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Oral care frequency of patients with intensive care needs after surgery: A cross-sectional study

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Abstract

Although oral care for critical patients when applied effectively, minimizes important health risks, no study has been found that determines the oral care frequentness after surgery. This study was conducted to determine the oral care frequentness requirements and related factors of surgical patients admitted to the postoperative intensive care unit. It was a cross-sectional study. It was conducted with 110 surgical patients who were hospitalized in the postoperative intensive care unit and whose oral care was not yet performed within the first 6 hours. "Sociodemographic and Clinical Characteristics Form" and "Intensive Care Oral Care Frequency Assessment Scale" were used to collect data. Descriptive statistics and Chi-square automatic interaction detection analysis were applied in the analysis of the data. The mean score of the Intensive Care Oral Care Frequency Assessment Scale of the patients after surgery was 21.60 ± 3.02 . The oral care needs frequency score of 23.6% of the patients was between 10-19 points, they were identified as needing oral care should be at least 8 to 12 hours, and oral care needs of 76.4% were between 20-29 points and they were identified as needing oral care should be at least 6 hours. It was determined that the oral care frequentness score of the patients over 65 was higher than the other age groups and it was statistically significant that they needed oral care should be at least 6 hours ($p < 0.001$). In addition, it was determined that the oral care frequentness increased in patients aged 65 and over, who had been intubated, and had undergone general surgery, cardiovascular surgery, and urological surgery ($p = 0.008$). This study showed that surgical patients who need intensive care after surgery had increased oral care frequentness care needs and had certain surgical risk factors that negatively affect their oral health.

Key words: Intensive care unit, nursing, oral assessment, oral care, surgery

Introduction

After some major surgeries such as cardiac and neurosurgery, patients are taken into intensive care due to the need for mechanical ventilation and close monitoring [1-3]. In the Intensive Care Unit (ICU), respiratory pathogens are frequently observed to be colonized in the oral mucous membrane in patients receiving mechanical ventilation support in ICU, increasing the likelihood of nosocomial pneumonia [4]. Ventilator-associated pneumonia (VAP), which affects approximately 27% of patients, is associated with increased ICU mortality, increased length of

stay on mechanical ventilator and hospital care, and increased cost [5]. VAP is one of the most serious postoperative complication and has a major impact on length of hospital care and healthcare costs [3]. Routine oral care is known to reduce the incidence of VAP [6]. Perioperative oral care has been reported to reduce the risk of postoperative wound infection and pneumonia [7].

Oral problems caused by various factors such as malnutrition, presence of endotracheal and gastric tubes, and decreased fluid intake [8] and problems associated with poor oral hygiene in intensive care patients have a greater impact on patients [9].

CITATION

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Xerostomia is one of the main predisposing factors for plaque accumulation that contributes to the deterioration of oral health. The development of salivation and xerostomia in patients without oral intake disrupts the integrity of the mucosa. Drugs commonly administered after surgery, such as narcotics, anti-hypertensives, benzodiazepines, and diuretics, also adversely affect oral health by contributing to the development of xerostomia [10]. Since some treatments applied to ICU patients, lack of oral intake of patients, equipment such as airway, nasogastric tube, and intubation tube cause changes in the oral mucous membrane, it is very important to preserve the integrity of the oral mucosa in these patients [11].

Oral care is one of the most basic nursing interventions and ICU nurses the care can affect the oral health outcomes of their patients with the care they provide [12]. Oral care for critical patients is the nurse's responsibility. In the ICU, patients are often dependent on nurses for their oral care needs due to physical disability or limited function [13]. Nurses have a critical role in providing self-care, including maintaining oral hygiene in hospitalized and dependent patients [14]. Therefore, regular oral care is an integral component of daily hygiene [13].

Providing appropriate oral care to the patient by evaluating the oral care frequentness for critical patients is an issue that is often overlooked. Therefore, patients in the ICU need to preserve the integrity of the oral mucous membrane, define the problems and possible complications, determine the oral care frequentness, and provide patient-specific oral care [15]. For quality oral care, the intervention should be done with a self-confident frequency. Oral care with chlorhexidine was reported to be 6 times a day at least every 4 hours [16]. In a study, 55.0% of nurses apply oral care once a day, 30.0% twice a day, and 15% apply three or more oral care [14]. The oral care frequentness care in intubated patients is controversial and depends on the patient's condition [17]. There is no specific evidence to define the most effective oral care frequentness care for critical patients [18]. It is shown that there is a wide range of oral care frequencies among intensive care nurses [18,19]. Although oral care for critical patients when applied effectively, minimizes important health risks, no study has been found that determines the oral care frequentness requirements in the postoperative period.

Aim

This study aimed to reveal the oral care frequentness care by valid tool of critical patients holistically.

Material and Methods

Setting and sample

This was a prospective cross-sectional descriptive study conducted to reveal the oral care frequentness of patients receiving post-operative care in the ICU. The study consisted of

surgical patients over the age of 18 years who were admitted to the ICU of a university hospital, who did not receive oral care in the first 6-hour period after admission to the ICU. The ICU where the patients received care is a hospital with 655 beds, 103 of which are in intensive care. Data were collected in brain surgery, general surgery, anaesthesia, cardiovascular surgery ICUs. These ICU are tertiary intensive care units and complicated patients receive care. Oral care needs in ICUs are not assessed with a valid scale. All patients are routinely cared for with chlorhexidine gluconate and mouth swabs every 6 hours. According to the data received, the number of patients in need of postoperative intensive care in the last 6 months of 2021 was around 200. Based on this information, it is necessary to reach 99 samples that can determine the oral care need of 85% by calculating the known universe from the formula. The study included 110 patients.

Data collection tools and methods

The data of the study were collected from patients hospitalized in the postoperative ICU of a university hospital between July 19 and October 31, 2022 within the first 6 hours after surgery. Oral care should be evaluated with a valid measurement tool for mechanically ventilated patients and verbally for other patients within the first 6 hours after admission to the ICU [20]. Sociodemographic and clinical features were obtained from the patient and his/her medical record. Oral care evaluation was made by one of the researchers independently of the nurses using the Intensive Care Oral Care Frequency Assessment Scale (ICOCFAS).

Sociodemographic and Clinical Characteristics Form was prepared by researchers. In this form, there are 16 variables in total, such as the patient's age, education level, gender, body mass index, chronic diseases, presence of dental prosthesis, medical diagnosis, type of surgery, duration of surgery, anesthesia type, being connected to a mechanical ventilator, use of equipment that causes dry mouth, use of drugs that causes adverse effects such as dry mouth, products, solutions used in oral care, preoperative fasting time, and nutrition type, etc.

Intensive Care Oral Care Frequency Assessment Scale; The scale developed by Kökçü and Terzi in 2020 consists of nine items. In the scale, scoring is made by assessing the age, cheeks, lips, tongue, salivation, oral mucosa, nutrition and respiratory support, teeth of the patient. Assessment parameters are considered normal to severe on a scale of 1 to 4. The total ICOCFAS score is the sum of the scores obtained for each item. In cases of immunosuppressive drug use, antibiotic use and steroid therapy, low Hemoglobin level, Diabetes Mellitus and one point is added to the total score for each parameter Oral care is recommended at least every 12 hours if the total score from the scale is 9, at

least every 8-12 hours if it is 10-19 points, at least every 6 hours if it is 20-29 points, and at least every 4 hours if it is 30 points or more [15].

Data analysis

IBM SPSS 25.0 (IBM, Amork, NY) program was used. The socio-demographic and medical characteristics of the patients were described with frequency and distribution of percentage in addition to standard and mean deviation values. t-test and one-way ANOVA was used. p value was approved statistically significant if less than 0.05 in all results ($p < 0.05$). CHAID (Chi-square automatic interaction detection) analysis was applied to determine the factors affecting the oral care frequentness care.

Ethical disclosures

Permission was obtained from the Non-Interventional Ethics Committee of a university for the research (dated 01.07.2022 and numbered 2022/8). Written permission was obtained from the chief physician's office of the hospital where the study was conducted (dated 06.07.2022 and numbered E.95418). Participation in the study was based on volunteerism. Written consent was obtained from the patient/patient's relatives with an informed consent form.

Results

Participant characteristics

54.5% of the patients were 65 years and older and 56.4% were male. 63.6% of the patients were primary school graduates and 44.5% had a normal body mass index. 79.1% of the patients had at least one chronic disease. 26.4% of the patients were in the hospital due to neoplasm and 32.7% had a general surgery. The surgery of 41.8% of the patients lasted between 2 and 4 hours. 90.9% of the patients received general anesthesia. 37.3% of the patients needed mechanical ventilators after surgery. 51.8% of the patients were using an oxygen mask. 49.1% of the patients had dental prostheses. A narcotic drug was given to 42.7% of the patients. 72.7% of the patients experienced a fasting period of less than 12 hours before surgery. After the surgery, oral feeding was not started in 85.5% of the patients (Table 1).

Relationship between participant characteristics and oral care frequency

It was determined that the oral care needs of the patients admitted to the ICU after the surgery were significantly affected by age, presence of chronic disease, type of surgery, type of anesthesia, need for a mechanical ventilator, use of equipment that causes dry mouth, use of dental prosthesis, use of drugs, nutrition ($p < 0.05$). It was found that the oral care needs of critical patients were not affected by gender, education level, body mass index, medical diagnosis, operation time, and preoperative fasting

period ($p > 0.05$). It was determined that the need for oral care was higher in patients aged 65 and over, with chronic disease, who had undergone orthopedic surgery, had received general anesthesia, post-operative intubation tube and need mechanical ventilation, using a dental prosthesis, given bronchodilator and narcotic analgesic together, enteral feeding (Table 1).

Postoperative oral care frequency evaluation parameters

It was determined that 55.5% of the patients who underwent postoperative oral care assessment were between the ages of 50-69, and the lips of 71.8% were slightly dry and red. 61.8% of patients had localized plaques on their teeth. It was determined that 80.0% of the patients had dry tongues and prominent papillae. The oral mucosa of 52.7% of them was pale and dry, and there was an isolated lesion. Saliva was insufficient and slightly thick in 71.8% of the patients. The cheeks of 59.1% of the patients were slightly dry and red. 89.1% of the patients were not receiving oral nutrition. It was determined that breathing was supported by a nasal cannula or simple oxygen mask in 50.0% of the patients (Table 2).

Postoperative oral care frequentness

The oral care frequentness score of 23.6% ($n=26$) of the patients participating in the study was between 10-19 points and oral care should be at least 8 to 12 hours. Oral care frequentness score of 76.4% ($n=84$) of the patients is between 20-29 points and oral care should be performed should be at least 6 hours (Graphic 1).

Relationship between postoperative oral care frequentness and surgery-specific parameters: CHAID analysis

CHAID Analysis was performed to determine the relationship between the participant's age, type of surgery, duration of fasting before and after surgery, and oral care frequentness care. Oral care frequentness with categorical features was chosen as the dependent variable in the CHAID analysis. Age, type of surgery, and duration of fasting before surgery were defined as independent variables. Independent variables also have a categorical structure. According to the results of CHAID Analysis ($p < .001$), While 91.7% ($n=55$) of patients aged "65 and over" required oral care should be performed at least 6 hours, 58% ($n=29$) of patients "under 65 years of age" required oral care should be performed at least 6 hours. The most effective variable in determining the oral care needs frequency of patients under the age of 65 was the type of surgery ($p=0.008$). While 22.2% ($n=4$) of patients who underwent neurosurgery, orthopedic surgery, thoracic surgery, and other types of surgery (pregnancy, childbirth, respiratory system, herniation, wound infection) required oral care should be at least 8 to 12 hours, 78.1% ($n=25$) of those who underwent general surgery, cardiovascular surgery, and urologic surgery required oral care should be at least 6 hours (Figure 1).

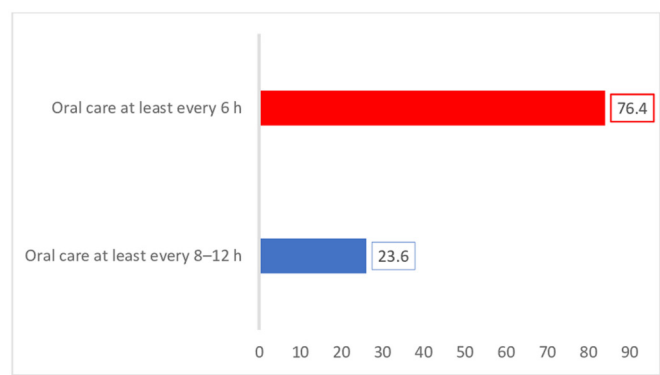
Table 1. Oral care frequentness mean scores according to the sociodemographic and clinical characteristics of the patients

		ICOCFAS Mean±SD	Test	p
Age				
Under 65 years	50 (45.5)	20.16±2.93	-4.472	<0.001
65 years and older	60 (54.5)	22.80±2.55		
Gender				
Female	48 (43.6)	21.39±3.23	-0.727	0.467
Male	62 (56.4)	21.75±2.86		
Education				
Illiterate	7 (6.4)	23.85±2.96	10.766	0.056
Literate	3 (2.7)	22.33±3.21		
Primary school	70 (63.6)	21.94±2.74		
Middle school	8 (7.3)	21.00±2.92		
High school	16 (14.5)	20.06±3.60		
University	6 (5.5)	19.50±2.58		
Body mass index				
Underweight (<18.5)	5 (4.5)	19.80±3.76	2.166	0.539
Healthy weight (18.5-24.9)	49 (44.5)	21.61±3.20		
Overweight (25.0-29.9)	31 (28.2)	21.48±2.79		
Obesity (30.0-34.9)	25 (22.7)	22.08±2.82		
Chronic disease				
Yes	87 (79.1)	22.12±2.71	-3.285	0.001
No	23 (20.9)	19.60±3.34		
Medical diagnosis				
Neoplasms (cancer)	29 (26.4)	21.75±2.66	10.208	0.116
Cardiovascular diseases	24 (21.8)	22.58±2.82		
Digestive system diseases	20 (18.2)	21.31±2.32		
Injury/trauma/deformity	12 (10.9)	17.51±4.70		
Urogenital system diseases	8 (7.3)	21.50±1.41		
Nervous system diseases	7 (6.4)	19.85±3.43		
Other	10 (9.1)	19.80±2.93		
Surgery type				
General surgery	36 (32.7)	21.77±2.49	17.158	0.009
Cardiac surgery	23 (20.9)	22.56±2.90		
Urological surgery	20 (18.2)	21.85±2.60		
Neurosurgery	10 (9.1)	19.80±3.76		
Orthopedics and traumatology	9 (8.2)	23.00±4.12		
Thoracic surgery	6 (5.5)	20.00±2.68		
Other	6 (5.5)	18.50±1.87		
Operation time				
0-<2 hours	25 (22.7)	21.12±3.44	0.824	0.662
2-<4 hours	46 (41.8)	21.58±2.99		
More than 4 hours	39 (35.5)	21.92±2.80		
Type of anesthesia				
General anesthesia	100 (90.9)	21.81±2.89	-2.064	0.039
Regional anesthesia	10 (9.1)	19.50±3.65		
Need for mechanical ventilators				
Yes	41 (37.3)	23.63±2.49	-5.444	<0.001
No	69 (62.7)	20.39±2.64		
Use of equipment that causes dry mouth				
O ₂ Mask	57 (51.8)	20.73±2.60	34.188	<0.001
Intubation tube	37 (33.6)	23.72±2.43		
Other (NG, tracheostomy, airway)	4 (3.6)	22.75±3.30		
None	12 (10.9)	18.75±2.30		
Presence of dental prosthesis				
Yes	54 (49.1)	22.70±2.67	-3.709	<0.001
No	56 (50.9)	20.53±2.97		
Use of drugs that can cause dry mouth				
Only narcotics	47 (42.7)	20.59±2.99	20.669	0.002
Beta-blockers+narcotics	34 (30.9)	20.90±2.87		
Bronchodilators+narcotics	11 (10.0)	23.38±2.44		
Only beta-blockers	7 (6.4)	22.14±2.54		
Only bronchodilators	5 (4.5)	22.40±2.96		
Diuretics	4 (3.6)	19.25±2.50		
None	2 (1.8)	19.50±3.53		
Preoperative fasting period				
<12 hours	80 (72.7)	21.83±3.13	-1.589	0.112
≥12 hours	30 (27.3)	20.96±2.64		
Nutritional status				
Nothing by mouth	98 (89.1)	21.84±2.96	9.332	0.025
Oral feeding	5 (4.5)	18.14±2.54		
Enteral feeding	3 (2.7)	22.75±3.30		
Parenteral feeding	4 (3.6)	21.00±1.58		
ICOCFAS: intensive care oral care frequency assessment scale				

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Table 2. Postoperative oral care frequentness evaluations of patients

Evaluation parameters	n (%)	X±SD
1. Patient age		
1. 15-29	6 (5.5)	3.15±0.76
2. 30-49	7 (6.4)	
3. 50-69	61 (55.5)	
4. 70 years old and above	36 (32.7)	
2. Lips		
1. Smooth, pink, soft, moist	10 (9.1)	2.10 ± 0.52
2. Slightly dry, red	79 (71.8)	
3. Dry, Swollen isolated blisters	21 (19.1)	
4. Edema, inflamed blisters	-	
3. Teeth		
1. Clean	37 (33.6)	1.72±0.57
2. There are plaques localized on the teeth	68 (61.8)	
3. Plaque films on teeth in moist areas	4 (3.6)	
4. There are visible dense plaques on and between the teeth	1 (0.9)	
4. Tongue		
1. Smooth-pink-soft-moist	17 (15.5)	1.89±0.43
2. Dry, prominent papillae	88 (80.0)	
3. Dry, swollen, tip and papillae red lesions	5 (4.5)	
4. Very dry, edematous, bleeding ulcers are present	-	
5. Oral mucosa		
1. Smooth-pink-soft-moist	41 (37.3)	1.73±0.63
2. Pale, dry, isolated lesion	58 (52.7)	
3. Swollen red	11 (10.0)	
4. Very dry and edematous, inflamed	-	
6. Saliva		
1. Thin, juicy	14 (12.7)	2.61±0.71
2. Increase in the amount of saliva (hypersalivation)	16 (14.5)	
3. Insufficient and a little thick	79 (71.8)	
4. Thick and sticky or no salivation (xerostomia)	1 (0.9)	
7. Cheeks		
1. Smooth, normal, and undistorted	42 (38.2)	1.65±0.53
2. Slightly dry red	65 (59.1)	
3. Integrity is broken (abrasion, crack)	3 (2.7)	
4. Very dry, edematous, bleeding ulcer	-	
8. Nutritional support		
1. Enteral (Oral)	5 (4.5)	3.77±0.71
2. Enteral (Naso-oro gastric tube-PEG)	3 (2.7)	
3. Parenteral	4 (3.6)	
4. No support	98 (89.1)	
9. Ventilatory support		
1. Normal spontaneous breathing	14 (12.7)	2.61±1.11
2. Assisted with nasal cannula/simple oxygen masks	55 (50.0)	
3. Supported by mechanical ventilation with noninvasive masks	1 (0.9)	
4. Invasive mechanical ventilation assisted with oro-nasotracheal intubation tube \tracheostomy	40 (36.4)	
10. Additional point (In cases of immunosuppressive drug use, antibiotic use and steroid therapy, low Hb level, diabetes mellitus)		0.37±0.48
Total score		21.60±3.02



Graphic 1. Postoperative oral care frequentness need of intensive care patients

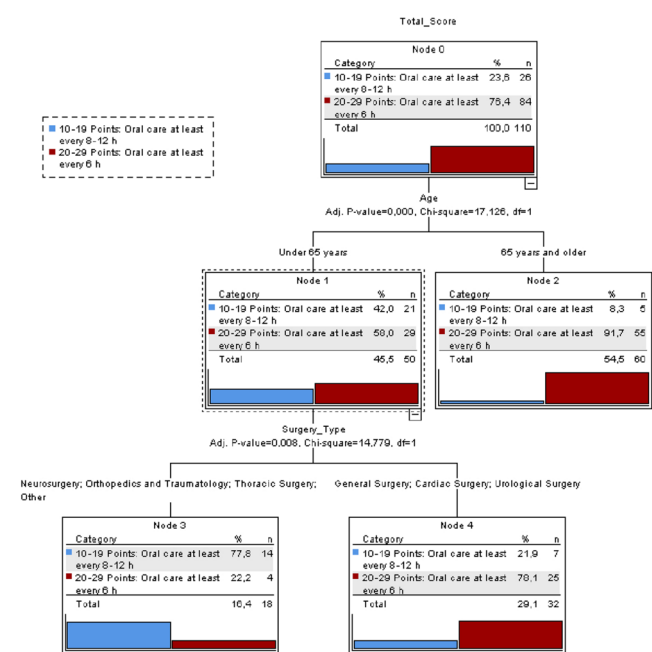


Figure 1. Tree diagram for variables affecting oral care frequentness needs

Discussion

Evidence-based information is needed to apply the frequentness and methods of individualized oral care according to the oral health status for critical patients. A direct comparison of the oral health of critical patients is only possible when a standardized, valid, and objective parameters is applied [13]. However, the evaluation of the oral health of critical patients, unlike the evaluation of other medical problems, is made subjectively, not objectively, according to their signs and symptoms [21]. The subjective assessment of oral health does not distinguish between periodontal diseases that occur due to the effect of the specific conditions (intubation, drug use, lack of oral feeding, etc.) of the patients hospitalized in the ICU on oral health [13]. The oral health status of patients should be assessed within 6 hours of hospital admission, ideally with an objective oral assessment tool [20].

In this study, a measurement tool with proven validity and reliability was used to determine the oral care frequentness care specific to ICU patients holistically. The oral care frequentness requirements was determined by evaluating the patient's oral mucosa with nine parameters. As a result of the evaluation made in this context, the frequentness of oral care in patients with age, chronic disease, and postoperative intubation differed from other patients. Similar to the studies, our study showed that the need for oral care increases for critical patients over 65 years of age, with chronic disease, dependent on mechanical ventilators, and cannot be fed orally [22,23]. Unlike these results, there are also studies showing that there is no relationship between age and deterioration of oral health [24–26]. As age progresses, the patient’s inability to perform their self-care, the increase in the drugs used, the deterioration of nutrition and the increase in the sensitivity of the mucosa increase the risk of deterioration of oral health [23,27]. In this study, age was found to be the most effective variable on oral care frequentness. The type of surgery was found to be effective in determining the frequentness of oral care in patients under 65 years of age. This result may be due to the fact that the elderly are more susceptible to dehydration due to the duration of preoperative fasting and thirst. Decreased physiological functions and self-care skills in the elderly affect oral hygiene more. Oral hygiene problems were reported between 70.0% and 87.6% of elderly patients [6]. In the study conducted by Hanneman and Gusick (2005), it was observed that the frequentness of oral care differed between intubated patients. Mechanically ventilated intubated patients need special oral care because of their condition [28]. When performing oral care in these patients, attention should be paid to the technique, equipment and solution used and the frequentness of care. The accumulation of debris in the endotracheal tube provides a favorable environment for microbial growth, resulting in an open mouth, xerostomia, mucosal dryness, dental plaque formation and decreased salivation [29].

In this study, It was determined that the frequentness of oral care increased in patients who underwent orthopedic surgery, received general anesthesia, used dental prostheses, were given bronchodilators and narcotic analgesics together, and fed enterally. Ogawa et al. (2021) demonstrated that cardiovascular surgery further deteriorates oral health due to prolonged perioperative endotracheal intubation [30]. In this study, it was determined that the need for oral care frequentness of the patients who had general surgery, cardiovascular surgery, and urological surgery increased. After such surgeries, bleeding may be high and this may lead to a decrease in the amount of saliva, dry mouth and plaque formation. However, further studies are needed for this purpose.

Oral care is vital for critical patients. It can affect the clinical outcome as well as the well-being of patients [29]. ICU nurses have a major role in evaluating the oral situation of critically ill patients [15]. In this study, the oral care frequentness requirements of intensive care patients was evaluated with a

risk assessment tool. As a result of the study, it was determined that 76.4% of the patients needed oral care every 6 hours after surgery. The frequentness of oral care for ICU patients is still a controversial issue. While in the literature it is recommended that frequency be based on a score from a systematic assessment that measures a "risk", [17] and on the other hand, although there is no evidence to support the frequency of optimal oral hygiene for critically ill patients in the ICU, there is a consensus that teeth should be brushed at least twice a day [31]. Evidence-based consensus document for oral care in adult ICUs published by the British Society of Intensive Care Nurses recommends an oral care assessment within 6 hours of admission and every 12 hours thereafter in a ventilated patient (Strong, 4) [20].

Limitations

The current study was performed in only one university hospital, so the results cannot be generalized to all surgical patients and this can be considered a limitation. Another limitation is the lack of preoperative evaluation of the oral health of patients. It cannot provide information on the extent to which preoperative oral hygiene status affects the frequency of postoperative oral care. However, it provides important information to nurses about providing care to surgical patients in ICU according to the oral care frequentness requirements.

Conclusion

This study showed that oral health is comparatively worse in patients who need postoperative intensive care, receive general anesthesia, are 65 years of age and older, are dependent on mechanical ventilators, cannot be fed, and use drugs that cause dry mouth. Intensive care nurses should evaluate the oral care frequentness care within the first 6 hours after the admission of patients to the ICU. In addition, during the patient's stay in the ICU, systematic and routine oral health diagnoses should be made and measures should be taken against risk factors. Postoperative oral evaluation should include the evaluation of the ICOFAS parameters, as well as the patient's surgical operation, type of anesthesia, chronic disease, and drug use that may cause dry mouth. Nurses should objectively evaluate the oral health of patients with a valid assessment tool and determine the frequentness of oral care according to the needs of the patient.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

Permission was obtained from the Non-Interventional Ethics Committee of a university for the research (dated 01.07.2022 and numbered 2022/8). Written permission was obtained from the chief physician's office of the hospital where the study was conducted (dated 06.07.2022 and numbered E.95418).

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