The impact of an evidence-based practice education program on the role of oral care in the prevention of ventilator-associated pneumonia

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Evidence-based practice; Oral care; Ventilator-associated pneumonia

Summary
Background: Despite strong evidence in the literature on the role of oral care in the prevention of ventilator-associated pneumonia (VAP), nurses continue to view oral care as a comfort measure with low priority and utilise foam swabs rather than toothbrushes. Although an evidence-based oral care protocol existed and best-practice oral care tools were available, the VAP rates had not significantly decreased even though nurses reported providing oral care.

Objectives: The aim of the study was to determine if an evidence-based practice (EBP) educational programme would improve the quality of oral care delivered to mechanically ventilated patients; thereby, reducing the VAP rate.

Results: Improvement in oral health was demonstrated by a decrease in median scores on the Oral Assessment Guide (pre (11.0), post (9.0)). A t-test analysis revealed a statistically significant difference (p = 0.0002). The frequency of oral care documentation also improved as demonstrated by a positive shift to the more frequent timeframes. The VAP rates have decreased by 50% following the EBP education intervention.

Conclusions: The implementation of an EBP educational programme focused on patient outcome rather than a task to be performed improved the quality of oral care delivered by the nursing staff.

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Introduction

The evidence in the literature is robust on the role of oral care in the prevention of ventilator-associated pneumonia (VAP), yet nurses continue to believe oral care is a comfort measure (Grap
Evidence-based practice (EBP) refers to the conscientious, explicit and judicious use of theory-derived, research-based information in making decisions in care delivery to patients (Fain, 2004, p. 75). Using EBP provides a consistent approach to quality patient care thereby resulting in less variability (Ervin, 2005). The major components of the EBP education programme were a review of the literature on the role of oral care in the prevention of VAP and a competency checklist inclusive of an observed performance of oral care by each member of the staff. Feedback was given during the observation. The intent of this method of education was to improve nursing staff skills and strengthen areas of their practice that would result in improved patient outcomes (Ervin, 2005).

Methods

This quantitative study with a pre- and post-intervention design was conducted at an 854 bed tertiary academic medical centre in the southeastern United States. The population studied consisted of all adult intensive care unit patients mechanically ventilated for at least 24 h. The adult intensive care units consist of pulmonary/medicine, general surgery, vascular surgery, cardiothoracic surgery, neurosurgery and trauma patients. The total bed capacity for these units is 75. An assessment of the oral cavity and oral care documentation was performed before and after the EBP educational program. The Oral Assessment Guide was the tool selected for this study.

The Oral Assessment Guide (OAG) by Eilers et al. (1988) comprises eight categories reflective of oral health and function for bone marrow transplant patients. The categories include voice, swallow, lips, tongue, saliva, mucous membranes, gingival and teeth. Each category is descriptively ranked normal, mild compromise and definite compromise with normal assigned a value of one and definite compromise a value of three. The score is the sum of the eight categories with a range of 8–24: a lower score is indicative of better oral health. The interrater reliability of the OAG was reported as 0.912. Content validity was supported by a panel of experts. The OAG was determined to be a useful tool in the evaluation of oral status.

In a study by Andersson et al. (1999), the reliability of the OAG was validated and utilised to evaluate the oral status of oncology patients. The OAG underwent minor modifications one of which included the combination of categories mucous membranes and tongue. The OAG was substantiated as a means to detect changes in the oral cavity and indicate the need for oral care measures. Barnason et al. (1998) also adapted the OAG with removal of the voice and swallow categories to accommodate an orally intubated population to assess the effect of type of endotracheal tube securement on oral mucosa and facial skin integrity. The overall reliability \(r = 0.92\) was again demonstrated.

In this study, based upon the work of Andersson et al. (1999) and Barnason et al. (1998), the OAG...
was further modified with permission to five categories: lips, mucous membranes/tongue, gums, teeth and saliva. The scores range from 5 to 15 (Fig. 1). Interrater reliability and content validity were not conducted in this study. The critical care clinical nurse specialists jointly conducted each oral assessment. The oral assessments were conducted unannounced and occurred on both shifts per unit. In conjunction with conducting the oral care assessment, documentation of oral care for the previous 24 h was collected. The documentation frequency was categorized as every 2—4, 4—6, 6—8, 8—12 and 24 h. The longest period of time without oral care documentation determined the frequency category. Data collection occurred 11 times over a period of 1 week and required approximately 90 min each time.

The evidence-based educational programme developed consisted of several components. Posters displayed in each of the units pointed out the highlights of the existing best-practice oral care protocol. Storyboards were designed to outline the role of oral care in the prevention of VAP. The underlying theme of the storyboard was to dispel the myth that oral care provides a comfort measure and thus has a low priority in the intensive care unit. The inherent protective mechanisms of the oropharynx and pathogenesis of oral bacterial colonisation were featured, thereby supporting the association among oral care, oral colonisation, anatomy of the intubated or tracheostomized respiratory tract and ventilator-associated pneumonia. In addition, research studies were presented to support the use of toothbrushes over the use of foam swabs. Important aspects of the oral care protocol were emphasised. Published data from numerous hospitals supporting the evidence that oral care protocols can make a difference in the reduction or elimination of VAP were included. The storyboards were utilised for self-learning as well as individualised or small group in-services by either the critical care clinical nurse specialists or the unit based educators. The storyboard content was posted on the hospital intranet for self-learning as well. Nurses and nursing assistants were required to complete a competency checklist with an observed performance of oral care based on the oral care protocol. Direct feedback was provided on the performance. Twenty to thirty minutes were needed to complete the components

<table>
<thead>
<tr>
<th>Category</th>
<th>Numerical and descriptive ratings</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Lips</td>
<td>Smooth and pink</td>
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<tr>
<td>Mucous membranes/Tongue</td>
<td>Pink and moist</td>
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<tr>
<td>Gums</td>
<td>Pink and firm</td>
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<tr>
<td>Teeth</td>
<td>Clean, no debris</td>
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<td>Saliva</td>
<td>Watery</td>
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Figure 1 Oral assessment guide.

Modified from Eilers et al. (1988) with permission.
of the EBP educational programme. Two months after the EBP educational programme was completed, the post-intervention oral assessments were conducted. The assessments were performed in the same manner as the pre-intervention phase.

Data/results

Patients mechanically ventilated for at least 24 h in any of the adult intensive care units were included in the sample. The pre-education sample size was 55. Three patients were excluded (N = 52) from the oral care assessment for inability to visualise the oral cavity, i.e. bite blocks and patient uncooperativeness. In the post-education phase, the sample size was 61. A total of four patients were excluded (N = 57) from the oral assessment for inability to visualise the oral cavity, i.e. jaws wired, bite block and oral surgery. The overall acuity in the adult intensive care units was determined by a standardized patient classification system. There was no significant difference (p = 0.21) in acuity during the data collection periods.

A two-tailed \( t \)-test analysis was used to determine the impact of the EBP educational programme. The OAG scores ranged from 5 to 15 with 5 being normal, 6–10 representing mild compromise and 11–15 representing definite compromise. There was a difference in the median OAG scores, pre (11.0) and post (9.0). A statistically significant difference (p = 0.0002) was detected between the pre- and post-groups (Table 1).

The frequency of oral care documentation post-education improved with an increase in every 2–4 h category as specified in the oral care protocol. There was also an increase in documentation every 4–6 and 6–8 h showing a positive shift in the overall compliance with the oral care protocol (Table 2). With the improvement in the quality of oral care provided by the nursing staff following the EBP educational programme, the institution’s VAP rate has decreased by 50%.

Discussion

There are several limitations in this study. The convenience sample in addition to the small size limits generalisability. Yet, in spite of the sample size, a statistically significant difference exists. The modified OAG used in this study has not been validated in the critical care setting with mechanically ventilated patients. Furthermore, the OAG was designed to obtain a baseline assessment and to follow patients along a continuum of care to guide oral care needs. In this study, a baseline assessment prior to mechanical ventilation was not conducted nor were serial oral assessments. The education to the nursing staff was provided by multiple educators, the two clinical nurse specialists and four unit based educators. To promote consistent delivery of information, the unit based educators received training on the content and educational materials from the clinical nurse specialists. Of note, 84% of the intensive care unit nursing staff (N = 290), nurses and nursing assistants, completed the EBP educational programme.

Conclusion

The EBP educational programme demonstrated an improvement in the quality of oral care provided to the patients in the adult intensive care units as indicated by the decrease in the median OAG scores. Futures studies are needed in this patient population to validate the modified OAG tool. Based upon our statistically significant results, we recommend an EBP educational programme that reinforce the role of oral hygiene in the prevention of nosocomial infections among mechanically ventilated patients and teaches strategies for delivering best care. Moreover, multifaceted educational interventions are necessary to promote the change from task to outcome focused.


