oral health curriculum in CNA training would strengthen knowledge of staff members and promote access to oral health care for residents.

In conclusion, this project demonstrated that WFC nursing staff members oral health care

knowledge statistically improved following the oral care and denture maintenance training; however, it is not possible to conclude whether the nursing staff members' posttest scores were influenced by discussion of the test between staff members or by knowledge gained by talking with the examiner immediately prior to testing. A significant improvement in PI scores for WFC residents with natural dentition was recorded from baseline to one month follow up but not significant at the baseline to two month or one month to two month follow ups. Significant decrease in plaque scores were recorded in denture wearers at the baseline to one and two month follow ups but not between the one month and two month follow up. PI scores for the single RPD wearer were a two at baseline (fair oral hygiene) and remained a one (good oral hygiene) at the one and two month follow ups. Residents with dentures, and RPD produced a significantly greater reduction in PI scores between baseline, one and two month follow-ups. This PI deviation between natural dentition, denture, and RPD suggests that nursing staff were more comfortable brushing dentures and RPD appliances rather than residents' natural teeth. The results of this study suggest that the oral care and denture maintenance training is effective at improving nursing staff oral care knowledge and decreasing residents' PI scores. However, because nursing staff were not required to formally document daily oral hygiene care and nursing staff and residents were not individually assigned together for the actual cleaning, it was not possible to determine if oral care training was the sole influence on PI improvements. In addition, residents' attitudes towards improving personal oral hygiene care may have been influenced after the investigator educated residents on their PI score immediately following collection and recording.

Eliminating barriers to WFC residents' oral care will improve future oral care plans. Currently

WFC staff are not required to separately document daily oral hygiene services. Documentation of daily oral hygiene services would help to hold nursing staff accountable for residents' individualized needs and help to identify and address any oral health issues that arise. Mandatory training throughout the year would help to equip staff with the knowledge and confidence to provide improved oral care for all residents. Once staff members are trained and confident in oral care skills this could potentially lead to opportunities to train fellow staff members. Staff are often fearful of being spit, coughed, or gaged on. Providing staff with the necessary personal protective equipment (PPE) to keep themselves and the resident safe is essential in eliminating possible barriers to providing oral hygiene services. Also having staff supplied with appropriate cleaning aides such as toothpaste, toothbrushes, floss, denture brushes, and interdental toothbrush aides will assist staff in providing proper oral care to residents.

Introducing a trained midlevel dental provider such as a dental health aid (DHA) could be implemented into WFC to reduce barriers to residents receiving oral care. This individual would be able to provide residents with limited routine dental services such as tooth brushing and flossing. The DHA would also act as a liaison between the resident, nursing staff, and family to communicate any resident dental concerns and activate referral procedures when necessary. This dental provider would also continue educating staff on oral care throughout the year as well as train new employees on how to properly care for residents with natural teeth, dentures, and RPDs.

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Appendix A

Nursing Staff Test

Name:_____   Date:_____

Pre-test/Post-test for Oral Health Training Program

   1.) True or False: Plaque causes tooth decay and gum disease.

2.) True or False: Residents who have diabetes who also have severe gum disease have more trouble controlling their blood sugar levels.

3.) Which of the following is true:

      a. Even if the resident has no natural teeth, the inside of the mouth should still be cleaned with a toothbrush or swab

      b. A swab is effective for removing plaque from the teeth.

      c. Ideally natural teeth should be brushed for 20-30 seconds

4.) How often should natural teeth be brushed?

      a. Once a week

      b. 2-3 times per week

      c. Once per month

      d. At least twice per day

5.) After you have washed your hands and put on gloves you should

      a. Adjust the bed to the correct position

      b. Turn on the light over the bed

      c. Touch only the resident's own oral hygiene supplies

6.) Which of the following is a FALSE statement about toothbrushes?

      a. Medium bristle toothbrushes are more effective at cleaning plaque

      b. A three headed toothbrush cleans all three sides of the tooth at the same time

      c. Toothbrushes should be replaced after 3 months

7.) Xerostomia or (dry mouth) can cause?

      a. Difficulty in speech

      b. Difficulty in eating

      c. Leads to halitosis

      d. Tooth decay

      e. all of the above

8.) When brushing teeth, the brush should be

      a. Pointed at a 45 degree angle

      b. Moved in a circular motion

      c. Pressed lightly to spread the bristles under the gum

      d. All of the above

9.) In what position should the resident be in when brushing the teeth?

    a. It doesn't matter, whatever is most comfortable

    b. If possible sitting up, if bedridden then elevate the head of the bed

    c. Laying flat in the bed

10.) Which is NOT a true statement about dentures?

    a. They should be protected by placing a towel in the sink when cleaning

    b. They should be cleaned once a week

    c. They may cause redness and irritation in the mouth if left in overnight

    d. They should be checked for cracks, sharp edges and missing teeth each time they are cleaned

Appendix B

Nursing Staff Oral Health and Denture Maintenance Test Results

Descriptive Statistics

	N	Range	Minimum Score	Maximum Score	Mean Score	Std. Deviation	Variance
Pretest	27	40.00	60.00	100.00	84.4444	11.87542	141.026

One Month	27	30.00	70.00	100.00	94.44 44	7.51068	56.410
Two Month	27	10.00	90.00	100.00	98.88 89	3.20256	10.256
Valid N (listwise)	27						

Appendix C

Denture and Natural Teeth Descriptive Test Results

Group Statistics

	Teeth Type	N	Mean	Std. Deviation	Std. Error Mean
Baseline	Dentures	16	2.5625	.81394	.20349

	Natural	19	2.5368	.32009	.07343
One Month	Dentures	16	1.3125	.60208	.15052
	Natural	19	1.9879	.50305	.11541
Two Month	Dentures	16	1.6250	.80623	.20156
	Natural	19	2.2426	.53185	.12201

Appendix D

T-test Using Excel with All 36 Participants

t-Test: Paired Two Sample for Means		
	Combined Baseline PI	*1 mo Combined*
Mean	2.533333333	1.660277778
Variance	0.345142857	0.411517063
Observations	36	36
Pearson Correlation	0.413226543	
Hypothesized Mean Differenc	0	
df	35	
t Stat	7.85088911	
P(T<=t) one-tail	1.57837E-09	
t Critical one-tail	1.689572458	
P(T<=t) two-tail	3.15674E-09	
t Critical two-tail	2.030107928	
t-Test: Paired Two Sample for Means		
	Combined Baseline PI	*2 mo Combined*
Mean	2.533333333	1.961388889
Variance	0.345142857	0.518755159
Observations	36	36
Pearson Correlation	0.321094052	
Hypothesized Mean Differenc	0	
df	35	
t Stat	4.459476147	
P(T<=t) one-tail	4.05489E-05	
t Critical one-tail	1.689572458	
P(T<=t) two-tail	8.10977E-05	
t Critical two-tail	2.030107928	
t-Test: Paired Two Sample for Means		
	1 mo Combined	*2 mo Combined*
Mean	1.660277778	1.961388889
Variance	0.411517063	0.518755159
Observations	36	36
Pearson Correlation	0.735892235	
Hypothesized Mean Differenc	0	
df	35	
t Stat	-3.611485643	
P(T<=t) one-tail	0.000472328	
t Critical one-tail	1.689572458	
P(T<=t) two-tail	0.000944656	
t Critical two-tail	2.030107928	