Impact of PCTs in the Prevention of HAP through a ROUTE Bundle with an Emphasis on Oral Care and Positioning the Patient Out of Bed and in a Chair

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Capstone Quality Improvement Project: Impact of PCTs in the Prevention of HAP through a ROUTE Bundle with an Emphasis on Oral Care and Positioning the Patient Out of Bed and in a Chair

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N653: Internship

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IMPACT OF PCTS IN THE PREVENTION OF HAP THROUGH A ROUTE BUNDLE WITH AN EMPHASIS ON ORAL CARE AND POSITIONING THE PATIENT OUT OF BED AND IN A CHAIR

Abstract

Background: Hospital Acquired Pneumonia (HAP) is a leading cause of most hospital-acquired infections among surgery patients who are hospitalized and bed-bound for more than 48hrs. The occurrence of HAP is associated with increased hospital stays and cost of care. However, its occurrence can be reduced by oral care. In this regard, this project aimed to decrease the incidence of HAP on the 3rd, 4th, 6th, and 7th floors on the Medical Surgical and ICU units of the Northern California Hospital.

Methods: To achieve the aim above, the project utilized methods namely SWOT analysis, Plan – Do – Study – Act (PDSA) cycle, and Cost-benefit analysis in the collection of data. The HAP Response recording tool was also used in the collection of data.

Results: Out of the 25 PCTs who took part in the study, 9 (36%) were familiar with the ROUTE Bundle was. The majority of the PCTs on the AM shift managed to implement oral care to patients under their care. Specifically, 7 of the PCTs who worked on AM shifts managed to perform oral care two times a shift and 18 of the PCTs were able to complete oral care once a shift. Over 21 PCTs (84%), identified staffing as a main barrier to their tasks and 76% felt that having the toothbrush on the tray would not be effective in increase oral care rates. There was also comments on issues with poor teamwork, no standardized oral protocol, lack of knowledge of oral care bundle, and a supply of poor oral care resources.

Conclusion: The implementation of ROUTE bundle reduces the incidence of HAP among patients who are bed-bound. Education and training of care providers on bundle is important, appropriate resources for oral care must be provided, there must be teamwork among nurses and PCTs, and a standardized oral care protocol must be implemented.
Introduction

The delivery of high-quality health care services that enhances the outcome of patients is at the center of clinical practice. However, various challenges hamper the achievement of this goal. For patients who are hospitalized in the ward, the risk of developing hospital-acquired infections (HAIs) is a major issue of concern leading to protracted hospitalization, increased cost of healthcare, and poor quality of life (QoL). Non-ventilator hospital-associated pneumonia (NV-HAP) is one of the leading HAIs in hospital wards (Davila, 2020). In the US, hospital-acquired pneumonia (HAP) constitutes 25% of all HAIs, while NV-HAP constitutes 60% of the total HAPs in hospital settings (Munro & Baker, 2018). These statistics translate to an estimated 35 million hospitalized patients who are at risk of HAP in the country. Munro and Baker add further that the mortality rate of HAP is 15% to 30%, while the incidence rate is 1.22–8.9/1000 patient days. HAP is preventable; however, it has a high frequency, morbidity, and mortality, and is associated with increased health care costs. Currently, the cost of treating one patient who is diagnosed with HAP is around $40,000 (Louise et al. 2016) due to the cost of treating associated health issues and the prolonged hospital stay, which is normally increased by 6-25 days. In this regard, health care facilities must find effective interventions to prevent and reduce the rates of HAP for improved patient outcomes.

Problem Description

A further assessment of the floor revealed that Patient Care Technicians (PCTs) lack sufficient the utilization of appropriate care bundle to prevent HAP among patients hospitalized on the 3rd, 4th, 6th, and the 7th floors Medical Surgical floor of a Northern California Hospital. Also, there is no proper organization for their educational materials and a lack of access to any quality improvement bundle to reduce HAP. This prompts the need for introducing a quality improvement care bundle ROUTE bundle on the floor.
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ROUTE bundle has five components – Respiratory Care/Reduced Sedation, Oral Care, Up, Tube Care, and Education as illustrated in Appendix 1. Effective implementation of the bundle requires the training of PCTs on how to effectively implement it. The key reasons this study focused on educating PCTs to reduce the incidence of HAP are; a) the PCTS are the frontline workers and have a direct one on one contact with the patients, b) providing oral care and moving the patient out of bed and up in a chair is one of the major roles of PCTs, and c) existing research studies show that oral care reduces the rates of HAP, d) since the reduction of HAP constitutes high-quality of care and outcome for patients and also reduces the cost associated with treatment, and e) there are barriers to performing oral care involving PCT education on ROUTE bundles and time constraints. PCTs educational needs (5 Whys) are illustrated in Appendix 2. In this regard, to shed in-depth insight into the problem, the Fishbone (Ishikawa) Diagram (Appendix 3) was used to perform a root cause analysis.

Therefore, to guide this research, the following PICOT question was developed:

(P) For patients on the 3rd, 4th, 6th, and the 7th floors Medical Surgical Floor of Northern California Hospital who are bed bound more than 48 hours, would (I) utilization of oral care by Patient Care Technicians (PCTs), (C) compared to no implementation of oral care on the floor (O) eventually decrease the rate of hospital acquired pneumonia by December 2022?

Specific Project Aim

- The aim for this project is to decrease the incidence of HAP on the 3rd, 4th, 6th, and the 7th floor of a Medical Surgical and ICU units of the Northern California Hospital.

Hypothesis
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- The implementation of a ROUTE Bundle with an emphasis of oral care and positioning the patient out of bed and in a chair by PCTs reduces the rate of HAP among hospitalized patients who are bed bound for more than 48hrs.

Literature Review

Themes

Education/Teaching and Training

Education and training of care providers and family members of patients on the ROUTE bundle facilitate its successful implementation and the subsequent prevention of HAP. Teaching constitutes the final component of the chosen care bundle for this study; the ROUTE bundle. In a study by Jansson et al. (2018), it was found that education and training equip care providers with effective knowledge and skills on how to effectively implement the ROUTE bundle in the effort to prevent and reduce HAP among patients who are hospitalized for a period of time. A comprehensive teaching plan informs care providers on when and how they should execute the components of the bundle, for instance, oral care and positioning patients out of bed and up in a chair. Training PCTs on oral care equips them with effective knowledge and skills of oral care such as encouraging patients to brush their teeth or brushing patients’ teeth twice or three times a day for high oral hygiene and the prevention of HAP (Chipps et al. 2020).

Education also informs care providers on the harms of excessive use of sedatives on patients who have undergone surgery. Such knowledge enables care providers to administer the right amount of sedatives, only when necessary, which is useful in preventing the patient from developing a HAP. In addition to this, education and training of care providers enable them to properly implement the other components of a care bundle, which is associated with reduced medical errors, improved patient safety, and the delivery of high-quality care that prevents HAP and overall improved patient outcomes.
Educaion as a means of encouraging positive patient safety culture is linked to the findings of Rello et al. (2012), who stated that the implementation of care bundles as a quality improvement intervention encourages a positive culture that leads to adherence or compliance among care providers. Care providers who are educated and trained on the ROUTE care bundle exhibit higher adherence and compliance with regard to the implementation of the intervention. These authors found that the rate of compliance is highest when care providers are being trained and immediately after training. During this period, the rates of HAP are significantly very low since the involved team of care providers is still motivated to reduce HAP through the new quality improvement intervention (Lavallée et al 2017). As a result, the period of stay in hospitals for patients as well as the cost of treatment is reduced, with patients reporting higher outcomes.

However, follow-up studies reveal that adherence or compliance with care bundles can be very low long after the education and training of care providers. This is attributable to the lack of motivation, monotony, or the lack of sufficient resources to implement the preferred care bundle (Lavallée et al 2017 and Kc & Mehta, 2016). These factors hamper the success or the sustainable implementation of a care bundle; hence, threatening the status quo, which harms the quality of care delivery and a re-emergence of hospital-acquired infections such as HAP that is the center of focus in this study. In this regard, effective strategies for boosting adherence among the team of care providers who have undergone training must be implemented. According to Rello et al (2012), some of the key factors of protracted adherence include frequent training or refresher training sessions for the team involved, the use of posters on the walls inside patient wards, the regular distribution of flyers, brochures, and handouts as a constant reminder for the need and benefits of adhering to care bundles.
The involvement of a multi-disciplinary team boosts the efficacy of care bundles in a healthcare setting. Multi-disciplinary teams consist of healthcare workers of different expertise coming together to formulate and deliver a high-quality healthcare service to a patient who is diagnosed with complex conditions (Munro & Baker, 2018 Warren et al. 2019). In a qualitative study that explored the views as well as the experiences of patients on the quality of health care service that they received under a health care program led by a multi-disciplinary team, it was found that patients are highly satisfied by the care offered (Gowing et al. 2016). Increased satisfaction is attributable to the confidence that the patients have in the ability of the team of care providers who are giving services to them. High rates of satisfaction among patients are also attributable to the involvement of patients in the formulation and implementation of their treatment plans. Since this is a qualitative study that involved interviews with 25 participants, there is a high validity of the findings; however, due to the small sample size, there is a high likelihood that the findings are highly generalized; hence, lack of external validity and reliability.

Multi-disciplinary teams are effective in decision-making, problem-solving, and improving the quality of service delivery to patients during the implementation of care bundles. Teamwork has been at the center of the successful delivery of high-quality healthcare service to patients in clinical settings across the globe. This is attributable to the quality of input that is brought in by each member of the team in the execution of the treatment plan. Patients with complex conditions require complex care that is prone to errors, therefore, there is a need to avoid and prevent all possible errors to ensure patient health and safety. According to Lin et al. (2022), multi-disciplinary teams are effective in the timely identification of a problem and ensuring a prompt and effective solution to it. In a team, care providers engage in constant two-way communication where they exchange information on the treatment plan, potential changes,
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challenges, and barriers that lead to errors or misses (Gowing et al. 2016). Such discussion facilitates early detection of possible human risk factors, effective decision-making, and the finding of efficient solutions to the identified problems. There it suffices to state that the involvement of multi-disciplinary teams enhances error identification, boosts effective decision-making, and improves the quality of service delivery and associated patient outcomes.

Team members play varied roles that enhance care. Studies that entailed the examination of the benefits of interdisciplinary teams in the delivery of oral care to reduce the rates and eventually prevent HAP among hospitalized patients. The findings reveal that the involvement of interdisciplinary teams is useful in the success of creating and delivering evidence-based oral care (EBP) Chipps et al. (2016), found that EBP-based oral care should consist of oral or dental health experts such as dental hygienists, dentist, and a clinical nurse. These findings are also supported by (Munro & Baker, 2018) who established that a combined effort of more than one oral health expert has high efficacy in boosting the quality of oral care that is delivered to patients. Significant improvements are linked to the associated teamwork that boosts care delivery (Soukup et al. 2018). In this regard, it is apparent that the involvement of a multi-disciplinary team in a care bundle is effective in the successful delivery of care bundles for improved patient outcomes.

**Oral Care and Oral Care Protocol**

Oral care emerges as the most utilized component of the ROUTE bundle in the effort to prevent HAP in hospitalized patients. Majority of studies that examine the prevention of HAP focus on oral care and oral care protocols. In a systematic review that was performed by Mitchelle et al. (2019), it was established that oral care was the most utilized HAP prevention strategy than others – mobility, dysphagia, and less sedation – in healthcare settings. Studies on oral care that were reviewed commonly agreed that oral care can be improved through the
education of care providers and patients on the most effective strategies for oral care, namely increased frequency and consistency in brushing teeth and tongue scrubbing, for at least twice a day. Sources that were reviewed also revealed that the use of professionals such as dentists and dental hygienists in the implementation process improves the quality of oral care. Despite the benefits of oral care as revealed in these studies, the systematic review by Mitchelle and colleagues also identified concerns with the type of antiseptic agents that are used in oral care in healthcare facilities. Reviewed studies reveal concerns with agents such as cetylpyridinium chloride, sodium bicarbonate, chlorhexidine gluconate, and hydrogen peroxide, which are deemed not to be very effective; however, may not be safe for some patients (Zhao et al. 2020). Hence, in-depth studies into their benefits or harms should be carried out.

Due to the concerns raised concerning the oral care agents or potential existing inconsistencies in the implementation of oral care, there has been a proposed oral care protocol. According to Alja'afreh et al. (2019), it is recommended that oral care should be performed at least twice a day using specific products that meet the needs of the patient. Oral care protocol also recommends a consistent delivery of oral care to inhibit the multiplication of bacteria that causes HAP in patients. Using a standardized oral care method has also been deemed cost-effective. For instance, a study by Munro and Baker (2018) found that a universal standardized oral care protocol lowered the cost of treatment by $2.84 million and prevent a total of 13 deaths of patients in 19 months. Munro and Baker also highlighted the various barriers to the successful implementation of oral care as inappropriately designed oral care plans, inadequate resources, and poor oral care monitoring plans. The consequences of the aforementioned challenges are echoed by Green, Bell, and Mays (2017), who reiterated that healthcare facilities should provide dedicated resources for the successful implementation of quality improvement initiatives. In
addition to dedicated resources, the team implementing the selected care bundle should have well-defined leadership to steer the process to ensure consistency and adherence to the components of the care bundle.

**Change Theory**

The nursing process was the preferred change model utilized in this quality improvement project. According to Udod and Wagner (2021), the nursing process theory constitutes four major phases: assessment, planning, implementation, and evaluation. In the assessment phase, the researchers identified the high prevalence rate of HAP among patients on the 4th-7th surgical floor of Northern California Hospital. The team responsible performed thorough data analysis and noted that patients who have been bedridden for around 48hrs were at risk for HAP. Besides, further research revealed that there was a lack of knowledge on the effective implementation of the ROUTE bundle by the PCTs working on the aforementioned floors.

In the planning phase, the quality improvement team collaborated with the nurse managers to create awareness of the involved problem at the facility. The management and other members of staff in the facility were consulted, which led to the obtainment of staff buy-in. As a result, the project entered the implementation stage, where the PCTs were surveyed and given the ROUTE bundle flyer. Finally, an evaluation of the effectiveness of the selected intervention – the ROUTE care bundle – was done. The data on the rates of HAP before and after the implementation of the bundle are limited due to the time constraints. However, the results section gives an overview of findings of this project.

**Methods**

Several methods were utilized in this quality improvement project in the collection of information, analysis, studying, as well as the implementation of the preferred intervention in
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effort to reduce HAP in the site of study. The Methods section includes Context, SWOT Analysis, PDSA Cycle, Cost Benefit Analysis, Gantt Chart, and Interventions.

Context

Various tools were used to gather relevant information for a comprehensive description of the context of the 3rd, 4th, 6th, and the 7th floor of Medical Surgical floor of a Northern California Hospital. Demographically, patients who are admitted on these floors are inclusive to all adult ages, who have undergone surgical procedures for different diseases and conditions. The tools that were used are the strength, weakness, opportunities, and threats (SWOT) analysis, Plan-Do-Study-Act (PDSA) cycle, a cost-benefit analysis, and a Gantt chart.

SWOT Analysis

The researcher performed a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of the study to evaluate its feasibility, barriers, and potential for long-term success. A figure of the SWOT analysis is illustrated in Appendix 4. One of the strengths of this quality improvement project is the availability of a standardized tool – ROUTE Bundle – for implementation in the project. The availability of this tool simplifies the implementation of the project since it provides the relevant guidelines for preventing the occurrence of HAP among those patients who are bed bound for more than 48hrs. Another strength of this project is the availability of data bundles and educational resources (printing and toothbrushes supplied by the hospital) that were used in equipping the PCTs with the relevant knowledge and skills to implement the evidence-based practices (EBP) to prevent HAP. This project is also very cost-effective since it entails the implementation of an intervention that is less costly. For instance, a single toothbrush is around 13 cents when purchased in bulk, data bundles are affordable, and digital devices such as smartphones with zoom are readily available. Finally, the support given
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by the floor staff and managers of the involved healthcare facility was another strength of the project.

The weakness that was identified in this project is the lack of sufficient time to provide comprehensive education to the PCTs on the ROUTE Bundle. To ensure that the PCTs gain in-depth insight into the effective strategies of implementing the ROUTE Bundle and to ensure its sustainability over a protracted period for improved outcomes, sufficient time, for instance, 4-6 months, is needed to educate the PCTs. However, the project was carried out only for two months, which involved the introduction and implementation of the quality improvement initiative. Insufficient preparation of the PCTs was thus a resulting weakness of this project.

A needs assessment also focused on the opportunities associated with the project. The findings of the assessment of the facility’s environment identified the readiness to receive education as the opportunity for the success of this project. The results of the initial assessment showed that the PCTs lacked knowledge on the implementation of the ROUTE Bundle and that there was a poor organization of care bundles; however, the PCTs were willing to be enlightened on EBP care bundles for improving clinical care delivery.

Besides, the increased prevalence of HAP in the study site also presented an opportunity to implement this quality improvement project to bring about the desired change; reduction of HAP rates among those who are hospitalized on the selected floors. The desire for improved patient outcomes and quality of life after discharge, the need for reduced hospital stays, and a reduction in the cost of treatment are other opportunities that were associated involved in this project.

Based on the HAP Mobility Workgroup, the HAP rate was 2.3 (20 out of 8,795 patients) with a target goal of 2. When paralleling the other hospitals in the northern region, this specific
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location fell upon the middle tier scale with lowest rating being 1 and highest being 4.3. Teeth brushing metrics on Medical-Surgical/Telemetry floors scored a 67.8% with the norther region averaging a 72.8%. An indecent of HAP can increase a hospital visit from 7 to 9 days and is a leading cause for ICU infections and close to half of all antibiotic use (Goldman & Schafer, 2012). Finally, there are extra costs associated with the treatment of a patient with HAP up to $40,000 per patient that significantly increases the cost of health care (Giuliano et al., 2018). Therefore, addressing these issues were considered vital opportunities in this study.

Currently, the key threat to this project is the lack of adherence to ROUTE Bundle practices by the 25 PCTs after undergoing education on the supplied material. There is a moderate level of likelihood that the PCTs who are trained on the appropriate implementation of this case bundle will not effectively adhere to the required best practices; hence, preventing the project from achieving its goals. Resistance to this new quality improvement initiative was another threat to this project. Since the target of the project was only 25 PCTs, there was the threat of resistance to change from other PCTs who did not undergo education in this care bundle.

**PDSA Cycle**

This project utilized the Plan, Do, Study, Act (PDSA) model to guide the execution process as follows. In the first stage (planning), the project defined details including; who, what, when, and how. In this regard, the planning and organization of the project-related activities was carried out and outlined in a Gantt Chart (*Appendix 5*) to ensure that all activities are achieved within the set timeline (Kaleeva, 2022). In addition to this, the planning stage of this project included a thorough literature review to identify and retrieve peer-reviewed articles on the phenomenon under investigation; the prevention of HAP through the implementation of the ROUTE Bundle – oral care – at the selected site of study. Also, a physical visit to the 3rd, 4th, 6th,
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and the 7th floor Medical Surgical and ICU floors of a Northern California Hospital was done by the researcher group. An environmental survey was performed to examine the status of the floor in terms of utilization of HAP prevention strategies and identifying any barriers that may be forestalling the progression of this project. This entailed the assessment of the staff’s current protocol, PCTs knowledge of Bundle ROUTE care, and surveying PCTs and healthcare professionals on their personal outlook on limitations to quality oral care.

In the second phase (Do phase) the data will be collected from and presented to the stakeholders, the hospital floor staff, and the management of the hospital, in particular, to inform and persuade them of the need for the implementation of the selected quality improvement initiative (Kaleeva, 2022). Following their acceptance, education on the utilization of the ROUTE Bundle was offered to 25 PCTs on the floor. A copy of PCT Daily Checklist and a “ROUTE Bundle” flyer were given to each PCT and floor leadership on the 3rd, 4th, 6th, and the 7th floor as a reminder to the PCTs to implement the care bundle. In the third phase (Study), an assessment of what the PCTs have learned about the preferred care bundle was carried out to determine the potential success of the project.

The PCTs were audited during the change period to determine if the material was memorable and utilized by the staff and if there were deficiencies on such implementation. In the final stage (Act), the education plan was revised based on the recommendations from the Study phase to improve the quality of education of PCTs on the implementation of the ROUTE Bundle. The PDSA cycle and ROUTE Bundle Flyer are illustrated on Appendix 3 and 6.

Cost-Benefit Analysis
An evaluation of the cost of this quality improvement project revealed that the project was cost-effective as follows. Direct costs of implementing this project include the cost of creating the flyers (printing), and transportation costs for researchers. There were also incentives
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Following the successful implementation of this quality improvement project, the hospital could lower costs by reducing HAPs. With the HAP rate of 2.3, with a goal rate of 2 would decrease the number of patients from 20 to 17 out of 8,795 patients. Since the cost of treating 1 patient with HAP is $40,000 (Louise et al. 2016), spending could account for at most $800,000 for 20 patients to $680,000 for 17 patients. If proper application of the oral care bundle led to a reduction in the number of patients developing HAP from to an occurrence of 2 could lead the hospital with a cost savings of $120,000. This means that there is a significant reduction in the cost that is associated with the decreased treatment of patients who develop HAP on the hospital floor.

On top of the potential financial savings of this quality improvement project, the improved outcomes of patients are another benefit that was realized. ROUTE bundle’s structured implementation contributes to a tremendous reduction of the patients’ risks and exposure to HAP-causing pathogens in the surgical unit of the hospital. In addition to this, there could be notable improvement in the satisfaction of patients with the treatment that they receive. Therefore, this quality improvement project was not only associated with financial benefits but also improvement in the quality of care.

**Gantt Chart**

Quality improvement projects require a well-designed and organized set of activities. Therefore, to facilitate the successful completion of the project, the researchers organized the activities in a Gantt Chart to set a timeline for major activities as illustrated in Appendix 6. Structurally, the Gantt chart extends over 2.5 months that were taken to prepare and complete the
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project. The timeline is based on the PDSA cycle, and it begins on the 1st of September 2022 and ends on the 10th of December of the same year.

**Intervention**

PCTs education is one of the interventions that was implemented in this project. A total of 25 PCTs were taken through training on the effective implementation of the ROUTE bundle. All contents of the ROUTE Bundle were presented to the PCTs, whereby they were reintroduced to the importance of oral care reassuring effective utilization or implementation in the prevention of HAP. Surveying took place on five different days, where the PCTs were surveyed and reintroduced to all the components the bundle each day and repeated PCTs were given a refresher, the ROUTE Refresher Script can be seen in Appendix 7. For example, the necessity of maintaining oral care, with the usage of toothpaste and toothbrush, hand hygiene, and of suction supplies.

Afterwards, the PCTs were rewarded for their time and given the oral care bundle flyer and responses were recorded using a HAP Response Tool for data collection (see Appendix 8). During the AM and PM shifts, the PCTs performed the following:

i. The PCTs offered oral care to patients on the floor where they were assigned. It was recommended that PCTs should offer oral care to patients after every meal. Also, it was expected that the PCTs should perform oral care, at least twice every day – during the AM and PM shifts with patients in a chair or sitting up.

ii. After their shift, the PCTs were required to document the number of times they successfully managed to offer oral care and the barriers they encountered during the implementation of the intervention in the oral care checklist.

iii. Finally, the PCTs reinforced the importance of oral care to patients and their family members on the importance of adherence to oral care bundle, whereby an emphasis was
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placed on brushing of teeth and tongue. In this regard, PCTs engaged in the education of patients and their families when, how, and the number of times (after every meal) to brush their teeth and clean their tongue to reduce resistance and improve its acceptance for its successful implementation.

Results

Following the introduction of the ROUTE bundle, there was a significant increase in the implementation of oral care by PCTs on the floors that were under study. Out of the 25 PCTs who took part in the study, 23 (92%) were able to give oral care to their patients while 2 (8%) could not; only 4 (16%) were able to complete 2x/day teeth cleaning. When surveying the usage of placing a toothbrush on a tray to increase patient intervention, 76% of PCTs did not believe it would be a useful intervention. Based on the HAP response recording tool, most of the PCTs in the study were able to conduct oral care on patients during their shifts. Results show that a majority of the PCTs on the AM shift managed to implement oral care to patients under their care. Results also revealed that PM shifts for PCTs can become challenging to accomplish hygiene tasks due to reassignments to sitters with most AM shift PCTs being responsible for achieving required daily cleanings.

The findings reveal that no PCT adhered to the required 3 times a day oral care protocol. The rate is attributable to various barriers to the implementation of oral care in the units that were studied. Major barriers are: First, is inadequate staffing. There was a shortage in the number of PCTs on all the floors that were visited. There was a high PCT-to-patient ratio of 1:16. Understaffing was a problem, especially during the night shift where there was no PCT at all on some floors with 84% of staff identifying the shortage as one of the lead barriers for accomplishing there tasks. The findings also reveal that there is a lack of teamwork among
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members of staff, further making it difficult for the PCTs to execute oral care. Third, data from the HAP Response tool show that 9 PCTs did not know what the ROUTE Bundle is. Finally, there was a lack of motivation among patients to perform oral care on their own.

The findings also show that some of the floors that were included in the study had poor-quality oral care resources. Particularly, the unit clerk on the 7th floor reported that the patients have stated reiterated the issue of poor-quality toothbrushes, toothpaste, and mouthwash. Bristles of the toothbrushes given to patients on this floor fall apart, while the toothpaste and mouthwash had unpleasant tastes that patients did not want to use them. The most commonly used documentation was the hygiene section in Epic (18), and Flow chart (2) with statements from PCTs concerned that not every floor utilizes the same protocol for using the checklist.

Discussion

This project aimed to decrease the incidence of HAP on the 3rd, 4th, 6th, and 7th floors of the Medical-Surgical and ICU units of the Northern California Hospital. Based on this aim, it was hypothesized that the implementation of oral care bundle by PCTs reduces the rate of HAP among hospitalized patients who are bend bound for more than 48hrs.

Limited timing did not allow for data on the reduction of HAPs, however, the surveying created an opportunity for the hospital and future projects to build on further outreach and discovery. Previous studies that found that the implementation of oral care and the broader used of the ROUTE Bundle to patients has a high efficacy in preventing the occurrence of HAP (Zhao et al. 2020; Mitchelle et al. 2019; Alja’afreh et al. (2019; Munro & Baker, 2018 and Chipps et al. 2020). While prior research also identified that the higher the number of times oral care is implemented there is an increase chance of lowering the risk of HAP (Mitchelle et al. 2019).
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Therefore, care providers who are responsible for caring for bed-bound patients should provide oral care regularly during their shifts.

This study revealed the importance of education and training of care providers on oral care to facilitate the reduction of HAP among bed-bound patients. A relatively large number of the PCTs in the study were not aware of what the ROUTE Care Bundle entails. Therefore, they lack the relevant knowledge and skills to implement oral care to patients; hence, the need for training and education. Existing literature reveals that education of care providers of care bundles enhances adherence and frequency of oral care, which reduces the propensity of HAP in patients (Jansson et al. 2018; Chipps et al. 2020; and Rello et al. 2012). Education encourages a positive patient safety culture that leads to adherence or compliance among care providers. Care providers who are educated and trained on the ROUTE care bundle exhibit higher adherence and compliance with the implementation of the intervention. These authors found that the rate of compliance is highest when care providers are being trained and immediately after training. Besides, education equips care providers with effective knowledge and skills to deliver high-quality oral care.

Even though the study proved the efficacy of oral care in reducing HAP. It revealed various barriers to the implementation of this care bundle. Poor quality oral care materials hamper the successful delivery of oral care to patients. For instance, the unpleasant taste of mouthwash or toothpaste as mentioned by staff. The lack of a standardized oral care protocol also inhibits adherence to the care bundle. Therefore, all healthcare facilities with patients who are bed-bound should have oral care protocol (Mitchelle et al. 2019 and Sarangi, Simon, & Sarangi, 2021). Besides, interdisciplinary teamwork between nurses and PCTs should be encouraged (Munro & Baker, 2018; Warren et al. 2019; and Gowing et al. 2016). This will help
IMPACT OF PCTS IN THE PREVENTION OF HAP THROUGH A ROUTE BUNDLE WITH AN EMPHASIS ON ORAL CARE AND POSITIONING THE PATIENT OUT OF BED AND IN A CHAIR in reducing the care provider-patient ratio and ensure that all patients receive oral care after every meal.

Conclusion

The project aimed to measure the amount of PCTs that were surveyed using the ROUTE Bundle as a tool to bridge an outcome of decreasing HAP on the 3rd, 4th, 6th, and 7th floors of the Medical-Surgical and ICU units of the Northern California Hospital. The aim was non-conclusive, due to the limited time constraints and data, however it can be used for future frameworking to reduce HAPs in hospitals and can be further deployed for long term studies. The project also revealed that education and training of care providers on oral care bundles are important. Besides, the project reiterates that appropriate resources for oral care must be provided, there must be teamwork among nurses and PCTs, and a standardized oral care protocol must be implemented to establish confidence in patients and to further motivate them in their role of direct care.

Limitations and Recommendations for Future Studies

One of the limitations of the study is a small sample size and geographical location (Medical Surgical and ICU unit of the Northern California Hospital). The sample size is not representative of the sample population not only in California but in the US; therefore, the findings lack external validity and reliability due to susceptibility to generalization. In this regard, it is recommended that future studies should use a large sample size and involve more healthcare facilities in California and beyond. Another limitation of the study was the use of the PCT Checklist, which is redundant as the PCTs found it ineffective. Therefore, future studies should focus on the use of more effective forms of documentation such as EPIC and flow charts.
IMPACT OF PCTS IN THE PREVENTION OF HAP THROUGH A ROUTE BUNDLE WITH AN EMPHASIS ON ORAL CARE AND POSITIONING THE PATIENT OUT OF BED AND IN A CHAIR for improved efficiency in documentation. Another limitation of the study was the limited time within which it was completed.

The entire study took only two and a half months. Specifically, the training of PCTs on oral care and its implementation were all done within six weeks. Such a short duration was not sufficient to equip the PCTs with high-quality knowledge and experience to offer high-quality oral care. Besides, the implementation time was very short to arrive at a solid conclusion on the impact of oral care bundles on HAP. In this regard, future studies should spend more time on educating and training care providers and care bundle implementation.
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References


Appendices

Appendix 1: ROUTE Bundle Flyer

**ROUTE BUNDLE**

**R:** Respiratory Care/Reduced Sedation
Incentive Spirometry (10 breaths every 2 hours while awake)

**O:** Oral Care
Supervised or assisted oral care 2x a day with a soft toothbrush
Chlorhexidine rinse (2x a day unless restricted)

**U:** Up
Walking minimum 20 feet 2x a day
Up for meals
Head of bed up 30 degrees

**T:** Tube Care
Check feeding tube position after each feeding
Reassess NGT need daily
Check tube patency

**E:** Education
Educate and engage patients and family on Incentive spirometry
use, oral care, and positioning
Appendix 2: 5 Why’s

5 Whys | Problem Statement: Why we should focus on educating PCTs to reduce the incidence of Hospital Acquired Pneumonia (HAP)

1st Why? ...
... Because PCTs are frontline workers and have the most 1 on 1 time with the patients.

2nd Why? ...
... Because the role of a PCT includes providing oral care.

3rd Why? ...
... Because research has shown that oral care reduces the incidence of HAP.

4th Why? ...
... Because reducing HAP provides better quality of care for the patients and also reduces the overall hospital costs.

5th Why? ...
... Because there are barriers to performing oral care involving minimal education on route bundles and time restraints.

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Appendix 3: Fishbone (Ishikawa) Diagram

Fishbone Diagram | Root Cause Analysis for Reducing HAP

PEOPLE | PROCESS | POLICY
---|---|---
NURSING STAFF | LACK OF COMMUNICATION | LACK OF DEFINED PROTOCOL
PATIENT CARE TECHNICIANS (PCT) | PERCEIVED INSIGNIFICANCE | INSUFFICIENT STAFF
PHYSICAL THERAPISTS (PT) | LACK OF DEFINED PROTOCOL | LACK OF TRAINING
RESPIRATORY THERAPISTS (RT) | LACK OF DOCUMENTATION | PATIENT CONTRACTS HAP
ATTENDING PHYSICIAN / SURGEON | TIME CONSTRAINTS | (HAP RATE > 2.0)
TOOTHPASTE / TOOTHPASTE / GELS | DEMANDING TASKS | FAST PACED MS FLOORS
SUCTION SUPPLIES | STAFF CULTURE | LEARNING
MOBILITY / LIFT EQUIPMENT | 
READY ACCESS TO SUPPLIES | AT-RISK PATIENTS CONTRACTS HAP
EQUIPMENT / SUPPLIES | TIME | NORTHERN CALIFORNIA HOSPITAL

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Appendix 4: SWOT Analysis

**Strength**

- A hospital-wide standardized tool (ROUTE Bundle)
- Availability and reminder via EPIC with annotation area to document the performance of oral care during shift.
- PCT checklist – listing oral care as a task to be completed for each patient each shift.
- The Quality Department closely monitors the rates at which hospital-acquired pneumonia infections occur.

**Weakness**

- Patient: PCT ratio is exceeding the individual PCT limits each shift.
- Overall staffing is stretched thin and the patient: staff ratio limits the time staff can be with patients. PCT’s are prioritizing patient needs – oral care falling low on priority list.
- Overall lack of education and understanding of HAP – what it is, how it often occurs and how to prevent.
- The ROUTE bundle is a validated design and concept – the majority of staff have never heard of the ROUTE bundle/ acronym.
- The ROUTE bundle is not used or being implemented.

**Opportunities**

- Educating PCT’s on the importance of oral care and how it relates to the reduction in HAP rates.
- Educating PCT’s regarding the ROUTE bundle, what it is, how to implement it, and how it can be used to reduce HAPI rates.
- Address concerns and facilitate as lesions to hospital administration regarding barriers PCT’s face towards the implementation of oral care at each shift for each patient.

**Threats**

- Staffing – a lack of PCT’s on hand for all shifts.
- Patient: PCT ratios.
- Patient non-compliance.
- Staffing non-compliance.
- Educational barriers – inability to understand the importance of oral care as it relates to HAP reduction.
- Educational barriers – as it relates to ratios and PCT’s not having enough time to complete their daily tasks. PCT’s won’t have time for education to occur/comprehend the importance while USF students are on the floors.
Appendix 5: PDSA Cycle

1. **Plan Stage**
   - Set a gantt chart for all project-related activities
   - Conduct a literature review to identify key elements
   - Set a date to conduct a physical visit of the medical surgical floor for an environmental survey

2. **Do Stage**
   - Present implementation idea to stakeholders
   - Review the Route Bundle and Checklist material to at least 10 PCTs on multiple hospital floors
   - Place checklist material and ROUTE Bundle guides at easy access points of the floor

3. **Study Stage**
   - Audit knowledge proficiency of ROUTE Bundle utilization
   - Analyze deficiencies on the floor that prevent proper implementation
   - Survey the usage of the checklist and ROUTE Bundle

4. **Act Stage**
   - Project will be revised based on study findings to improve quality utilization
   - Communicate with stakeholders on the usage of this project on all floors of the hospital

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Appendix 6: Gantt Chart
IMPACT OF PCTS IN THE PREVENTION OF HAP THROUGH A ROUTE BUNDLE WITH AN EMPHASIS ON ORAL CARE AND POSITIONING THE PATIENT OUT OF BED AND IN A CHAIR

Appendix 7: ROUTE Refresher Script

ROUTE Refresher Script

Hi, my name is __________. I am a clinical nursing student from University of San Francisco (USF). We are implementing a quality improvement project to reduce the rates of Hospital Acquired Pneumonia that includes a short survey and education material. We have (coffee/pastries/Sharpies and multicolor pens) for your time. It should only take a few minutes.

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<tr>
<th>Name</th>
<th>Unit</th>
<th>PCT Y/N (if so- note which unit)</th>
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Questions:

1. During your shift, are you able to do oral care on your patient assignment?  
   YES NO
   If yes...

2. How many times per shift?  
   _______________ [ Morning (AM) / Afternoon (PM) / Night (NOC) ]

3. What are some of the barriers to get this accomplished?

4. Do you know what the ROUTE bundle is?  
   YES NO

This material was already created by Katers so today we will just have a quick refresher on the ROUTE bundle and get your feedback.  
(Give handout to follow along with)

ROUTE stands for: (Relevance)

Respiratory Care/Reduction and Sedation:
- Incentive spirometry (10 breaths every two hours while awake) (PCT)
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- Not using too many sedative medications like valium or ativan (Nurses and Physicians)

Oral care:
- Oral care twice a day with a soft toothbrush (PCT)
- Chlorhexidine rinses twice a day if its ordered by the doctor (PCT)

Up and walking:
- Walking 20 feet two times a day (PCT)
- Sitting up in a chair when the patient is eating (PCT)
- Head of bed up at least 30 degrees (PCT)

Tube care:
- Checking if the tube is in the right position for feedings (Nurses)
- Seeing if the patient still needs the tube (Nurses)
- Check if its still working properly (Nurses)

Education: Remind patients to use (PCT)

Our main focus is on Oral care since our research shows that it is really important when trying to decrease hospital acquired pneumonia (HAP) because all the germs in the mouth multiply so quickly, and easily spread into the lungs making people sick.

We want to make sure that patients are getting their teeth brushed after every meal, which is around 3 times a day.

Questions:

5. We were thinking of some ways that could help motivate patients to brush their teeth more. Do you think working with nutrition to have a toothbrush on the meal tray is a good idea?
   YES   NO

6. Do you have any ideas on how we can increase oral care and tooth brushing rates on your floor?

7. Where do you document oral care?

PCT Checklist
This checklist is an aid to help keep track of ROUTE tasks. They will be available with the Nurse manager.

Thank you so much for taking the time to help us! Do you have any questions or feedback for us?
IMPACT OF PCTS IN THE PREVENTION OF HAP THROUGH A ROUTE BUNDLE WITH AN EMPHASIS ON ORAL CARE AND POSITIONING THE PATIENT OUT OF BED AND IN A CHAIR

PCT Checklist
This checklist is an aid to help keep track of ROUTE tasks. They will be available with the Nurse manager.

Thank you so much for taking the time to help us! Do you have any questions or feedback for us?

AUDIT IF THEY TOOK THE EDUCATION PORTION ALREADY

Questions:

1. What does ROUTE stand for?
   Answer: Respiratory/Reduce Sedation, Oral Care, Up, Tube Care, & Education

2. Where do you document oral care?
   Answer: Show documentation on EPIC

3. Where is the PCT checklist located?
   Answer: With Nursing Manager

Appendix 8: HAP Response Tool

<table>
<thead>
<tr>
<th>Date</th>
<th>Patient Name</th>
<th>Indicate Shift (AM, PM)</th>
<th>Floor / Unit</th>
<th>PCT / RN</th>
<th>1. In your shift assignment, are you able to do oral care on your patient assignment? (Y/N)</th>
<th>2. If yes, how many times per shift?</th>
<th>3. What are some of the barriers to getting this accomplished?</th>
<th>4. Do you know what the ROUTE bundle is? (Y/N)</th>
<th>5. Do you have any ideas on how we can improve and make oral care easier to perform? (Y/N)</th>
<th>6. Do you have any ideas on how we can make oral care easier to perform? (Y/N)</th>
<th>7. Where do you document oral care?</th>
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