Original Articles

Oral care practice for the ventilated patients in intensive care units: a pilot survey

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Abstract

Introduction: Ventilator-associated pneumonia (VAP) is the most common nosocomial infection in intensive care units (ICUs). One factor causing VAP is aspiration of oral colonisation, which may result from poor oral care practice. Oral care using tooth brushing can prevent formulation of dental plaque that can be a reservoir for microbes causing VAP.

Methodology: A cross-sectional survey was conducted among 124 nurses, using a self-administered questionnaire, to determine methods used, frequency, and attitude of nurses toward oral care provided to mechanically ventilated patients in Malaysian ICUs.

Results: Methods for oral care and their frequency of use varied between nurses even in the same unit. Cotton with forceps was used by 73.4% of the nurses. Some nurses used forceps and gauze (65%) or spatulas and gauze (36%). Toothbrushes were used by 50.8% of the nurses. Nurses in this hospital reported to have positive attitude toward providing oral care.

Conclusions: The survey showed the need to have standardised oral care protocols in ICUs to improve quality of oral care provided to ventilated patients.

Key words: ventilator-associated pneumonia; nursing practice; attitude; oral hygiene; oral care


(Received 06 October 2010 – Accepted 01 April 2011)

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Introduction

Ventilator-associated pneumonia (VAP) is the most common complication in intensive care units (ICUs). This complication contributes to delayed recovery and increases patients’ mortality rates yet it is preventable. VAP extends patient’s length of stay and leads to increased health care costs and mortality [1-3]. The VAP incidence rate was reported to be 26.5% for three ICUs in Malaysia [4]. A number of quality improvement initiatives, involving the implementation of ventilator care bundle interventions are required to reduce mortality due to VAP [5,6]. These interventions include head-of-bed elevation, daily interruption of sedation to reduce time on mechanical ventilation, prevention of deep vein thrombosis, as well as peptic ulcer disease prophylaxis and achieve significantly better outcomes than when they are implemented separately [5-7].

Currently, there is limited data on the incidence of VAP in relation to oral care. Aspiration of oral colonisation has been identified as one of the common causes of VAP in the ICU, as a result of poor oral care [8]. Effective oral care can prevent the formation of dental plaque, which often provides a reservoir for the microbes causing VAP [1]. The oral antiseptic chlorhexidine gluconate and subglottic suctioning have also been identified as effective strategies for preventing VAP [9]. Tooth brushing has been suggested every 12 hours in a revised oral care policy [7]. Suctioning of oropharyngeal secretions and tooth brushing, together with a ventilator care bundle, may improve prevention of VAP [10]. Blamoun et al. [11] indicated that implementation of a ventilator care bundle, oral care policy and subglottic suctioning for 12 months significantly reduced the rate of VAP.
Traditionally oral care in the ICU has been focused on patient comfort rather than plaque removal [12,13]. Cotton swabs are commonly used for cleaning patient’s teeth, gum and tongue. Although cotton swabs are able to stimulate the mucosal tissues effectively, they are ineffective for removing plaque in between the teeth [14,15]. Nurses prefer to use cotton swabs because they are convenient, require little set-up, and clean faster than tooth brushing [16,17]. In the high-pressure and highly technological critical care environment, oral care is considered a low priority [12, 18]. A study found that 9 out of 10 nurses favoured foam sticks to toothbrushes for cleaning the oral cavity of intubated patients [16]. Similarly, Jones et al.[19] also found foam sticks to be highly preferred for oral care, as used by 88.5% of the nurses in the ICU. An observational study found that nurses varied the type and technique of the oral care they employed, possibly as a result of the vast array of cleaning tools provided [20]. The reason for this finding could be that the nurses were not aware of the importance of tooth brushing for critically ill patients, so they chose their preferred method even when toothbrushes were available [16]. Another barrier to oral care by tooth brushing is the endotracheal tube, [13,20] mainly because dislodging the endotracheal tube is life-threatening [12,21].

A small head toothbrush is preferred for intubated patients [21,22]. Studies also have recommended brushing with a child’s toothbrush at least twice a day for more effective dental plaque prevention in mechanically ventilated patients [14,15,23]. Although there is limited data associating dental plaque removal with reduced incidence of VAP [24], colonization of dental plaque with respiratory pathogens was found to be correlated with occurrence of pneumonia and nosocomial infections [25]. There are a number of studies addressing the methods for oral care in ICUs worldwide. There are a number of studies addressing the methods for oral care in ICUs worldwide [1,12]; however, there is limited data available for Malaysia. This survey therefore describes the methods used for the oral care of the mechanically ventilated patients in Malaysian ICUs and the corresponding frequencies as well as the nurses’ attitude toward providing oral care. The results of this survey can be used as baseline data to develop guidelines for providing oral care in our ICUs.

Methodology

Study design

This was a cross-sectional survey elaborated at a tertiary government referral hospital in Kuala Lumpur, Malaysia, with 2,375 beds distributed in 82 wards of 22 disciplines. All adult ICUs in the hospital, namely medical surgical, neurology, urology, and post-infarction care, involving a total of 39 beds and 180 nurses were included in the survey. The ratio of nurses to patients was about 1:1 per shift in all ICUs. Participants

A sample size of 82 participants was estimated based on Snedecor & Cochrane sample size calculation [26]. Our survey included all registered ICU nurses or ward managers who were caring for ventilated patients. Student nurses and registered nurses posted to the unit for their post-basic critical care course were not included in the survey.

Survey instrument

A self-administered questionnaire was adapted from an American study by Binkley et al. [27] The researchers modified the questionnaire to adapt to the Malaysian context and practice. The questionnaire was peer reviewed by seven experts, namely two anaesthesiologists, one surgeon, one nurse manager, and three nurses with Post-Basic Critical Care qualification. The expert panel agreed on the survey items and supported the number, format and validity of the questions posed. Only one question in the demographic profile (the nurses’ highest qualification) was rephrased for greater clarity. Experts also agreed that the sampling of the questions was adequate and reflected the nurses’ practice of oral care and supported the face validity. Cronbach alpha for eight attitude items was 0.66. Cronbach alpha values are quite sensitive to the number of items in a scale and values lower than 0.7 are common with less than 10 items [28]. The questionnaire consisted of five sections. Section one focused on the protocol in the unit, while section two concerned the knowledge of VAP’s mode of transmission. Findings from section two will be reported in another paper. Section three was related to the nurses’ practice on oral care. In this section, nurses were asked about the frequency of oral care and the equipment used, such as cotton and forceps, gauze and forceps, gauze and spatula and moisture agents. Nurses were also asked whether they used manual toothbrushes for patients while the use of a
paediatric toothbrush was not specifically mentioned. Additionally, nurses were asked to identify the type of mouthwash used for oral care. Section three also included questions on the support provided by the hospital; i.e., nurses were asked to respond to questions regarding hospital supplies, equipment and time, using a five point Likert scale of strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, and strongly agree. Section four consisted of eight items related to nurses’ attitude on providing oral care. Questions regarding attitudes were also answered using the five-point Likert scale. In the last section, participants were asked to provide demographical data such as age, level of qualification, type of ICU where they work presently, and length of service.

The questionnaire was pretested on November 14, 2005 in a group of 38 nurses working in an ICU in one of the Ministry of Health hospitals in Kuala Lumpur. The reliability test was not conducted because the main purpose of the trial was to assess the clarity of the questions. Ten nurses completed the questionnaires. There were no further alterations made after the trial.

Ethical considerations

Ethical approval for this survey was granted by the University of Putra Malaysia Medical Ethics Committee. Participation in this survey was voluntary and anonymous. No written consent was taken because participants were considered to have consented if they completed the questionnaire.

Procedures

Data collection was conducted from 1 December 2005 until 22 December 2005. A researcher distributed a pack of envelopes that each contained the questionnaire, an information sheet, and a self-addressed envelope for participants to return the answered questionnaires.

All the nurses and nurse managers in the units were invited to participate in the survey. Nurses, besides the participant’s information sheet they were given together with the questionnaire, were also verbally informed about the research by the researcher or the ward manager.

Data analysis

Collected data were processed using the Statistical Package of Social Sciences (SPSS) 13.0.1 standard version (IBM, Chicago, USA). Response rates and sample characteristics were analyzed using descriptive statistics. In descriptive data analysis, proportions (percentages) were reported.

Results

Response rate

Among a total of 181 nurses working in the four ICUs during the survey period, only 124 nurses completed the questionnaire resulting in a response rate of 68.5%. The nurses’ characteristics are shown in Table 1. In total, 46% of the nurses from the medical surgical, neurology and urology ICUs reported that their units had an oral care protocol. Post-infarction care nurses responded that there was no oral care protocol available. Other nurses stated that an oral care protocol was not available or they were not sure if any oral care protocol existed in the unit. More than 56% of the nurses reported that they have learned about oral care practice either in their basic nursing training or in continuous education programs.

Oral care practices

Nurses responded that they used more than one method for practicing oral care (Table 2). However, the methods for oral care and the frequency of use varied between nurses in the same unit. Cotton with forceps was the primary material used by the majority (73.4%) of nurses. Some nurses practiced oral care using forceps and gauze or spatulas and gauze, at 65% and 36%, respectively. Approximately 50.8% of the nurses reported that they practiced oral care using toothbrushes at least once a day (Table 3). However, 86 (69%) nurses reported that the hospital did not supply the toothbrushes for the patients, while 38 (31%) agreed that the hospital had provided toothbrushes for the patients. Out of 124 nurses, only one indicated that she used chlorhexidine mouthwash, while 72% used glycerine thymol gargle, and 13% mixed glycerine thymol gargle and chlorhexidine.

Nurses’ attitudes toward oral care

Most nurses reported having a positive attitude toward providing oral care for the ventilated patients, with 85% agreeing that oral care is a high-priority procedure for such patients. However, approximately 16% of the nurses responded that the oral cavity is a difficult body area to clean and that this procedure is an unpleasant task (Table 4).
Table 1. Nurses’ characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working experience as a nurse (n = 124)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than one year</td>
<td>6</td>
<td>4.8</td>
</tr>
<tr>
<td>1-3 years</td>
<td>26</td>
<td>21.0</td>
</tr>
<tr>
<td>4-6 years</td>
<td>35</td>
<td>28.1</td>
</tr>
<tr>
<td>7-9 years</td>
<td>20</td>
<td>16.1</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>37</td>
<td>30.0</td>
</tr>
<tr>
<td>Working in ICU (n = 124)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than one year</td>
<td>10</td>
<td>8.1</td>
</tr>
<tr>
<td>1-3 years</td>
<td>41</td>
<td>33.1</td>
</tr>
<tr>
<td>4-6 years</td>
<td>32</td>
<td>25.8</td>
</tr>
<tr>
<td>7-9 years</td>
<td>22</td>
<td>17.7</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>19</td>
<td>15.3</td>
</tr>
<tr>
<td>Position (n = 124)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>121</td>
<td>97.6</td>
</tr>
<tr>
<td>Ward Manager</td>
<td>3</td>
<td>2.4</td>
</tr>
<tr>
<td>First nursing qualification (n = 124)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificate program</td>
<td>22</td>
<td>17.7</td>
</tr>
<tr>
<td>Diploma program</td>
<td>101</td>
<td>81.5</td>
</tr>
<tr>
<td>Degree program</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Highest nursing qualification (n = 124)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Post basic critical care</td>
<td>62</td>
<td>50.0</td>
</tr>
<tr>
<td>Diploma in nursing</td>
<td>56</td>
<td>45.2</td>
</tr>
<tr>
<td>Certificate in nursing</td>
<td>5</td>
<td>4.0</td>
</tr>
<tr>
<td>Shift (n = 121)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office hours</td>
<td>6</td>
<td>5.0</td>
</tr>
<tr>
<td>Shift</td>
<td>113</td>
<td>93.4</td>
</tr>
<tr>
<td>Office hours &amp; shift</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Discipline (n = 124)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical surgical</td>
<td>66</td>
<td>53.2</td>
</tr>
<tr>
<td>Neurology</td>
<td>17</td>
<td>13.7</td>
</tr>
<tr>
<td>Urology</td>
<td>21</td>
<td>17.0</td>
</tr>
<tr>
<td>Post-infarction care</td>
<td>20</td>
<td>16.1</td>
</tr>
</tbody>
</table>

Table 2. Oral care practices

<table>
<thead>
<tr>
<th>Method (number of nurses)</th>
<th>Yes n (%)</th>
<th>No n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forceps and Cotton [n = 100]</td>
<td>91 (73.4)*</td>
<td>9 (7.2)</td>
</tr>
<tr>
<td>Forceps and Gauze [n = 95]</td>
<td>80 (64.5)*</td>
<td>15 (12.1)</td>
</tr>
<tr>
<td>Spatulas and Gauze [n = 93]</td>
<td>45 (36.3)</td>
<td>48 (38.7)</td>
</tr>
<tr>
<td>Cotton and Orange Sticks [n = 91]</td>
<td>31 (25.0)</td>
<td>60 (48.4)</td>
</tr>
<tr>
<td>Toothbrushes [n = 91]</td>
<td>63 (50.8)</td>
<td>28 (22.6)</td>
</tr>
</tbody>
</table>

*Common methods of oral care practice based on nursing college protocols
This survey described the type and frequency of oral care provided to ventilated patients in the ICUs in a government hospital in Malaysia. The results indicated that the frequency and method of oral care differed among nurses. Although this survey was only performed in four ICUs at one hospital, it has provided important insight into nurses’ oral care practice and their attitude toward prevention of VAP in ventilated patients, and identified areas for future improvement.

The results show that most of the nurses prefer to use cotton and forceps rather than toothbrushes for cleaning patients’ mouths. Approximately 73.4% of the 124 nurses used cotton and forceps for oral care practice. Nurses may be hesitant to provide oral care or use toothbrushes for patients who are intubated because endotracheal tubes may limit access to the oral cavity [12]. Nurses may also fear dislodging or displacing the endotracheal tube [29]. Another reason for not using toothbrushes could be the nurses’ lack of knowledge of up-to-date research findings; therefore, nurses were not applying the latest oral care practices [19] and providing a variety of oral care interventions designed for patients’ comfort rather than plaque removal [30].

The frequency and method of oral care varied among the nurses. The various practices among nurses indicate that there is a need of having a standardized oral care protocol in the units. A study found that approximately 93% of nurses practice oral care more than four times per shift after the implementation of a new oral care protocol [14,31]. Cutler and Davis [23] also found that there was an increase in the frequency and comprehensiveness of the oral care that was provided after the implementation of a standardized protocol and the provision of the recommended oral care tools.

The presence of protocols in the unit could affect

**Table 3. Frequency of using a toothbrush for oral care**

<table>
<thead>
<tr>
<th></th>
<th>More than Once a Day n (%)</th>
<th>Once a Day n (%)</th>
<th>Never n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toothbrush</td>
<td>55 (44.3)</td>
<td>8 (6.5)</td>
<td>28 (22.6)</td>
</tr>
</tbody>
</table>

**Discussion**

The results show that the type and frequency of oral care varied among the nurses. The various practices among nurses indicate that there is a need of having a standardized oral care protocol in the units. A study found that approximately 93% of nurses practice oral care more than four times per shift after the implementation of a new oral care protocol [14,31]. Cutler and Davis [23] also found that there was an increase in the frequency and comprehensiveness of the oral care that was provided after the implementation of a standardized protocol and the provision of the recommended oral care tools.

The presence of protocols in the unit could affect
the oral care provided, as well as the attitude and knowledge of nurses. Only one nurse out of 124 indicated that she used chlorhexidine for oral care. No information was collected about the chlorhexidine supply in the unit; however, the lack of usage of chlorhexidine may indicate lack of awareness about current best practice recommendations [9,32].

This survey shows that nurses have a positive attitude towards providing oral care practice to mechanically ventilated patients. This finding is similar to the previous study performed by Binkley et al. [27]. Some nurses did not use toothbrushes in their practice; however, they still followed the oral care protocol learned during their basic nursing training, which shows that they have positive attitude in providing oral care. Other than following the oral care protocol, nurses also practiced oral care as a routine procedure. A study found that without a protocol for oral hygiene, oral care was performed infrequently [23]. They also found that 40% to 46% of the nurses in the study reported that oral care is an unpleasant and difficult task, and the mouth of the patient who needs prolonged ventilation deteriorates even if oral care is provided. In this survey 84.7% of the nurses regarded oral care as very important for the mechanically ventilated patients and had the training and time to provide it. These results are similar to those of a study by Binkley et al. [33]. Having sufficient time to provide oral care, as well as seeing it as priority and not unpleasant, is associated with providing better oral care for patients [34]. A survey on oral care interventions in the ICUs also found that oral care was accorded low priority while of greater importance was to stabilise the condition of the critically ill patients [32].

There was also an interest in determining the effect of hospital-provided supplies on the provision of oral care. Inappropriate toothbrushes hindered nurses from providing oral care [16]. Approximately more than half agreed that the hospital did not supply toothbrushes. Availability of supplies and equipment for patient care can greatly affect the quality of care given by the nurses [13,16]. Availability of an oral care protocol with a child-size toothbrush is important so that it becomes part of the routine patient care in the unit. Child-size toothbrushes should be included in the existing oral care procedure since oral care and implementation of the ventilator care bundle interventions have been shown to decrease the rate of VAP [10].

Limitations

A number of limitations within this survey are acknowledged. First, this survey records reported practices and attitudes, rather than evaluating the oral health and disease of the ICU patients by directly observing nurses’ practices. Hence there might be a gap between the reported and actual practice and how the nurses answered the questionnaire [19,27]. Second, our results cannot be generalized to all hospitals in Malaysia since our survey was conducted at four ICUs in a single government hospital using a purposive sampling method. Third, the use of validated measures may improve the survey’s findings. Finally, the type of toothbrush used by the nurses was not identified, which might influence the frequency and technique of the oral care provided since having improper equipment may discourage nurses from practising recommended oral care procedures.

Conclusion

Oral care is a routine procedure in our hospital; however, the frequency and type of oral care practice varied among nurses in the units. The existence of various oral care practices indicates that there is a need of a standardized oral care protocol that includes tooth brushing and use of chlorhexidine mouthwash. Furthermore, having chlorhexidine mouthwash and proper toothbrushes available in the unit’s stock may assist in implementing evidence-based practice and help to improve patients’ outcome. This survey has offered important insight into nurses’ oral care practice and their attitude toward prevention of VAP in ventilated patients and has identified areas for future improvement in our hospital.

Acknowledgement

We wish to thank the General Director of Health, Malaysia, for the permission to publish this paper and the ICU nurses for their support in this study.

References


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Conflict of interests: No conflict of interests is declared.