

## Oral care in intensive care units: Lithuanian nurses' attitudes and practices

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### ABSTRACT

**Aim:** This study examines the attitudes and practices of ICU nurses towards the provision of oral care to their patients.

**Objective:** We conducted this cross-sectional survey about oral health care practices in ICUs in Lithuania.

**Methods:** We used a self-administered 20-item questionnaire to survey the current oral care practices, training, and attitudes of 108 nurses. The questionnaire was based on previous studies to gather information related to the attitudes, oral care practices, and training of ICU nurses. We used the chi-square test to analyze relationships between the categorical variables.

**Results:** Most (88, 82%) of the nurses stated that oral care is important. Although most (83, 77%) had adequate training, a clear majority (98, 91%) of the nurses reported a willingness to learn more. Most (78, 72%) of the nurses found the oral cavity difficult to clean, and (71, 66%) found doing so unpleasant. When performing oral care, the nurses used mostly foam swabs (62, 61%) and moisturizers (54, 53%). More than half (57, 57%) of the nurses expressed a need for more hospital support.

**Conclusions:** Nurses working in ICUs reported that oral care is a high priority for their patients, but a difficult and unpleasant task. Nurses provided oral care mainly with toothbrushes, foam swabs, and moisturizers.

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### Introduction

Intensive care unit (ICU) patients require life support or critical care. ICU nurses have recognized the importance of professional oral care [1,2] in preventing infection and discomfort [3], and in reducing the incidence of ventilator-associated pneumonia (VAP) [4–6] in ICU patients.

Oral hygiene care, toothbrushing, the use of dental gels, mouthwash, or a combination of these, together with suction secretions, may reduce the risk of ventilator-associated pneumonia [7,8]. Studies have shown the effectiveness of toothbrushing [6,9], chlorhexidine [10–12], and mouthwashes (saline, antiseptics) applied as sprays, liquids or with a swab [7] in maintaining oral care for ICU patients. Some studies have shown that ICU nurses prefer chlorhexidine as the first-choice measure [13]. The teeth of ventilated patients should be brushed twice daily with a paediatric or soft small-head toothbrush. A swab is recommended for cleaning and moisturizing the oral cavity and teeth between brushings [5].

Mechanically ventilated patients are the most exposed group because oral bacteria accumulate in the endotracheal tube. Intubated patients could have oropharyngeal colonization with pathogens, depending on the hospital environment, drug regimens, and staff behaviour [14,15].

Xerostomia is one of the main predisposing factors for plaque accumulation contributing to oral health deterioration. Patients nourished using non-oral methods present

worsened oral health because salivation and the development of xerostomia disrupt the integrity of the mucosa. Commonly administered medications such as narcotics, anti-hypertensives, benzodiazepines, and diuretics also predispose and contribute to the development of xerostomia [7].

Not much is known about ICU nurses' attitudes towards oral health. Some studies have shown that ICU nurses consider oral care a high priority [1,16,17] and that they are willing to provide oral care to patients. Nurses are aware of the importance of oral health to general health [18]. However, their lack of knowledge, excessive workload, insufficient resources, adverse patient responses, capability or skills, and their ability to put their knowledge into practice, are barriers to their ability to provide sufficient oral care [1,16,18,19].

The evidence for the benefits of appropriate oral care in ICU patients is strong [11], though this issue has received little research attention. Studies about nurses' attitudes and current practices towards oral care for ICU patients are few. This study aimed to examine ICU nurses' attitudes and behaviour towards oral care of ICU patients in Lithuania.

### Materials and methods

We conducted this cross-sectional survey of oral health care practices in Intensive Care Units (ICU) at the LUHS University Hospital, Kaunas, Lithuania in 2019–2020. We used a 20-item

questionnaire to survey ICU nurses' current oral care practices, training, and attitudes. The study was conducted in line with the principles of the Declaration of Helsinki. The Bioethics Centre of the Lithuanian University of Health Sciences approved the study protocol (number BEC-OF-32). All participants provided their written informed consent to participate in the study. Participation in the survey was voluntary and the nurses were free not to join for any reason.

The survey was conducted at the LUHS University Hospital, the largest hospital with 2240 beds in Lithuania, with five intensive care units. The target population included all ICU nurses at the LUHS University Hospital. We invited the ICU nurses to voluntarily complete a self-administered anonymous questionnaire. Of the 135 nurses invited, 108 completed the questionnaire (response rate: 80%).

### Questionnaire

We used a 20-item questionnaire to survey ICU nurses' attitudes, current oral care practices, and training. The questionnaire was based on previous studies [17,20,21] to gather information related to the attitudes, oral care practices, and training of ICU nurses. The questionnaire was first translated from English to Lithuanian and then back-translated from Lithuanian to English. A pilot study was conducted on 10 voluntary nurses to assess the clarity, validity, and applicability of the tool, and the necessary modifications were done accordingly. The researcher (GS) visited the ICUs, explained the aim of the study to the nurses, and asked them to fill in the anonymous questionnaire. The researcher collected the questionnaires immediately after the survey.

The self-administered questionnaire enquired about the nurses' background characteristics, attitudes and beliefs, as well as their behaviour, the type and frequency of the oral care provided, their oral care training, and hospital support. The nurses' background information included their age in years ( $\leq 25$ , 26–35, 36–45, 46–55,  $\geq 56$ ) and was later dichotomised as  $\leq 45$  or  $> 45$ . The nurses' level of education, initially recorded according to the Lithuanian system as secondary school, college, or university education, was later dichotomised into  $\leq$  college or university education. The nurses' working experience as a nurse and in ICUs, initially recorded as  $< 3$ , 4–6, 7–9 and  $\geq 10$  years, was later dichotomised into  $< 10$  and  $\geq 10$  years. The nurses' shift length was initially recorded as 6–8, 12, 24 h/day, but later dichotomised into 6–12 and 24 h/day.

We assessed the respondents' attitudes towards and beliefs about oral care on a five-point Likert scale: 'strongly agree', 'somewhat agree', 'neither agree nor disagree', 'disagree', and 'strongly disagree'. We later categorized the responses into three groups: "strongly agree/somewhat agree", 'neither agree nor disagree', and "disagree/strongly disagree". We assessed the nurses' behaviour towards the oral care of ICU patients with five questions: 'Do you provide oral hygiene care to your patients?' 'Are removable dental prostheses removed from patients' mouths in your ICU?', 'Do you know how to treat a coated tongue?', 'What method do you use?', 'Does your clinic have a protocol for providing

oral hygiene to intubated patients in intensive care?'; the answer options were 'Yes' or 'No'.

We also asked the nurses how often, if ever, they use the following supplies: foam swabs, moisturizers, mouthwashes, manual toothbrushes, or toothpaste. If they used mouthwash, we asked the respondents to specify the type as water, peroxide, chlorhexidine, normal saline, or other.

One question ('I have received adequate training in providing oral care in the department'.) addressed the nurses' oral care training at the ICU, and two questions ('Would you like to learn more about methods for providing oral care?' and 'I need more information on research-proven oral care standards'.) enquired about the nurses' willingness to receive more information and oral care training in the future. We used a five-point Likert scale ('strongly agree', 'somewhat agree', 'neither agree nor disagree', 'disagree', 'strongly disagree') for the assessment, and later combined the responses into three groups: 'strongly agree/somewhat agree', 'neither agree nor disagree', and 'disagree/strongly disagree'.

We used a Likert scale ('strongly agree', 'somewhat agree', 'neither agree nor disagree', 'disagree', 'strongly disagree') to assess the nurses' responses to five questions about hospital support and the availability of oral care supplies.

### Data analysis

We used IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp for the statistical data analysis. Descriptive statistics served to depict the basic features of the data. We used the chi-square test to analyze relationships between the categorical variables and considered  $p < .05$  to be statistically significant. The STROBE checklist was used in the reporting of the study.

### Results

Table 1 shows the demographic characteristics of the study participants. More than half (59, 54.6%) of respondents were  $\leq 45$  years, and (62, 57.4%) had a college education. About two-thirds (70–72, 65%–67%) of the nurses had at least 10 years of working experience as a nurse and in ICUs. Half (54, 50%) of the nurses had 24-hour-long shifts.

Figure 1 shows the nurses' attitudes towards the oral care of ICU patients. Most (88, 82%) of the nurses agreed that oral care should be prioritised, and a clear majority (98, 91%) indicated their willingness to learn more about providing oral care to their patients, though they generally (83, 77%) perceived their training for it as adequate. The younger nurses were significantly more motivated to learn more about oral care than were the older nurses ( $p < .05$ ), though more older nurses reported that oral care should be a higher priority than did younger nurses ( $p < .05$ ). Most (78, 72%) of the nurses reported that the oral cavity is difficult/challenging to clean, and (71, 66%) considered the task unpleasant.

Table 2 shows the nurses' behaviour towards the oral care of ICU patients. Most (75, 69%) of the nurses stated that their ICU has a protocol for providing oral hygiene to patients. Almost all (102, 94%) reported providing oral

hygiene care to their patients and that (78, 72%) removed dental prostheses from patients' mouths. Additionally, (95, 94%) reported knowing how to treat a coated tongue: (66, 70%) used a toothbrush, and (26, 30%) used gauze. The nurses working long 24-hour shifts reported significantly more thorough oral care (providing oral care to ICU patients, removing dental prostheses from patients' mouths, knowing how to treat a coated tongue, using a toothbrush when performing oral hygiene procedures) of their patients ( $p < .05$ ) than did those working shorter shifts.

Table 3 shows the type and frequency of oral care the nurses provided to their ICU patients. When providing oral care every four hours, the nurses used mostly foam swabs (62, 61%) and moisturizers (54, 53%). When providing oral care twice daily, nurses most often used manual toothbrushing (54, 53%) and toothpaste (49, 52%), and water (60, 56%),

**Table 1.** Demographic characteristics of intensive care units' nurses ( $N = 108$ ).

Characteristic	Number (N)	Percentage (%)
Sex		
Male	2	1.9
Female	106	98.1
Age		
$\leq 25$	10	9.3
26–35	23	21.3
36–45	26	24.1
46–55	39	36.1
$\geq 56$	10	9.3
Education		
Secondary school	1	0.9
College	61	56.5
University	46	42.6
Working experience as a nurse		
$< 3$ years	16	14.8
4–6 years	14	13
7–9 years	6	5.6
$\geq 10$ years	72	66.7
Working in intensive care units		
$< 3$ years	13	12.1
4–6 years	16	14.8
7–9 years	9	8.3
$\geq 10$ years	70	64.8
Shift length		
6–8 h/day	7	6.6
12 h/day	47	43.5
24 h/day	54	50

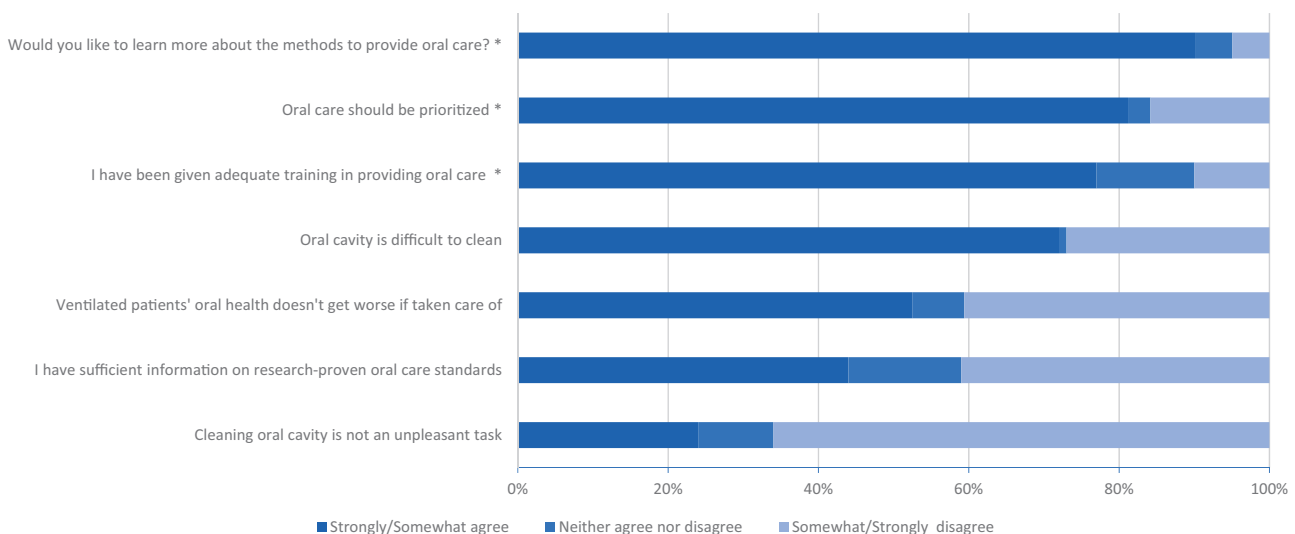
chlorhexidine (39, 36%) and saline (isotonic solution) (3, 3%) as a moisturizer (data not shown in the tables).

Table 4 shows the nurses' views about workplace support for patients' oral care. Most (77, 76%) of the nurses reported having enough time to provide oral care for their patients. In addition, (76, 74%) of the nurses reported having the supplies readily available at the department, though (57, 56%) expressed a need for more oral care supplies and equipment. Opinions on dental hygienists' role in performing oral care tasks, however, were mixed.

## Discussion

Most of the nurses in our study agreed that oral care among ICUs patients should be prioritized but reported that cleaning the oral cavity is difficult/challenging and an unpleasant task. When providing recurrent oral care, the nurses used mostly foam swabs and moisturizers. Nurses working longer shifts showed more thorough behaviour towards their patients' oral care. Oral care supplies were reportedly readily available at the department, though more than half expressed a need for more hospital support.

The attitudes of ICU nurses in our study towards patients' oral care were generally good, considering that oral care for ICU patients often is not an urgent lifesaving procedure. Our findings of the nurses' attitudes towards the priority of oral care for ICU patients are in line with those of some earlier studies [1,17]. However, the nurses' experience of cleaning the oral cavity as an unpleasant task contrast with those in other studies [16]. About half (53%) of the nurses in our study reported that ICU patients' mouths do not worsen with adequate care. This affirmative attitude corresponds with the nurses' perception of oral care as a high priority and that they have adequate training to provide it, even though they find it difficult and unpleasant. The perception of cleaning the oral cavity as difficult and unpleasant may be due to the presence of tubes in the mouth and adverse patient responses (e.g. biting, turning the head from side to



**Figure 1.** Intensive care unit nurses' ( $N = 108$ ) attitudes towards oral care. \* $p < .05$ , Chi square test.

**Table 2.** Nurses' (N = 108) behaviour towards oral care of the ICUs patients.

		Yes	No	p-value <sup>a</sup>
Does your clinic have protocol for performing oral hygiene to intensive care intubated patients?				
Age	≤45	41 (69.5%)	18 (30.5%)	.911
	>45	34 (69.4%)	15 (30.6%)	
Education	Secondary/College	39 (62.9%)	23 (37.1%)	.087
	University	36 (78.3%)	10 (21.7%)	
Working as a nurse (years)	≤10	23 (63.9%)	13 (36.1%)	.375
	>10	52 (72.2%)	20 (27.8%)	
Shift length (hours)	6–12	30 (55.6%)	24 (44.4%)	.002
	24	45 (83.3%)	9 (16.7%)	
Do you carry oral hygiene care for your patients?				
Age	≤45	59 (95.2%)	3 (4.8%)	.706
	>45	43 (93.5%)	15 (6.5%)	
Education	Secondary/College	33(91.7%)	3 (8.3%)	.373
	University	69 (95.8%)	10 (4.2%)	
Working as a nurse (years)	≤10	36 (94.7%)	2 (5.3%)	.922
	>10	66 (94.3%)	4 (5.7%)	
Shift length (hours)	6–12	48 (88.9%)	6 (11.1%)	.012
	24	54 (100%)	0	
Are removable dental prostheses removed from patient's mouth in your ICU?				
Age	≤45	45 (90%)	5 (10%)	.197
	>45	33 (80.5%)	8 (19.5%)	
Education	Secondary/College	42 (80.8%)	10 (19.2%)	.120
	University	36 (92.3%)	3 (7.7%)	
Working as a nurse (years)	≤10	29 (93.5%)	49 (81.7%)	.125
	>10	2 (6.5%)	11 (18.3%)	
Shift length (hours)	6–12	37 (97.4%)	1 (2.6%)	.007
	24	41 (85.7%)	12 (22.6%)	
Do you know what to do with coated tongue?				
Age	≤45	51 (94.4%)	3 (5.6%)	.861
	>45	44 (93.6%)	3 (6.4%)	
Education	Secondary/College	56 (96.6%)	2 (3.4%)	.218
	University	39 (90.7%)	4 (9.3%)	
Working as a nurse (years)	≤10	30 (90.9%)	3 (9.1%)	.351
	>10	65 (95.6%)	3 (4.4%)	
Shift length (hours)	6–12	41 (87.2%)	6 (12.8%)	.007
	24	54 (100%)	0	
What kind of method you use?				
Age		Toothbrush	Gauze	.125
	≤45	32 (62.7%)	19 (37.3%)	
Education	>45	34 (77.3%)	10 (22.7%)	.338
	Secondary/College	37 (66.1%)	19 (33.9%)	
Working as a nurse (years)	University	29 (74.4%)	10 (25.6%)	.173
	≤10	18 (60%)	12 (40%)	
Shift length (hours)	>10	48 (73.8%)	17 (26.2%)	.004
	6–12	22 (53.7%)	19 (46.3%)	
	24	44 (81.5%)	10 (18.5%)	

<sup>a</sup>Chi-square test was used.

**Table 3.** Type and frequency of oral care the nurses' (N = 102) provided to their ICU patients.

	Foam swabs N (%)	Moisturizer N (%)	Mouthwashes N (%)	Manual brushes N (%)	Toothpaste N (%)
Every 4 h	62 (60.8%)	54 (52.9%)	19 (18.6%)	7 (6.9%)	6 (5.9%)
Every 8 h	16 (15.7%)	16 (15.7%)	25 (24.5%)	14 (13.7%)	11 (10.8%)
Every 12 hours	14 (13.7%)	12 (11.8%)	38 (37.3%)	54 (52.9%)	49 (52%)
Once a day or less	6 (5.9%)	7 (6.9%)	9 (8.8%)	13 (12.7%)	14 (13.7%)
Never	4 (3.9%)	13 (12.7%)	11 (10.2%)	14 (13.7%)	18 (17.6%)

side to avoid oral cleaning, gagging, or coughing) which have been found to result in insufficient oral care [3,16,17].

Oral care of ICU patients aims to minimise dental plaque formation and oropharyngeal debris accumulation. The diverse microbiome in the mouth includes viruses, fungi, protozoa, archaea and around 1000 bacterial species [11,22]. Bacteria may then enter the lungs during aspiration, leading to pneumonia. Studies have shown a link between inadequate oral hygiene and higher incidence of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) [15]. Bacteria commonly causing nosocomial pneumonia inhabit the oral cavity of ICU patients. Hospitalization has also shown a link to

a general deterioration of oral health, particularly among intubated patients, due to the increased accumulation of bacteria in dental plaque [23,24], with the pathogens *Staphylococcus aureus*, *Enterobacteriales*, *Pseudomonas aeruginosa*, and *Acinetobacter baumannii* [25,26] as the most frequent aetiological factors. Ventilator-associated pneumonia is the most common nosocomial infection in ICUs and is associated with high mortality in critically ill patients [15]. Coated tongue and oral bleeding could be considered as possible risk factors for development of ventilator-associated pneumonia [27], emphasizing the importance of oral care in ICU patients and the need for staff working in ICUs to acquire the

**Table 4.** Nurses' (N = 108) views about workplace support for patients' oral care.

	Strongly agree N (%)	Somewhat agree N (%)	Neither agree nor disagree N (%)	Somewhat disagree N (%)	Strongly disagree N (%)	Missing
I need better supplies and equipment	23 (23.1%)	34 (31.5%)	14 (13%)	11 (10.2%)	19 (17.6%)	7 (6.5%)
Supplies are readily available	33 (30.6%)	43 (39.8%)	6 (5.6%)	15 (13.9%)	5 (4.6%)	6 (5.6%)
I have adequate time to provide oral care	48 (44.4%)	29 (26.9%)	3 (2.8%)	18 (16.7%)	4 (3.7%)	6 (5.6%)
The toothbrushes provided are suitable	23 (21.3%)	38 (35.2%)	18 (16.7%)	16 (14.8%)	6 (5.6%)	7 (6.5%)
I prefer that a dental hygienist perform oral care tasks	19 (17.6%)	20 (18.5%)	30 (27.8%)	14 (13%)	18 (16.7%)	7 (6.5%)

necessary knowledge and skills to perform adequate oral hygiene procedures.

Most of the nurses reported to have received adequate training in providing oral care in their department, though almost all expressed a willingness to learn more about methods for providing oral care. The younger nurses were significantly more motivated to learn more about oral care than were the older nurses, however the older nurses prioritized oral care too. More than half of the nurses also reported a need for more information in this field, probably because the nurses were unsure or unaware of appropriate oral care methods for ICUs patients. This result underscores the importance of and need for an oral care protocol. However, as previous studies have reported contradictory findings regarding ICU nurses' training and preparedness [16,17], more research in this area is needed to strengthen nurses' preparedness for and contribution to improving patient health and care.

The oral hygiene of ICU patients is an important part of nursing care, and a standardized approach in the form of an oral care protocol has the potential to improve clinical outcomes. Studies have emphasized the importance of providing mouth care to patients [11], and especially following a specific protocol [2,28]. In our study, two-thirds of the ICU nurses reported having an oral care protocol at their clinic, however frequency of oral care procedures differed slightly between the ICUs. Lack of a written oral care protocol or standards leads to the use of available products instead of appropriate evidence-based care [17]. Andersson et al. (2019) showed that nurses who have oral care guidelines to follow provide oral care regularly and independently of their workload.

When providing oral care to ICU patients, it is important that nurses have the required knowledge and adequate training and use appropriate measures. Research has shown toothbrushing to be an effective measure in ICU patients' oral care [9,29]. In this study, two-thirds of the nurses reported using a toothbrush in patients' oral hygiene. In particular, nurses working long shifts used toothbrushes to clean their patients' mouths more often than those working shorter shifts. A study carried out in 25 ICUs in Switzerland [13] found similar results, but other studies [6,16] have reported lower frequencies. The presence of oral care protocols in the ICUs, as well as the nurses' training and access to supplies, may explain these differences in the use of toothbrushing as an oral hygiene measure. In our study, the nurses also frequently used foam swabs every four hours, which studies have found to be as effective as a toothbrush in improving oral care significantly [30].

Some studies have shown the use of chlorhexidine mouthwashes or gels to reduce the risk of developing ventilator-

associated pneumonia in critically ill patients [7,11]. However, there is accumulating evidence that the use of chlorhexidine is associated with increased mortality [31–33]. About half of the nurses in our study had the experience of using chlorhexidine as a moisturizer every four hours, though a study in Switzerland [13], for instance, has reported more frequent use. The pharmacological action of chlorhexidine and the mechanical action of toothbrushes work together to improve oral health, prevent dry mouth, and elevate pH [11,29]. This combination has the potential to improve ventilation-related outcomes and reduce oral bacterial formation [9]. Therefore, mechanical oral plaque control should be encouraged in ICU patients instead of antiseptic mouthwashes [34].

Adequate oral care for ICU patients depends mainly on the skills and behaviour of the nurses, but hospital support in education, equipment, and measures is also essential. The nurses in our study reported that supplies were generally available and that they had sufficient time to provide oral care to their patients. Having an oral care protocol in place in all clinics, however, would certainly improve the situation. While other studies have shown similar findings [16,17], the working environment in an ICU is periodically hectic, and time to provide oral care may be inadequate [19], but the tendency of nurses to understand and prioritise oral health and care is encouraging.

The nurses working long 24-hour shifts reported providing oral care to their ICU patients, removing dental prostheses from patients' mouths, knowing how to treat a coated tongue, and using a toothbrush to provide their patients with oral care significantly more often than those working shorter shifts. This holistic and desirable care could result from having a more peaceful, undisturbed shift. Nurses working 24-hour shifts might experience tiredness, however, after the long shift, they must have at least 24 hours rest.

To our knowledge, this study is the first to examine oral care practices in intensive care units in Lithuania. The response rate in our study was high, and we used a questionnaire previously utilized in Europe and the USA. Practical implications of this study point, e.g. to the need for comprehensive oral health protocols and hospital support to improve oral care in ICUs.

Our study nevertheless has some limitations. Although the relatively low number of participants, for example, does not represent all ICU nurses in Lithuania, the LUHSU is the largest university hospital in the country thus speaking for the representativeness of the study. In addition, our survey presents the personal opinions of the nurses rather than practices supported by evidence-based guidelines. On the other hand, we did not include nurses' attitudes and

practices for intubated and non-intubated separately as well as their perceptions of chlorhexidine oral care as a potentially harmful practice. Lastly, our study failed to include the time spent on various oral care practices.

## Conclusion

Nurses working in ICUs reported that oral care is a high priority for their patients, but a difficult and unpleasant task for them. Oral care was provided mostly with toothbrushes, foam swabs, and moisturizers. Nurses working longer shift hours showed more thorough oral care practices towards their patients.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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