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## Oral care practices in intensive care units: a survey of 59 European ICUs

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**Abstract** *Objective:* To explore the type and frequency of oral care practices in European ICUs and the attitudes, beliefs, and knowledge of health care workers. *Design:* An anonymous questionnaire was distributed to representatives of European ICUs. Results were obtained from 59 ICUs (one questionnaire per ICU) in seven countries 91% of respondents were registered nurses. *Measurements and results:* Of the respondents 77% reported that they had received adequate training on providing oral care; most (93%) also expressed the desire to learn more about oral care. Oral care was perceived to be high priority in me-

chanically ventilated patients (88%). Cleaning the oral cavity was considered difficult by 68%, and unpleasant as well as difficult by 32%. In 37% of cases respondents felt that despite their efforts oral health worsens over time in intubated patients. Oral care practices are carried out once daily (20%), twice (31%) or three times (37%). Oral care consists principally of mouth washes (88%), mostly performed with chlorhexidine (61%). Foam swabs (22%) and moisture agents (42%) are used less frequently as well as manual toothbrushes (41%) although the literature indicates that these are more effective for thorough cleaning of the oral cavity. Electric toothbrushes were never used. *Conclusions:* In European ICUs oral care is considered very important. It is experienced as a task that is difficult to perform, and that does not necessarily succeed in ensuring oral health in patients with prolonged intubation. Oral care consists primarily of mouth washes. The use of toothbrushes should be given more attention.

**Keywords** Key words · Oral care · Mouth wash · Prevention · Intensive care unit · Pneumonia

### Introduction

Oral hygiene is a basic task for health care workers (HCWs) caring for ICU patients [1, 2]. All patients may

suffer from poor oral health, but especially at risk are those on mechanical ventilation (MV) because endotracheal intubation facilitates bacterial adherence to the mucosa, and because several drugs frequently used in ICUs may

cause xerostomia, which has a damaging impact on oral health [3–5]. The primary objective of oral care is to minimize dental plaque formation and accumulation of oropharyngeal debris as these create an ideal environment for pathogenic micro-organisms that may cause such conditions as stomatitis and gingivitis [6, 7]. In this way oral care can effectively maintain oral health. Additionally, in patients on MV it may reduce the incidence of pneumonia [8–12].

Notwithstanding the apparent advantages of adequate oral care in ICU patients, this issue receives only modest attention. The literature provides little information on the current practice, training, and attitudes of HCWs regarding oral care in ICU patients. The objective of this survey was to determine the type and frequency of oral care in European ICUs and the attitudes, beliefs, and knowledge of HCWs regarding this issue.

## Methods

A 27-item questionnaire was used that was developed by a research team at the University of Louisville (Louisville, Ky., USA) [13]. Due to the lack of a previously developed and tested instrument, this team designed the questionnaire based on a review of the literature and on the following research questions: (a) What is the type and frequency of oral care provided to ICU patients? (b) What are the attitudes and beliefs of ICU HCWs regarding oral care? (c) How are ICU HCWs trained in oral care? This questionnaire, after being pretested, was used to gather information related to oral care practices, training, and attitudes among nurses in ICUs across the United States in 2002 [13]. In addition to the questionnaire, information regarding demographics and nurses' training experience was requested (Table 1).

The questionnaire was distributed to voting members of the infection section of the European Society of Intensive Care Medicine. Those willing to participate could then contact other ICUs in their country of origin. Therefore a response rate could not be calculated. Participation in the survey was voluntary and anonymous. Fifty-nine questionnaires (one questionnaire per ICU) from seven countries were available for analysis. Participating ICUs were from Spain ( $n = 33$ ), Greece ( $n = 12$ ), France ( $n = 5$ ), Belgium ( $n = 3$ ), Italy ( $n = 3$ ), Germany ( $n = 1$ ), Andorra ( $n = 1$ ), and Turkey ( $n = 1$ ). Table 1 presents the demographic characteristics of respondents.

## Measurements

### *Attitudes, beliefs, and knowledge*

The assessment of respondents' attitudes and beliefs used a five-point Likert scale ranging from "strongly agree"

**Table 1** Demographic characteristics of responders ( $n = 59$ )

Demographics	<i>n</i>	%
Shift pattern		
Morning	24	40.7
Afternoon	3	5.1
Night	1	1.7
Rotating	30	50.8
Position		
Registered nurse	54	91.5
Clinical assistant	3	5.1
Respiratory therapist	1	1.7
Other	1	1.7
Nurse's education		
3-year degree	47	79.7
Bachelor's degree	1	1.7
Master's degree	4	6.8
Other	2	3.4
Oral care training		
Nursing school	9	15.3
Continuing education	8	13.6
In-service	25	42.4
Self-taught	1	1.7
More than one	15	25.4
Hospital type		
University/academic	45	76.4
Private nonprofit	1	1.7
Private profit	2	3.4
Public	10	16.9
ICU type		
Medical	6	10.2
Surgical	2	3.4
Trauma	3	5.1
Cardiac	1	1.7
Neurosurgical	1	1.7
Cardiosurgical	2	3.4
Polyvalent	44	74.6

(= 5) to "strongly disagree" (= 1; Table 2). Respondents' knowledge of current evidence that microaspiration of oropharyngeal debris is a risk factor for ventilator-associated pneumonia (VAP) was assessed by including the following scenario in the questionnaire: "An 18-year-old male was involved in an all terrain vehicle accident five days ago and was admitted to your ICU. He has been mechanically ventilated since admission and has now developed pneumonia." The respondent had to assess the likelihood on a scale of 1–10 regarding each of the following being the mechanism of disease: (a) aspiration of contaminated oropharyngeal secretions from oropharynx, (b) transmission from HCWs hands, (c) transmission from contaminated respiratory equipment, (d) preadmission colonization, and (e) transmission from other patients (Table 3).

### *Type and frequency of the provided oral care*

Respondents were asked about the frequency of the use of the following supplies: foam swabs, manual toothbrushes,

**Table 2** Attitudes regarding oral care

	Strongly agree		Somewhat agree		Neither agree or disagree		Somewhat disagree		Strongly disagree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Oral care is a very high priority	52	88.1	6	10.2	1	1.7	0	0	0	0
Cleaning the oral cavity is an unpleasant task <sup>a</sup>	6	10.2	17	28.8	16	27.1	6	10.2	13	22.0
The oral cavity is difficult to clean	15	25.4	25	42.4	7	11.9	6	10.2	6	10.2
The mouths of most ventilated patients get worse no matter what I do	5	(8.5)	17	28.8	4	6.8	15	25.4	18	30.5
I have been given adequate training in providing oral care	26	44.1	19	32.1	8	13.6	4	6.8	2	3.4

<sup>a</sup> One respondent did not answer

**Table 3** Response rates on the clinical scenario (see text) (*IQR* interquartile range)

Assumed mechanism of disease	Main response	
	Median	<i>IQR</i>
Aspiration of contaminated secretions	8	6–9
Contamination from health care workers hands	4	3–6.25
Transmission from contaminated equipment	2	1–4.5
Preadmission colonization	3.5	1–7.25
Transmission from other patients	2	1–5

electric toothbrushes, moisture agents, toothpaste, and mouthwash. If mouthwash was used, respondents were asked to identify the type.

*Oral care training*

Two questions were about previous oral care training, and three were about respondents’ attitudes towards additional oral care information and training.

*Hospital support and supplies*

For the assessment of hospital’s policy regarding oral care and the availability and adequacy of oral care supplies the respondents were asked five questions to answered on a Likert scale [ranging from “strongly agree” (= 5) to “strongly disagree” (= 1)].

**Results**

Table 2 presents the results of the survey regarding attitudes to oral care. On the item questioning knowledge as to the mechanisms of disease in VAP, responses demonstrated that respondents were generally aware that microaspiration is the most probable mechanism of VAP (Table 3). In 77% of cases the respondents expressed the belief that they had received adequate training on

providing oral care in ICU patients (see Electronic Supplementary Material, ESM, S.T1). Over 40% reported receiving this training in-service and 15% in nursing school. Interestingly, 68% denied having received oral care training during nursing school.

The most common practice for providing oral care was the use of mouthwashes (ESM, S.T2). These are performed mostly with chlorhexidine and at least once daily (ESM, S.T3). All respondents stated that they have adequate time to provide oral care at least once daily (ESM, T.S4). Most respondents believed nurses should be responsible for cleaning the oral cavity of intubated patients, while a minority felt that a dentist-hygienist should perform this task. Regarding the supplies for providing oral care, 81% replied that they had adequate supplies. However, 63% replied that they need better supplies and equipments to perform oral care in ICU. Only one-third found the toothbrushes provided by the hospital adequate; it is interesting that 37% of the respondents replied that toothbrushes were not available. Only 27% preferred an electric toothbrush to a manual, and nearly the same percentage suggested that the staff would be more likely to brush patients’ teeth with an electric toothbrush than with a manual one.

**Discussion**

To our knowledge this is the first survey on oral care practices in ICUs performed on a European scale. The results show that oral care in ICU patients is regarded as a nursing matter in most centers that participated in the survey. Overall, oral care is considered of high importance. However, only a minority of respondents had received training or education on oral care in nursing school. The gap between the lack of basic education and the skills needed in the ICU is often compensated by in-service training. Still, most respondents would like to receive more training in oral care. This is consistent with the fact that a substantial proportion of respondents consider oral care a difficult and unpleasant task that is potentially frustrating as most reported that in spite of their efforts oral health in intubated patients

worsens over time. There seems to be an important challenge in the training nurses such that their attitude becomes more positive. This may be achieved by providing adequate equipment. For example, mouth washing is the most frequently performed practice, but this is rather impractical in intubated patients. On the other hand, although electric toothbrushes have been shown to improve the quality of oral care [14]; in no unit electric toothbrushes are used (S.T5, S.T6, ESM). Indeed, lack of suitable equipment has previously been pointed out as a fundamental impediment to complying with guidelines among ICU staff [15, 16]. In this regard it is likely that attitudes of HCWs would change positively if innovative and more practical methods for oral care became available.

The results of our survey regarding attitudes of oral care matches are in accord with those reported by Binkley et al. [13] using the same questionnaire. Concerning the type of oral care, however, there exist substantial differences between the United States and Europe. In European ICUs the use of foam swabs and moisturizers is rather rare (ESM, S.T2), while in the United States these are used very frequently (at least every 12 h in more than 90% of the respondents). The beneficial effect of foam swabs, however, remains unconfirmed [17]. Also, manual brushes and toothpaste are seldom used in European ICUs whereas manual brushing with toothpaste is performed once daily in about 40% of the practices in ICUs in the United States [13]. The use of a toothbrush is a more adequate tool for thorough mechanical cleaning of the oral cavity [17]. Although not always easy to perform in ICUs, this practice leads to improved oral health [18], decreased gingival inflammation [19], and cost savings by the elimination of toothettes [18]. While proven to be superior to manual brushes, electric toothbrushes are very rarely used in both European and United States ICUs [13, 14].

The emphasis in of oral care practice in Europe is clearly on mouthwashes, principally with chlorhexidine. Mouthwashing with chlorhexidine has been associated with a decrease in dental plaque formation [20], a decrease in the incidence of respiratory infections [8], VAP [9, 10, 20], and nosocomial infections in general [8]. Based on a randomized, double-blind, placebo-controlled trial Koeman et al. [12] reported a 65% reduced risk of VAP associated with oral decontamination with chlorhexidine applied every 6 h in intubated patients. Mori et al. [10] also found a reduced risk of VAP when using a 20-fold diluted povidone-iodine gargle combined with manual toothbrushes every 8 h. This study, however, was not randomized but rather used a historical cohort as control group. The first step to take in improving oral care practices in Europe seems to be the promotion of manual or better electric toothbrushes. The success of an educational program depends on several aspects. Educational pro-

grams aimed at improving oral care should be supported by an evidenced-based protocol and provided by qualified instructors [21]. In-service training with direct clinical contact has been shown to be more effective than passive learning from textbooks [22]. To ensure a long-term effect it is important to provide a multifaceted educational program [23]. Furthermore, given the negative perception of nurses towards oral care it is important to offer the educational sessions in a positive way and to stress the significance of the issue [24].

This study has limitations. First, there was the unequal distribution of participating ICUs across Europe, and from some countries no single unit responded. Secondly, the questionnaire was developed to explore oral care practices and attitudes in individual nurses, while in this survey it was used to investigate practices among European ICUs. Nevertheless, our results match those obtained in ICUs in the United States [13]. It should also be noted that because of the lack of a solid scientific basis the survey is likely to reflect the personal opinion of the respondents rather than practice supported by evidence-based guidelines. Another potential bias in our survey is that over 75% of the participating ICUs were from university or academic institutions. The survey carried out by Binkley et al. [13] in the United States found that private hospitals provided more oral care than university-affiliated centers. Furthermore, there exists the problem of selection bias inherent in questionnaire research. Although the survey was anonymous, it is to be expected that units in which oral care is considered of high importance were more likely to participate. As noted by the team that developed the questionnaire, the instrument lacks items regarding existing or planned protocols of oral care [13]. The presence of protocols may influence practice, either in frequency and/or quality. Additionally, the questionnaire does not adequately distinguish between oral care in intubated and that in nonintubated patients. Neither does the questionnaire collect data regarding the time spent on various types of oral care, which may affect the attitude towards particular practices, such as the use of toothbrushes. A study by Hanneman and Cusick [25] found that daily rates of oral care in intubated and nonintubated patients were 3.3 and 1.8, respectively.

In conclusion, in European ICUs oral care is considered of high importance and is generally carried out by nurses. It is experienced as a task that is difficult to perform, and that does not necessarily succeed in ensuring oral health in patients with prolonged intubation. Oral care primarily consists of mouth washes, mostly with chlorhexidine. The use of toothbrushes should be given more attention as these are used only rarely while being more effective for thoroughly cleaning of the oral cavity.

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