Creating an Impetus for Oral Care: A Quality Improvement Project

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Abstract

Background: Oral hygiene is one of the most frequently cited missed nursing cares and is implicated in the development of non-ventilator hospital acquired pneumonia (NV-HAP), which is associated with high morbidity and mortality and represents a significant work burden for healthcare providers including nurse practitioners.

Aim: This quality improvement project aimed to increase the percentage of patients receiving oral care at least once in a 24-hour shift to 75% over a three-month period.

Methods: The intervention was directed at education of staff and patients and utilized a video presentation for staff and educational signs for patient rooms. Oral care documentation was collected using automated electronic health record reports to capture data from the three-month intervention period as well as retrospectively from a six-month period prior to the intervention. The pre-intervention and post-intervention data were analyzed using a run chart and t-test.

Results: The mean percentage of patients receiving oral care prior to the intervention was 35.4%. Following the intervention, the mean percentage of patients receiving oral care increased to 51.6%, a total change of 16.2% ($t=-12$, $p<0.001$, Cohen's $d=1.55$).

Discussion: This project resulted in a strong, statistically significant change attributable to oral care education, suggesting that poor oral care performance on this unit was due in part to a staff and patient knowledge gap. An additional workload-dependent component to oral care performance was observed.

Keywords: Oral care, Missed Nursing Care, NV-HAP.

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Introduction

Problem description

According to a systematic review, 55 to 98 percent of nurses were unable to finish at least one task during their last shift (Park et al., 2018). These unfinished tasks are referred to as missed nursing care, and are a consequence of time constraints, inadequate staffing and other factors (Labrague et al., 2021; Uchmanoquicz et al., 2020). The most commonly missed tasks are general nursing care duties, such as providing patient hygiene, education, comfort and reassurance, and ambulation (Park et al., 2018). These missed nursing tasks have profound repercussions for patient comfort and safety, as they are associated with increased medication errors, nosocomial infections, pressure ulcers, patient falls, and hospital readmission and mortality rates (Recio-Saucedo et al., 2017).

Oral hygiene is one of the most frequently cited missed nursing cares and is also one of the costliest (Assaye et al., 2020; Silva et al., 2021; Uchmanoqicz et al., 2020; White et al., 2019). Just 48 hours after a patient enters a hospital their oral microbiota begins to change to more virulent pneumonia-causing organisms, and in the absence of regular oral care can quickly form a substantial biofilm within the oral cavity (Giuliano et al., 2021; Munro et al., 2018). Furthermore, as high as 45% of adults have been found to silently micro-aspirate oral secretions into their lungs while asleep, placing those without adequate oral hygiene at higher risk of contracting pneumonia (Munro et al., 2018). Consistent oral care can decrease a patient's risk of non-ventilator hospital-acquired pneumonia (NV-HAP) by up to 40 to 60%, and by the same logic, its absence can greatly contribute to rates of NV-HAP (Munro et al., 2018; Willis & Brady, 2022). In fact, a recent study of 837 patients with NV-HAP found that 50% of those patients had not received any oral care preceding the onset of their illness (Willis & Brady, 2022). Not only do patients with NV-HAP have greater lengths of hospitalization and spend more days in the intensive care unit, but they also have mortality rates of up to 30% and are at 50% greater risk of

acquiring sepsis (Munro et al., 2018). Non-ventilator hospital-acquired pneumonia is the leading hospital-acquired infection, with a current estimated incidence of about 1 out of every 100 hospitalized patients (Giuliano et al., 2023). Thus, as a largely preventable infection, NV-HAP contributes unnecessarily to the work burden of providers, as it heightens patient complexity of care and increases resource utilization, detracting from the treatment of the primary illness patients present with. Finally, for each patient diagnosed with NV-HAP, the hospital is charged about 40,000 dollars, representing a significant economic cost for the healthcare field (Munro et al., 2018).

On a general medicine nursing unit missed oral care was identified by the nursing management team as a persistent problem. Informal data collection in the form of chart auditing was performed and revealed a low percentage of patients on this unit received oral care each 12-hour nursing shift. Following the initial round of chart auditing, new oral care equipment kits were stocked on the unit in accordance with the hypothesis that increased accessibility to quality equipment would facilitate oral care acquisition, however, subsequent chart auditing revealed missed oral care remained an issue. A follow up survey seeking to understand barriers to oral care performance found the most frequent issues staff cited surrounding oral care were time constraint (89%), high workload (86%), patient refusal (75%), and that it was not a priority (29%). Additional barriers to oral care on this unit include high patient acuity, nurse-CNA delegation issues, staff knowledge gap regarding oral care benefits, supply issues, and the lack of both a hospital-wide and unit specific policy or documented standard of care for oral care for non-ventilated patients (Appendix A).

Available knowledge

The clinical environment in which a nurse practices has a significant impact on the level of missed nursing care (Schubert et al., 2020). There is strong evidence amongst the literature that links stressful work environments with inappropriate nurse staffing to greater levels of missed nursing care (Assaye et al., 2020; Chaboyer et al., 2020; Cho et al., 2018; Silva et al., 2021; Nantsupawat et al., 2021;

Schubert et al., 2021). Cho et al., (2018) propose that lower nurse staffing levels result in time scarcity, forcing nurses to prioritize certain tasks while leaving some unfinished. In contrast, working environments associated with lower levels of missed nursing care are those with improved nurse to patient ratios and those that promote teamwork and personal accountability (Cordeiro et al., 2020). Thus, aside from the more costly intervention of increasing the number of nursing staff, creating an environment that cultivates staff accountability could have a moderating effect on missed nursing care (Cordeiro et al., 2020). One method that promotes staff accountability is the use of nursing care reminders, which are task reminders for nurses aimed at reducing missed care (Cordeiro et al., 2020). These reminders can be delivered to nursing staff through a variety of methods including verbal cueing, signs at patients' bedsides, musical alerts, and electronic health record (EHR) based work lists, with multiple studies yielding statistically significant reductions in missed care with their implementation (Schubert et al., 2020).

Oral care is often falsely viewed solely as a comfort measure, and therefore is more likely to be less prioritized and left undone when nurses are faced with time scarcity (Johnny et al., 2021). This suggests that a significant knowledge gap exists for some nurses surrounding beliefs about oral care and its relation to overall health (Jenson et al., 2018). Thus, providing nurses with education surrounding the importance of oral care in preventing certain life-threatening illnesses might result in its higher prioritization. Similarly, patients lack the awareness of the role that oral care plays in health maintenance, with patient refusal, resistance, and reduced motivation cited as barriers to providing oral care (Cocker et al., 2020; Schutte & Warren, 2020). Therefore, an appropriate intervention might be to educate patients on the risks of NV-HAP in the absence of oral care to facilitate nurse-patient partnership in oral care provision (Warren et al., 2019).

Access to appropriate oral care equipment can help facilitate the provision of consistent oral care (Schutte & Warren, 2020). Multiple studies found that hospitals stock inadequate oral care supplies

that do not comply with the American Dental Association (ADA) guidelines and are ineffective in reducing the oral biofilm that causes NV-HAP (Jensen et al., 2018; Munro et al., 2018; Quinn et al., 2020). Quinn et al., (2020) suggest that lack of easy-to-use evidence-based products and educational materials are significant barriers to nurses performing regular oral care for patients. Furthermore, Clark et al., (2020) cite that nurses are more likely to leave care undone if they are working in an environment with insufficient or inadequate resources.

A consistent theme across the literature is that a lack of protocol or standardization of oral care is a barrier to it being consistently performed (Dagnew et al., 2020). The American Association of Critical-Care Nurses has issued a standard for oral care for intubated patients, but has yet to provide recommendations for non-intubated patients (Johnny et al., 2021). It is postulated that the absence of a recommended standard might explain the lower rates of oral care adherence in patients not receiving mechanical ventilation compared to those that are (Johnny et al., 2021). Multiple studies have shown that the implementation of a NV-HAP oral care standard has improved oral care performance as well as staff attitudes towards oral care, nurse oral care knowledge, oral care documentation, and hospital-acquired pneumonia rates (Giuliano et al., 2021; Pritts et al., 2020; Schutte & Warren, 2020; Wennerholm et al., 2021). Similarly, Lacerna et al., (2020) demonstrated a reduction in NV-HAP rates following the implementation of a provider-written pneumonia prevention order set, representing an intervention at the provider level for the prevention of NV-HAP.

Rationale

This project utilized the Institute of Healthcare Improvement (IHI) Model for Improvement (MFI) to structure the intervention. The MFI was selected to guide this project because it has been cited as an effective, evidence-based tool for quality initiatives in healthcare improvement science literature (Crowl et al., 2015; Picarillo, 2018). An intervention from the literature was chosen that addressed the barriers identified at the clinical practice location (Appendix A). In accordance with the MFI framework, the QI

team sought to answer three questions during the structuring of the intervention: 1) "What are we trying to accomplish?"; 2) "How will we know if a change is an improvement?", and; 3) "What changes can we make that will result in improvement?" (Picarillo, 2018, p. 930). The intervention was implemented with the plan of continued refinement in a series of Plan-Do-Study-Act (PDSA) cycles with the goal of achieving the specific aim of the project (Picarillo, 2018).

Specific Aim

The aim of this QI project was to increase the percentage of patients on the general medicine floor who receive oral care at least once in a 24-hour period (0700-0659) to 75% over the 12-week period from November 7th, 2022, to January 31st, 2023.

Methods

Context

This project took place on an acute care general medicine unit at a large university teaching hospital in the Pacific Northwest. This unit contains 31 beds and serves a variety of patients, including those who require mechanical ventilation. The unit is staffed with nurses and CNAs in accordance with the unit's predetermined hours per patient day (HPPD), which is 9.5. Depending on the acuity of the unit, the floor might staff up with additional nurses or CNAs to lower the nurse-to-patient ratio to create a safer care environment. The providers that staff the unit include both physicians and advanced practice providers on the general medicine, family medicine, and hospitalist services. Although oral care is within both nurse and CNA scope of practice, it is ultimately the nurse's responsibility to ensure that it is performed. Hygiene practices are generally nurse driven in nature, and therefore oral care is often not entered as a nursing order by providers. One exception to this is for patients requiring mechanical ventilation, with this patient population receiving provider orders for oral care with chlorhexidine mouthwash four times daily in line with hospital policy. Staff nurses are meticulous with oral hygiene for these patients, as they receive formal education on its importance for the prevention of ventilator-

associated-pneumonia at the time they are trained on ventilators. In contrast, the institution that this unit is part of has no existing policy regarding oral care in non-mechanically ventilated patients and does not track the incidence of NV-HAP.

Improvement work targeting oral care for non-ventilated patients was started in the fall of 2020 by a floor nurse doing an evidence-based practice (EBP) fellowship partnered with the general medicine nursing management team. The COVID-19 pandemic, which was already established at the start of the EBP fellowship, turned this unit into the designated acute care floor for COVID-19 patients, creating a stressful work environment that resulted in a high degree of staff turnover and burnout, acting as a significant barrier to change. The general medicine floor has since then returned to its original patient population, now with a new nursing management team and numerous new floor staff, creating an opportunity to pursue improvement work encompassing oral care again. The QI team tasked with bringing fresh insight to the oral care initiative include the unit nurse manager and assistant manager, the hospital EBP nurse leader, a healthcare informaticist nurse, a EHR analyst, a unit staff nurse, and a Doctorate of Nursing practice (DNP) student. It is important to note that at the time that this QI project was implemented there were two other QI projects that were also occurring which requested unit staff participation.

Intervention & Evolution

The intervention chosen to address oral care performance focused on providing nurses, CNAs, and patients with education. The doctoral student created a 10-minute oral care education video presentation utilizing evidence from the literature review and addressed the following: 1) Pre-intervention baseline data highlighting opportunities for unit improvement; 2) Evidence-based data regarding oral care as it relates to pneumonia and patient outcomes; and 3) Unit specific standards and expectations surrounding oral care. Six weeks prior to the start of the intervention period, the education video was emailed to all unit nurses and CNAs along with a post-education quiz which was utilized to

track individual completion. Four separate email reminders regarding the education were sent out to staff during the six-week period. Due to initial low response rates, the unit manager encouraged staff members to participate by entering those who completed the education in a raffle for small prizes. QI team members created laminated oral care education signs (Appendix B) which were approved by the hospital marketing and branding team and then posted in patient rooms on the first day of the intervention period. These signs served as an education aid for staff and patients, while also doubling as a nursing care reminder. The intervention period took place over three months during which time EHR oral care documentation was collected for analysis.

To assist in data collection, an EHR analyst created an automated EHR-based report to record oral care documentation. Given that the crafting of an EHR-report is time intensive, the QI team opted to include additional information that might be helpful in future QI projects surrounding oral care. The report collected the following documentation from the EHR: 1) Patient name; 2) Patient medical record number (MRN); 3) Encounter CSN; 4) Patient gender; 5) Patient age; 6) Type of oral care performed; 6) Degree of staff assistance required; 7) The name and job position of the staff who documented the oral care; and 8) The date and time of documentation. Prior to the intervention period, the report was used to gather retrospective data from the six-month period of January 1st to June 1st, 2022. This retrospective data served as pre-intervention baseline data to be used for comparative analysis against post-intervention data. Once the intervention period began the report was set to automatically run every two weeks on the first and 15th of the month. To ensure data completeness and accuracy, each two-week report was assessed thoroughly by team members and independently verified by chart review. In the process of assessing for accuracy, three errors were identified within the EHR reports including: 1) Incomplete data uploading causing falsely low oral care counts; 2) Counting "patient refused" as oral care, falsely inflating oral care counts; and 3) Not capturing oral care that was charted after midnight on the last day of the report due to data load cut off time. These errors were rectified,

and additional manual chart counts were performed to ensure accuracy of subsequent reports. The EHR-report errors limited the ability for data analysis to occur throughout the three-month period of project implementation. For this reason, data analysis was performed at the end of implementation once the report was fixed, and the retrospective and intervention data collections were rerun.

Measures

The outcome measure for this project was the percentage of patients receiving oral care at least once in a 24-hour period (0700-0659) as documented in the EHR during both the intervention period between November 7, 2022, and January 31, 2023, and prior to the intervention between January 1st and June 1st, 2022. A patient was considered to have oral care if any of the following was found within their EHR documentation: 1) Teeth brushed; 2) Tongue brushed; 3) Swabbed with antiseptic solution; 4) Swabbed with sterile water; 5) Lip/mouth moisturizer applied; 6) Oral rinse provided; 7) Suction provided; or 8) Dental appliance cleaned. This measure allowed for the QI team to assess the impact that the intervention had on oral care performance by comparing pre-intervention data to post-intervention data. The process measure was the number and percentage of unit staff who completed the post-education quiz. This was chosen as the process measure because the intervention was dependent upon staff completion of the education video presentation, which was tracked by participant quiz completion. The additional work burdens this intervention placed on staff served as the balancing measure. As previously discussed, when faced with heavy work burdens nurses are forced to prioritize certain tasks while leaving others undone, which is a potential consequence of this intervention. The contextual elements contributing to the success or failure of the QI project were monitored and assessed: 1) Staffing levels; 2) Proportion of the unit staffed by float pool nurses untrained in oral care education; 3) Staff buy-in of the education; and 4) Accurate oral care documentation by staff.

Data Analysis

Quantitative data was gathered using EHR-based reports to analyze the efficacy of the intervention at improving oral care performance. The percentage of patients receiving oral care was visualized with a run chart to track the variation in oral care performance over time. This was accomplished by calculating the weekly mean percentages of patients receiving oral care and plotting the pre-intervention data (one through 22-weeks) alongside the post-intervention data (23 through 34-weeks) (Appendix C). The run chart was examined for shifts and trends which were then further analyzed to determine whether the variation was a result of the intervention or if it could be attributed to contextual elements influencing oral care performance.

Prior to the start of statistical analysis, the null and alterative hypotheses were determined. The null hypothesis stated that there is no statistically significant difference in the mean percentage of patients receiving oral care compared to before and after the oral care intervention, while the alterative hypothesis stated that there is a statistically significant difference between the two groups. To test these hypotheses and determine if there was a change in oral care performance attributable to the intervention, an unpaired 2-tail t-test using the pre-intervention and post-intervention outcome measure data was performed, with a p-value of 0.05 or less corresponding to a statistically significant difference between groups. Prior to running the t-test, the following assumptions and conditions were tested: 1) Normalcy of distribution was assessed with the Shapiro-Wilk test, which was found to be statistically insignificant, indicating that the data is normally distributed; 2) Box and whisker plots were created to identify outliers, of which two were found and subsequently removed prior to t-test performance; and 3) Homogeneity of variance was evaluated with Levene's test, which was found to be statistically significant, indicating that the variance within the data sets are not equal and that the t-test should be run in accordance to this. Cohen's d test was also calculated to assess for the effect size of the t-test, with any value equal to or greater than 0.8 indicating a large effect. The pre-intervention and

post-intervention mean percentages of oral care were derived from the t-test and graphed in a bar-chart to visualize the difference (Appendix D).

Ethical considerations

Consent for this QI project was granted by the clinical site by signing a letter of support that detailed the intended intervention. This project was submitted to the OHSU Investigational Review Board (IRB) and it was determined to not be human research (STUDY00024925).

Results

Six weeks following the email distribution of education to staff, 37 staff members had completed the post-education quiz, corresponding to a 60.7% staff completion rate. Of the staff that completed the education, 86.5% were nurses and 13.5% were CNAs. Overall, the education seemed to be well received, with staff members providing positive feedback regarding its contents. The staff completion rate was possibly impacted by two cooccurring QI projects that required email survey participation, possibly contributing to change-fatigue and reduced participation on the part of the staff.

According to the baseline retrospective data collected, the mean percentage of patients receiving oral care prior to the intervention was 35.4%. Following the intervention, the mean percentage of patients receiving oral care increased to 51.6%, a total change of 16.2%. According to the results of the t-test, the intervention resulted in a statistically significant change ($p<0.001$), with a t value of -12, indicating a strong increase in oral care performance following the education as depicted in the bar graph (Appendix D). Furthermore, Cohen's d test was run and yielded a value of 1.55, indicating that the intervention resulted in a large effect. Thus, based on these results, the null hypothesis was rejected and the alternative hypothesis, which states that a statistically significant change took place following the intervention, was accepted.

The variation in the data over time can be visualized in the run chart (Appendix C) that was generated using pre-intervention data (weeks one through 22) and post-intervention data (weeks 23 to

34). The run chart depicts a peak in oral care performance at week 25 with a high of 62.6%, shortly after the start of the intervention, possibly reflecting the initial motivation of staff to change following the education. Starting at week 27 the oral care performance begins to decline, until it reaches a low at week 30 of 43.6%. During this period of reduced oral care performance, the hospital declared crisis standards of care due to the concurrently heightened levels of respiratory syncytial virus, influenza, and COVID-19, resulting in a critical strain on hospital resources and capacity. Surprisingly, the unit did not suffer staffing shortages during this period, with the HPPD never dropping below the unit's predetermined HPPD of 9.5. However, there is a robust difference in the average HPPD between week 25 and 30, the weeks with the highest and lowest oral care performance. The staffing during week 25 was excellent, as indicated by an average HPPD of 10.7, while the staffing during week 30, although still above the unit's set HPPD, was lower at a value of 9.9. It is possible that the unit was staffing above the set HPPD due to higher acuity of patients on the floor, necessitating lower nurse to patient ratios. Thus, although the HPPD of week 30 was higher than the unit's set HPPD, it might have not provided sufficient staffing coverage for the unit's acuity.

Discussion

In summary, the oral care education intervention resulted in an increase in oral care performance from 35.4% to 51.6%, yielding an overall increase of 16.2% ($p<0.001$). Although the intervention resulted in a robust, statistically significant change, the specific aim of 75% of patients receiving oral care was not met. However, the implementation of the education intervention serves as PDSA cycle 1, with plans to continue working towards the goal outlined in the specific aim over additional PDSA cycles. The intervention did not result in as great of change as anticipated, likely because missed oral care is a multifactorial issue that extends beyond staff and patient education, as suggested by the difference seen in oral care performance between weeks with differing HPPD.

The fact that the intervention resulted in a strong, statistically significant change signifies that poor oral care performance on this unit was at least in part due to a staff and patient knowledge gap in relation to oral care and patient outcomes. This finding is in line with a prior study that demonstrated an improvement in oral care performance with subsequent reduction in NV-HAP rates resulting from staff education sessions, educational signs in patient rooms, and a standardized oral care protocol (Giuliano et al., 2021). Additionally, the observation that the weeks with the highest and lowest oral care performance varied in HPPD, suggest a work-load dependent component to oral care performance. This is consistent with a previous study examining missed nursing care in the context of COVID-19, which identified that nurse staffing levels are found to correlate significantly with missed nursing care ($p=0.001$) (Labrague et al., 2021).

Quality improvement work dedicated to improving oral care performance in a hospital setting has the potential to have far-reaching implications. Not only does oral care help to reduce the risk of NV-HAP and its provider associated work burden, allowing providers to refocus on the issues bringing patients to the hospital, but it also provides patients with comfort and improved oral health allowing for better ability to speak and swallow (Jenson et al., 2018). By promoting routine oral care in hospitals, staff assist patients in establishing long-term health maintenance practices that can aid in overall health. Furthermore, by investing in oral care quality improvement work, an institution can expect significant cost-savings resulting from reductions in NV-HAP rates (Munro et al., 2018).

This study contains various factors that limit both its internal validity and generalizability of findings. Firstly, this study was a single unit analysis without a control group and therefore any conclusions drawn from it should be taken with caution. Secondly, the study design utilized baseline pre-intervention data from five to eleven months prior to the intervention period. Although this generated a large sample size for analysis, this separation of time between the two data sets limits the strength of the study's findings. Additionally, the study design did not require staff to complete the education video,

resulting in an imperfect staff completion rate of 60%, making it difficult to discern the impact of the staff education intervention. However, staff who did not participate in the education video were still exposed to educational signage at patients' bedsides, which could have acted as a protective mechanism against the imperfect staff participation rate. Lastly, since the major goal of oral care in a hospital setting is to prevent pneumonia, the results of this study could have been augmented by correlating the incidence of NV-HAP with oral care performance. However, the hospital that the nursing unit is in does not track this data, so this was unable to be accomplished.

The results of this study provide important insight into a potential cause and solution to reduced oral care performance in a hospital environment. Consistent with prior studies, this QI project shows that providing staff and patients with oral care education results in an increase in patients receiving oral care, offering solid evidence that a staff and patient knowledge gap contributes to lower rates of oral care performance. To strengthen this finding, future PDSA cycles should aim at expanding the intervention to other nursing units in the hospital with the addition of control units for comparison. Given that missed nursing care in the form of patient hygiene is a problem cited throughout nursing literature, this intervention is likely to benefit many settings. Zooming out to the larger clinical context, this project ultimately aimed to address one of the factors that contributes to NV-HAP. Given the fact that NV-HAP is multifactorial in origin, its prevention should be structured in a similar vein. Thus, future research should pursue investigations into the development of evidence-based nursing care bundles or provider order sets aimed at targeting the many contributing factors of NV-HAP including routine oral care.

References

Assaye, A. M., Wiechula, R., Schultz, T. J., & Feo, R. (2022). Missed nursing care, nurse staffing levels and patient safety outcomes in low-income country acute care settings: An observational study. *Int J Nurs Pract*, *28*(1), e13031. https://doi.org/10.1111/ijn.13031

Chaboyer, W., Harbeck, E., Lee, B. O., & Grealish, L. (2021). Missed nursing care: An overview of reviews. *Kaohsiung J Med Sci*, *37*(2), 82-91. https://doi.org/10.1002/kjm2.12308

Cho, S. H., Lee, J. Y., You, S. J., Song, K. J., & Hong, K. J. (2020). Nurse staffing, nurses prioritization, missed care, quality of nursing care, and nurse outcomes. *Int J Nurs Pract*, *26*(1), e12803. https://doi.org/10.1111/ijn.12803

Clark, R. R. S., & Lake, E. (2020). Burnout, job dissatisfaction and missed care among maternity nurses. *J Nurs Manag*, *28*(8), 2001-2006. https://doi.org/10.1111/jonm.13037

Coker, E., Ploeg, J., & Kaasalainen, S. (2020). Relying on nursing staff for oral hygiene care: A qualitative interpretive description study. *Geriatr Nurs*, *41*(6), 891-898. https://doi.org/10.1016/j.gerinurse.2020.06.015

Cordeiro, R., Pires Rodrigues, M. J., Serra, R. D., & Calha, A. (2020). Good practices to reduce unfinished nursing care: An integrative review. *J Nurs Manag*, *28*(8), 1798-1804. https://doi.org/10.1111/jonm.12972

Crowl, A., Sharma, A., Sorge, L. & Sorensen, T. (2015). Accelerating quality improvement within your organization: Applying the Model for Improvement. Journal of the American Pharmacists Association, 55(4), e364-374. https://doi.org/10.1331/JAPhA.2015.15533

Dagnew, Z. A., Abraham, I. A., Beraki, G. G., Mittler, S., Achila, O. O., & Tesfamariam, E. H. (2020). Do nurses have barriers to quality oral care practice at a generalized hospital care in Asmara, Eritrea? A cross-sectional study. *BMC Oral Health*, *20*(1), 149. https://doi.org/10.1186/s12903-020-01138-y

Giuliano, K. Penoyer, D., Middleton, A., & Baker, D. (2021). Oral care as prevention for nonventilator hospital-acquired pneumonia: a four unit cluster randomized study. *American Journal of Nursing, 121*(6), 24-33. https://doi.org/10.1097/01.NAJ.0000753468.99321.93

Giuliano, K., Baker, B., Thakkar-Samtani, M., Glick, M., Restrepo, M., Scannapieco, F., Heaton, L., & Frantsve-Hawley, J. (2023). Incidence, mortality, and cost trends in nonventilator hospital-acquired pneumonia in medical beneficiaries, 2015-2019. American Journal of Infection Control, 51(2), 227-230. https://doi.org/10.1016/j.ajic.2022.06016

Jalili, M., Niroomand, M., Hadavand, F., Zeinali, K. & Fotouhi, A. (2021). Burnout among healthcare professionals during COVID-19 pandemic: a cross-sectional study. International Archives of Occupational and Environmental Health, 94, 1345-1352. https://doi.org/10.1007/s00420-021-01695-x

Jenson, H., Maddux, S., Waldo, M. (2018). Improving Oral Care in Hospitalized Non-Ventilated Patients: Standardizing Products and Protocol. *Medsurg Nursing, 27*(1), 38-45. https://digitalcommons.psjhealth.org/publications/885/

Johnny, J. D., Drury, Z., Ly, T., & Scholine, J. (2021). Oral Care in Critically Ill Patients Requiring Noninvasive Ventilation: An Evidence-Based Review. *Crit Care Nurse*, *41*(4), 66-70. https://doi.org/10.4037/ccn2021330

Labrague, L. J., de Los Santos, J. A. A., & Fronda, D. C. (2022). Factors associated with missed nursing care and nurse-assessed quality of care during the COVID-19 pandemic. *J Nurs Manag*, *30*(1), 62-70. https://doi.org/10.1111/jonm.13483

Lacerna, C., Patey, D., Block, L., Naik, S., Kevorkova, Y., Galin, J., Parker, M., Betts, R., Parodi, S., & Witt, D. (2020). A successful program preventing nonventilator hospital-acquired pneumonia in a large hospital system. Infection Control Hospital Epidemiology, 41(5), 547-552. https://doi.org/10.1017/ice.2019.368

Munro, S., & Baker, D. (2018). Reducing missed oral care opportunities to prevent non-ventilator associated hospital acquired pneumonia at the Department of Veterans Affairs. *Appl Nurs Res*, *44*, 48-53. https://doi.org/10.1016/j.apnr.2018.09.004

Nantsupawat, A., Poghosyan, L., Wichaikhum, O. A., Kunaviktikul, W., Fang, Y., Kueakomoldej, S., Thienthong, H., & Turale, S. (2022). Nurse staffing, missed care, quality of care and adverse events: A cross-sectional study. *J Nurs Manag*, *30*(2), 447-454. https://doi.org/10.1111/jonm.13501

Park, S. H., Hanchett, M., & Ma, C. (2018). Practice Environment Characteristics Associated With Missed Nursing Care. *J Nurs Scholarsh*, *50*(6), 722-730. https://doi.org/10.1111/jnu.12434

Picarillo, A. P. (2018). Introduction to quality improvement tools for the clinician. *J Perinatol*, *38*(7), 929-935. https://doi.org/10.1038/s41372-018-0100-4

Pritts, K., Kerber, C., Calderon, S., Bigler, P. (2020). Implementation of a Standardized Oral Care Protocol to Decrease Non-Ventilator Hospital-Acquired Pneumonia. *Medsurg Nursing, 29(*6), 387-390. https://www.proquest.com/openview/cd84c9a1e22b16b13625a6b305098f43/1?pq-origsite=gscholar&cbl=30764

Quinn, B., Giuliano, K. K., & Baker, D. (2020). Non-ventilator health care-associated pneumonia (NV-HAP): Best practices for prevention of NV-HAP. *Am J Infect Control*, *48*(5S), A23-A27. https://doi.org/10.1016/j.ajic.2020.03.006

Recio-Saucedo, A., Dall'Ora, C., Maruotti, A., Ball, J., Briggs, J., Meredith, P., Redfern, O. C., Kovacs, C., Prytherch, D., Smith, G. B., & Griffiths, P. (2018). What impact does nursing care left undone have on patient outcomes? Review of the literature. *J Clin Nurs*, *27*(11-12), 2248-2259. https://doi.org/10.1111/jocn.14058

Schubert, M., Ausserhofer, D., Bragadottir, H., Rochefort, C. M., Bruyneel, L., Stemmer, R., Andreou, P., Leppee, M., Palese, A., & CA, R. C. C. A.-. (2021). Interventions to prevent or reduce rationing or

missed nursing care: A scoping review. *J Adv Nurs*, *77*(2), 550-564. https://doi.org/10.1111/jan.14596

Schutte D. & Warren, C. (2020). Staff Knowledge and Attitudes toward Oral Care in an Acute Care Hospital Pre- and Post- Implementation of an Evidence-Based Practice Change. *Medsurg Nursing, 29(*3), 181-218. https://www.proquest.com/openview/e0cb48badf123f9f5b42529aab44eadc/1?pq-origsite=gscholar&cbl=30764

Silva, S. C. D., Morais, B. X., Munhoz, O. L., Ongaro, J. D., Urbanetto, J. S., & Magnago, T. (2021). Patient safety culture, missed Nursing care and its reasons in Obstetrics. *Rev Lat Am Enfermagem*, *29*, e3461. https://doi.org/10.1590/1518-8345.4855.3461

Uchmanowicz, I., Karniej, P., Lisiak, M., Chudiak, A., Lomper, K., Wisnicka, A., Wleklik, M., & Rosinczuk, J. (2020). The relationship between burnout, job satisfaction and the rationing of nursing care-A cross-sectional study. *J Nurs Manag*, *28*(8), 2185-2195. https://doi.org/10.1111/jonm.13135

Warren, C., Medei, M., Wood, B., & Schutte, D. (2019). A Nurse-Driven Oral Care Protocol to Reduce Hospital-Acquired Pneumonia. *American Journal of Nursing, 119*(2), 44-51. https://doi.org/ 10.1097/01.NAJ.0000553204.21342.01

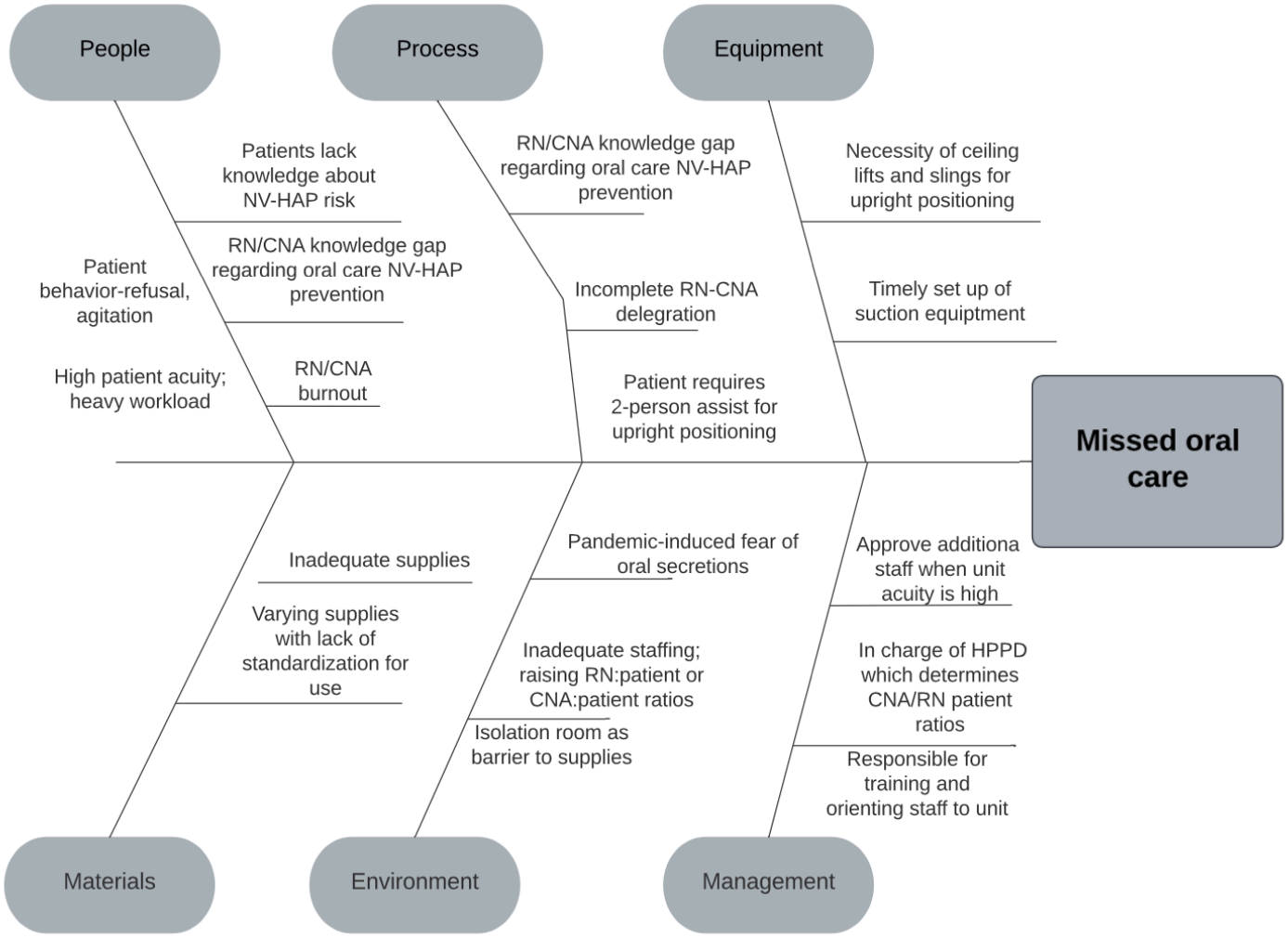
Wennerholm, L., Perez, N. R., Abt, S., Fon, K., & Elsabrout, K. (2021). Development of an Oral Care Multidisciplinary Initiative in an Acute Care Community Hospital: Framework, Timeline, and Outcomes. *Am J Speech Lang Pathol*, *30*(2), 517-531. https://doi.org/10.1044/2020_AJSLP-20-00159

White, E. M., Aiken, L. H., & McHugh, M. D. (2019). Registered Nurse Burnout, Job Dissatisfaction, and Missed Care in Nursing Homes. *J Am Geriatr Soc*, *67*(10), 2065-2071. https://doi.org/10.1111/jgs.16051

Willis, E., & Brady, C. (2022). The impact of "missed nursing care" or "care not done" on adults in health care: A rapid review for the Consensus Development Project. *Nurs Open*, *9*(2), 862-871. https://doi.org/10.1002/nop2.942

Appendix A

Cause and Effect Diagram



Appendix B

Oral Care Poster for Patient Rooms

Did you know?

Taking care of your teeth and mouth while in the hospital can prevent serious complications like pneumonia.

Stay safe during your hospital stay by:

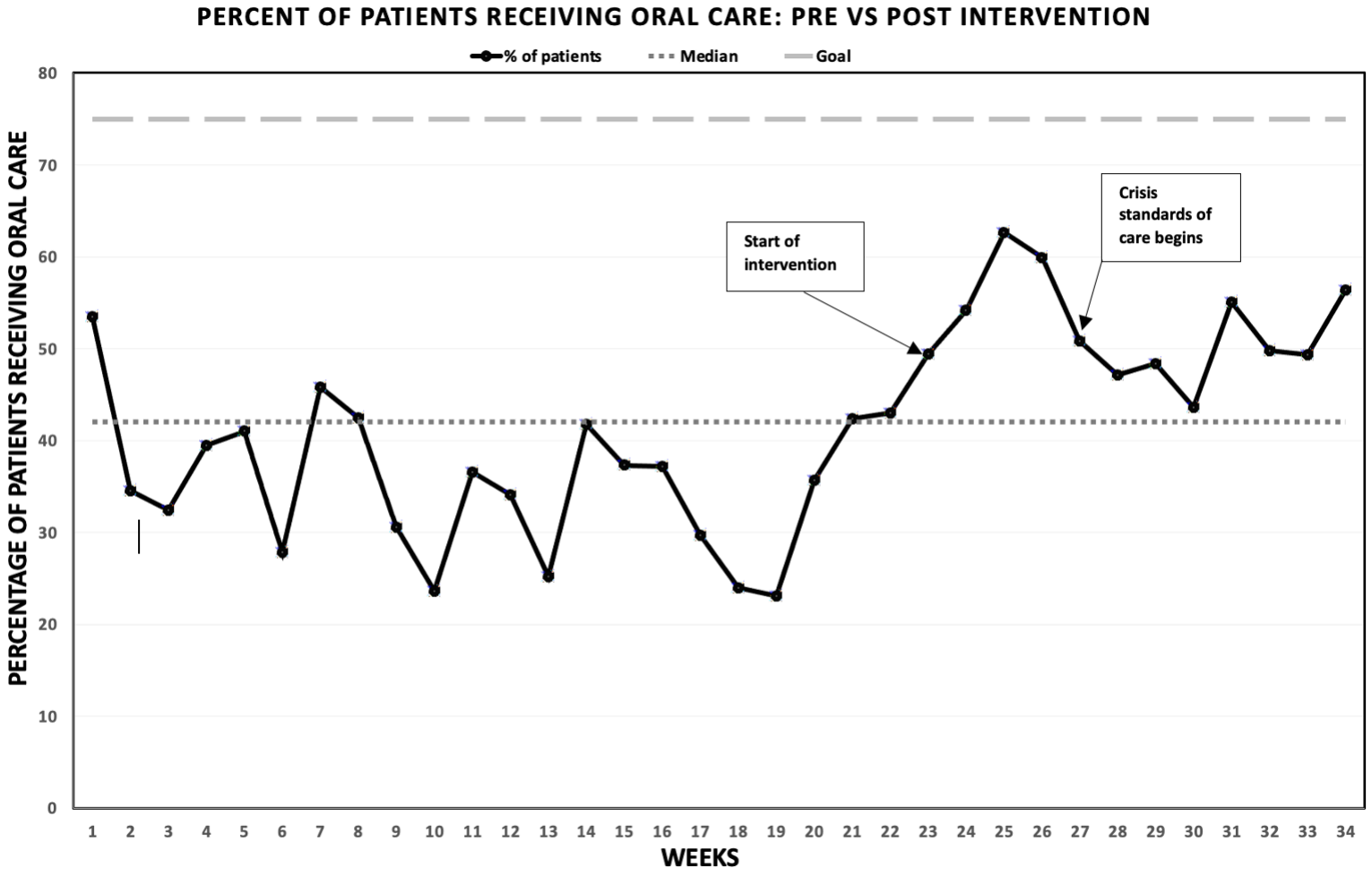
- BRUSHING 2 TIMES A DAY
- USING MOUTHWASH

Your care team can help!
Ask us if you need supplies or help caring for your mouth.

OHSU

Appendix C

Run Chart of Weekly Mean Oral Care Performance



Appendix D

Bar Graph of Pre- and Post-Intervention Mean Percentage of Oral Care