INTENSIVE CARE UNITS STAFF’S KNOWLEDGE AND ORAL HYGIENE PRACTICE IN CROATIAN HOSPITALS

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Abstract
Aim: Intensive Care Unit (ICU) patients require thorough oral care. Inadequate oral care may predispose ICU patients to severe nosocomial infection, Ventilator Associated Pneumonia (VAP). On the other hand, appropriate oral hygiene in ICUs can potentially reduce morbidity from VAP and therefore shorten hospital stay and reduce ICU mortality.
Aim of this study was to assess the awareness of this problem and oral hygiene practice of ICU medical staff.
Material and Methods: The study was conducted among 249 members of ICU nursing staff from 14 Croatian hospitals. A written survey comprising questions divided into two groups: staff knowledge and oral hygiene practice was used.
Results: 94.7% of respondents declared they were familiar with the VAP. Only 32.6% of respondents know the right cause of VAP. 44.9% reported having an oral care protocol in their hospital. Tongue brushing was reported by 42.2% nurses, and the most frequently used oral hygiene agent is gauze soaked in paraffin oil (75.1%). Most of the nursing staff was aware of the importance of oral care practice in ICU and they allege lack of time (47.1%), lack of staff (39.6%) and the lack of resources (36.6%) as limiting factors in the implementation of adequate oral hygiene. Only 60.6 % wanted additional education and training.
Conclusion: This study indicates a relatively low level of knowledge and great diversity of oral hygiene practices in Croatian ICUs. In order to improve oral hygiene in ICUs, a standardized written protocol should be introduced.
Encouraging staff education and providing ICU nurses with sufficient resources is needed in order to improve oral hygiene enforcement in ICUs.
Introduction

Intensive Care Unit (ICU) patients require 24-hour care and monitoring. Oral hygiene in critically ill patients is often neglected or inadequately performed by quickly swabbing patients' mouths [1]. Possible reasons for this practice are staff's attitude that other aspects of nursing care are more important than adequate oral care [1, 2, and 3], lacking awareness of thorough oral hygiene importance [4] and lack of standardized evidence-based protocol [1, 4, 5, 6, 7, and 8]. Oral flora of critically ill adults differs from that of healthy adults and contains bacteria that may cause pneumonia [1]. Inadequate oral care may predispose ICU patients to severe nosocomial infection, known as Ventilator Associated Pneumonia (VAP). VAP is defined as nosocomial pneumonia that develops in a patient who has been intubated for more than 48 hours [9]. Endotracheal intubation not only compromises the natural barrier between the oropharynx and trachea but also facilitates the entry of bacteria into the lower parts of respiratory tract [10]. Studies have shown that most cases of VAP were caused by bacteria that colonize the oral cavity and dental plaque [10, 11, and 12]. Furthermore, endotracheal tube may become colonized by bacteria. Intubation disables physiological cleaning of upper respiratory tract by coughing, compromises mucociliary transport and increases the secretion of mucilage. [13] All of these factors additionally facilitate development of VAP.

VAP is associated with high morbidity, longer hospital stay, higher health care costs and increased mortality rate [8, 10, and 14]. Simple oral care interventions such as tooth-brushing and mouth rinsing with chlorhexidine may reduce the incidence of VAP and consequently morbidity as well as mortality in ICU patients [15, 16].

Objectives

Data on oral hygiene practice of ICU staff in Croatian hospitals is lacking and up to date no research articles on this topic have been published. Aim of this study was to assess the awareness and knowledge concerning VAP as well as current oral hygiene practice of ICU medical staff in order to identify potential possibilities for improvement.

Subjects and Methods

The study was conducted from November 2010 to February 2011 among 249 members of ICU nursing staff from 14 Croatian hospitals. The research was approved by the Ethical Committee of the School of Dental Medicine, University of Zagreb. ICUs staff, who participated in this study, were informed about the research and signed informed consent. A written survey comprising questions divided into two groups: staff knowledge and oral hygiene practice was used.

Ten true/false statements were used to assess knowledge and attitudes of respondents regarding VAP:

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<tr>
<td>1.</td>
<td>VAP is infection caused by specific pathogens.</td>
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<tr>
<td>2.</td>
<td>VAP is infection caused by non-specific pathogens.</td>
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<tr>
<td>3.</td>
<td>VAP may be caused by multi-resistant strains.</td>
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<td>4.</td>
<td>The most common cause of VAP is air or droplet transmitted pathogens.</td>
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<tr>
<td>5.</td>
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<td>6.</td>
<td>VAP has high mortality rate.</td>
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<td>7.</td>
<td>VAP is easy to cure and patients usually recover well.</td>
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<td>8.</td>
<td>VAP is one of the most common nosocomial infections.</td>
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<td>9.</td>
<td>Appropriate oral hygiene in intubated patients may reduce the incidence of VAP.</td>
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<td>10.</td>
<td>Pneumonia may also occur in patients who are not intubated.</td>
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The following questions were used to assess staff's education and interest for future education and training:
1. Are you familiar with the VAP?
2. When were you first acquainted with the VAP? (during education, while working in hospital, during professional training, in some other occasion)
3. Do you want additional training and education? (yes, no, do not care)

In terms of practice, respondents were asked about commonly performed oral hygiene procedures and limiting factors in the implementation of adequate oral hygiene. The following list was given and participant was asked to mark procedures which he/she routinely performs (multiple answers are possible):

1. cleaning teeth with toothbrush
2. cleaning teeth with toothbrush and toothpaste
3. tongue brushing
4. rinsing with chlorhexidine
5. rinsing with hydrogen peroxide
6. rinsing with povidone iodine
7. rinsing with saline
8. rinsing with some other agent
9. cleaning with sponge and gauze
10. artificial saliva
11. gauze soaked with paraffin oil
12. something else

The following limiting factors were listed (multiple answers are possible):

1. lack of time
2. lack of education
3. lack of staff
4. lack of resources
5. something else

Results
In terms of knowledge, ten true/false statements were given. Percentage of correctly marked statements is shown in Figure 1. Statement “VAP is infection caused by specific pathogens” showed the least percentage of correct answers (29.3%, n=73). Statement with most correct answers was “Appropriate oral hygiene in intubated patients can reduce the incidence of VAP” (90.8%, n=226). Overall percentage of correct answers was 65.8%.

Figure 1: Percentage of correctly marked true/false statements.
1. VAP is infection caused by specific pathogens.
2. VAP is infection caused by non-specific pathogens.
3. VAP may be caused by multi-resistant strains.
4. The most common cause of VAP is air or droplet transmitted pathogens.
5. The most common cause of VAP is oral cavity pathogens.
6. VAP has high mortality rate.
7. VAP is easy to cure and patients usually recover well.
8. VAP is one of the most common nosocomial infections.
9. Appropriate oral hygiene in intubated patients may reduce the incidence of VAP.
10. Pneumonia may also occur in patients who are not intubated.

Most of respondents (94.7%, n=236) declared they were familiar with the VAP (Figure 2).

![Figure 2: Answers to question “Are you familiar with the VAP?”](image)

Missing data= 3

The most of nurses (86.3%, n=215) have received education concerning VAP during their work in the hospital, and significantly smaller number (28.9%, n=73) during formal school education.

![Figure 3: Answers to question “When were you acquainted with the VAP?”](image)

(Multiple answers are possible)
When asked about possible additional education, 16% (n=38) of respondents declared they do not want any additional training and education, and 22% (n=54) of them do not care. Most of subjects (62%, n=151) noted they are interested in future education (Figure 4).

![Diagram showing the distribution of answers to the question: Do you want additional training and education?]

**Figure 4: Answers to question: Do you want additional training and education?**

Missing data=6

Oral care practice varied within each hospital. Gauze soaked with paraffin oil was the primary material used (75.1%, n=187), and the most common mouthwash was chlorhexidine (57%, n=142). Tongue brushing was reported by only 42.1% (n=105) nurses (Figure 5).

![Bar chart showing the number of respondents for each oral hygiene procedure]

**Figure 5: Commonly performed oral hygiene procedures. (Multiple answers are possible)**

1. cleaning teeth with toothbrush
2. cleaning teeth with toothbrush and toothpaste
3. tongue brushing
4. rinsing with chlorhexidine
5. rinsing with hydrogen peroxide
6. rinsing with povidone iodine
7. rinsing with saline
8. rinsing with some other agent
9. cleaning with sponge and gauze
10. artificial saliva
11. gauze soaked with paraffin oil
12. something else

The most common factors limiting adequate oral hygiene are listed in Figure 6. Lack of time has been noted as the most common limiting factor (57.4%, n=143).

Discussion
Most of respondents (94.7%, n=236) declared they are familiar with the VAP, but only 36.6% (n=91) provided correct answer to the question about etiology of VAP. This indicates great discrepancy between self-perceived and real level of knowledge. Generally low level of knowledge is the possible cause of staff's unawareness and false impression they are well informed about the VAP. This is indicated by relatively low overall score—average score for all 10 questions is only 65.7%. Also, significant variability between scores for individual questions was noted. Percentage of correct answers ranges from 29.3% up to 90.7% (Figure 1). This indicates great variability in knowledge of different aspects of VAP. For instance, the worst results were scored for two questions dealing with etiology of VAP (29.3 and 40.1% accordingly) and the best result (90.7%) was scored for the statement “Appropriate oral hygiene in intubated patients may reduce the incidence of VAP”. High percentage of correct answers (84.3%) was also noted for statement “The most common cause of VAP are oral cavity pathogens”, which implies that nurses are relatively well informed about the role of oral bacteria in VAP etiology.

Considering that the majority of nurses stated they got familiar with VAP only at work (Figure 2, 3), presumably by word of mouth from older colleagues, and not during formal school education, it is somewhat contradictory that many of them haven’t shown interest for additional training and education (38%, n=95) (Figure 4). This finding also suggests that current curriculum of Croatian nursing schools lacks some crucial lessons and therefore should be revised. We suggest that oral hygiene in critically ill patients should be integrated in nursing school’s curriculum as a nursing activity of very high priority.

A high percentage of nurses (90.1% n=226) are aware that appropriate oral hygiene in ICUs
could reduce the incidence of the VAP, but they reported some limiting factors (Figure 6). Lack of time has been noted as the most common limiting factor (57.4%, n=143). A possible cause of this problem is relatively small number of nurses employed in Croatian ICUs, which seems to be insufficient to fulfill all required nursing tasks. In such situation, nurses are more likely to dedicate their time to some other tasks they consider more crucial for patient well-being [1, 2, and 3] rather than performing oral hygiene measures. Increasing number of nurses would probably enable them to distribute their nursing activities more evenly and to avoid neglecting of oral care. Literature dealing with oral care of critically ill often emphasizes the correlation of poor oral hygiene in ICUs with the lack of awareness [19, 20]. According to these studies, low awareness of the problem is the main cause of neglecting oral hygiene in critically ill patients. Since recommended measures [18] are relatively simple and inexpensive, simple rising of awareness (without any other interventions) should motivate nurses to perform oral care more efficiently. Considering poor economic situation in Croatia, as well as insufficient nursing education, we assume that mentioned lack of awareness plays important role in oral hygiene inadequacy. It is important to note the long-term efficiency of improved oral care for critically ill patients. Evidence shows that correctly maintained oral hygiene could greatly reduce the incidence of VAP [15, 16]. Lower incidence of VAP is correlated with less complication during hospitalization, shorter hospital stay, lower mortality and better postoperative recovery [8, 10, and 14]. This is beneficial not only for patients, but also for hospitals and healthcare system as a whole, since it greatly reduces hospital expenses. It is therefore rational to encourage education and enforcement of oral care in critically ill patients. The first step in accomplishing this goal should be raising awareness of the problem through formal school education, as well as during continuing lifelong education. The next step should be introducing a written evidence-based protocol (AACN) and providing staff with adequate materials and resources. 63.1% (n=157) of respondents perform oral hygiene measures as recommended by American Association of Critical Care Nurses (AACN), i.e. brushing and rinsing with chlorhexidine [18]. There is some evidence available indicating that measures recommended by AACN are effective in prevention of VAP [22]. Even if AACN protocol isn’t generally accepted as an effective measure for prevention of VAP, we consider its practical implementation useful for dealing with the problem. Several studies demonstrated that enforcement of protocol recommended by AACN successfully reduced VAP morbidity and mortality in clinical environment [15, 16, and 18]. Since it is the only protocol which is as-to-date supported by evidence, it should be taught in nursing schools and introduced to nursing staff. Also, tongue brushing, combined with tooth brushing and rinsing with chlorhexidine has desirable effects [22, 23, 24], but this survey has shown that it is performed by only 42.2% (n=105) of nurses. The most common oral hygiene procedure is swabbing with gauze soaked in paraffin oil, what we found very unique to Croatian ICUs. Little information has been found in the available literature regarding this method. In one Croatian medical high school textbook [21] paraffin is listed as an agent for oral hygiene in ICUs, but as dental professionals we are dubious about the potential benefit of this agent, except lubrication, moistening and mechanical protection of mucosa. It certainly lacks required antibacterial properties and combined with gentle swabbing isn’t very effective in plaque removal. This practice should be replaced with brushing in order to mechanically remove the plaque. Using chlorhexidine after brushing inhibits
formation of new plaque and recolonization of bacteria to mechanically cleansed tooth surfaces [25, 26].

A great variety of performed procedures (Figure 5) is probably the result of lack of written oral hygiene protocol in Croatian hospitals. Having no precise guidelines, nurses perform oral hygiene procedures at their own discretion and in accordance with available materials. Many different materials for oral hygiene are used (Figure 5), presumably depending on their availability in individual hospitals.

Conclusion

The results of this survey indicate that present level of knowledge among nurses and oral practice currently performed in Croatian ICUs may be ineffective in prevention of VAP. Implementation of standardized written protocols, as well as additional nurse training should be done.

References


