Effect of an Intervention Bundle on Thirst Intensity among Intensive Care Unit Patients

Nayera Mohamed Tantaewy [1,2], Manal Sayed Ismail [3], Marwa Fathallah Mostafa [1,4]

(1) Assistant Professor of Critical Care and Emergency Nursing, Faculty of Nursing, Mansoura University

(2) Associate Professor of Critical Care & Emergency Nursing, Faculty of Applied Medical Science Alula Branch, Taibahu University, KSA.

(3) Professor of Critical Care and Emergency Nursing, Faculty of Nursing, British University in Egypt

(4) Associate Professor of Critical Care and Emergency Nursing, Faculty of Nursing, British University in Egypt

Corresponding author: Marwa.fathallah@bue.edu.eg

Abstract

Background: Dry mouth and thirst are commonly associated with a strong desire to drink fluid. Despite this, thirst is often overlooked in the intensive care unit (ICU). Patients in the intensive care unit (ICU) experience various causes of distress. **Aim:** This study aimed to assess the effect of an intervention bundle on thirst intensity among ICU patients. **Methods:** A quasi-experimental research design was used with a purposive sample of 100 ICU patients were selected and randomly divided into two groups: the thirst bundle group comprised of 50 ICU patients who received thirst bundle intervention with lip moisturizer, peppermint water mouthwash, and vitamin C sprays. The control group comprised 50 ICU patients who received routine hospital care, including saline cotton balls. Numerical Rating Scale (NRS) and oral mucosa scale (OOMS) tools were used to evaluate the levels of thirst, oral mucosa hydration, and dry mouth severity among ICU patients at baseline and after the intervention. **Results:** After the intervention, patients in the thirst bundle group exhibited lower levels of dry mouth than those in the control group. Furthermore, the mean thirst severity score decreased significantly in the thirst bundle patients (3.52 ± 2.03) compared to the control group (5.74 ± 2.54), $p<0.001$. Additionally, a significant improvement in dry mouth severity was observed in the thirst bundle group, with a baseline score of 3.18 ± 0.85 and a post-intervention score of 1.96 ± 0.755 ($p<0.001$). **Conclusion:** Implementing a thirst bundle effectively reduced the severity of thirst and dry mouth intensity among ICU patients. Further research is necessary to determine the potential benefits of this intervention for ICU patients.

Keywords: Thirst bundle, Dry mouth, Thirst, ICU.

Introduction

Patients with dry mouth and a strong desire to drink fluids such as water frequently experience thirst. Among critical care patients, thirst is the second most common symptom and is ranked as one of the ten most distressing symptoms **(Gulia et al., 2019).** It is a severe symptom that affects over 70% of ICU patients, with 33-52% of them rating their thirst as moderate and 18-52% as severe **(Flim et al., 2022).** Thirst is associated with several distressing symptoms, including sleep depression, dyspnea, anxiety, and pain, which can severely impact a patient's quality of life and functionality **(Sato et al., 2023).** ICU supervisors report that thirst is the most common and frequent experience among ICU patients (**Qiongshan & ZHENG, 2023).**

It is important to recognize the various predictors of thirst among ICU patients. These include gastrointestinal disease, insufficient oral fluids, mechanical ventilation, and the use of specific medications such as diuretics and opioids **(Saltnes-Lillegård et al., 2023).** Due to swallowing difficulties and aspiration risks, many ICU patients are unable to receive fluids. In certain cases, preventive measures that result in xerostomia or dry mouth are employed to prevent patients from inhaling saliva into their lungs **(Chen et al., 2024).** Moreover, the oral endotracheal tube itself can cause xerostomia, which further complicates patients who struggle to keep their mouth closed **(Lee et al. 2020).**

Identifying and treating thirst in ICU patients can be challenging due to several factors. Patients often experience decreased consciousness due to anesthesia and delirium, affecting 30% of ICU patients and most patients on mechanical ventilation who require medication **(Clark & Archer, 2022).** Additionally, 65% of ICU patients have generalized muscle weakness, which can make

it difficult to drink and exacerbate feelings of thirst. Patients with catheters and infusion lines may also struggle with limited mobility, which can be uncomfortable when attempting to raise an arm to consume fluid **(Sharma and Kumar, 2020).** Moreover, ICU patients rely heavily on caregivers and visitors to meet their basic needs including access to water. Assessing risk factors can benefit both patients and health care professionals **(Nascimento et al., 2020).**

Dry mouth and thirst are often disregarded in ICU nursing care. Several factors contribute to ICU patients' sensation of thirst, such as fasting, medications administered during anesthesia, patient age, dehydration, surgical intraoperative bleeding, endotracheal intubation, and medications such as sedatives, high-dose antibiotics, diuretics, and analgesics that promote thirst **(Zhang et al., 2022).** Despite their desire to consume fluids, many ICU patients' requests for hydration are unrecorded by nurses, exacerbating their discomfort and distress **(Clark and Archer 2022).**

Most healthcare professionals, particularly nurses, frequently neglect to assess their patients for dry mouth and thirst, which may lead to severe consequences such as increased pain and shortness of breath. The oral cavity is comprised of osmoreceptors, whereas the esophagus responds to temperature, tactile, chemical, and pressure stimuli. Drinking cold fluids can alleviate thirst. Research demonstrates that cold beverages are more effective than warm or hot fluids in quenching thirst, according to a study conducted by **Halm (2022).**

Despite being acknowledged as a symptom, ICU nurses seldom evaluate, examine, or treat thirst **(Ho et al., 2021).** Certain tools, such as the numerical rating scale (NRS) for oral mucosal hydration and mouth dryness, are intuitive and require awareness among nurses. Course materials in general and ICU nursing rarely address the management of thirst **(Flim et al., 2022).** In ICUs, menthol lip moisturizers, cold water sprays, cotton saline swabs, and humidification are common strategies for reducing thirst. However, **Clark and Archer (2022)** found that insufficient research led to low-quality evidence.

Significance of the Study

Many nurses believe that there is no effective remedy for dry mouth and thirst in ICU patients. Furthermore, these symptoms are often disregarded in critical care areas of hospitals **(Çelik et al., 2023).** Currently, there are no long-term evaluation techniques for assessing thirst and dry mouth. This indicates that hospitals have yet to implement database solutions to alleviate the discomfort and severity of these symptoms **(Hawkins et al., 2020).** It is crucial to recognize and treat dry mouth and thirst as uncomfortable symptoms and to prioritize their management. Therefore, the present study aimed to investigate the effects of using a thirst bundle to decrease thirst severity and dry mouth intensity in ICU patients compared to those receiving standard care.

Aim of the Study

This study was conducted to assess the effect of an intervention bundle on thirst intensity among ICU patients.

Research hypothesis

We hypothesized that the implementation of an intervention bundle will reduce thirst intensity and mouth dryness among ICU patients compared to the control group who will receive routine care.

Operational definition

Intervention bundle is a recent trend used to avert thirst intensity and dry mouth. It comprises lip moisturizer, peppermint water mouthwash, and vitamin C spray.

Subjects and Method:

Design

A quasi-experimental design was used to achieve the aims of this study. This approach was chosen because of its resemblance to an experimental pre-and post-test for the intervention and control groups, which provides a high level of evidence (Reichardt, 2009).

Setting

This study was conducted in the surgical intensive care units (ICUs) at Mansoura Emergency Hospital. These ICUs comprise three separate units, namely Surgical 1, Surgical 2, and Surgical 3, each of which is

equipped with ten beds and serves patients with surgical or neurological issues, as well as those who have sustained multiple trauma injuries. These units are equipped with technology and have adequate personnel to provide optimal patient care. The nurse-to-patient ratio in these units is approximately 1:2.

Sample type: Purposive Sample.

Sample size and sampling technique.

The sample size was estimated using the power estimate. A test with a power of 80% and a value of significance of 0.05 was considered appropriate, and the sample size was estimated to be 45 patients in each group. A 10% increase in sample size was made to account for potential losses. Finally, 50 participants were included in each group. The sample size was calculated using the following equation:

$$n = \frac{Z^2\, P(1-p)}{d^2}$$

Where Z is the statistic that represents the degree of confidence, P is the predicted frequency, n is the sample size, and d is the precision related to the effect size.

A total of 100 ICU patients were randomly assigned to either the experimental or the control group. The experimental group comprised 50 ICU patients who received lip moisturizers, peppermint water mouthwashes, and vitamin C sprays, whereas the control group consisted of 50 ICU patients who received routine hospital care, including saline cotton balls. To be eligible for the study, participants had to be fasting ICU patients aged 18 years or older, admitted to the ICU for more than 24 hours, have good consciousness, and cooperate.

Individuals with mental disorders, ventilatory support, conscious difficulties, and cognitive disabilities who were unable to express themselves were excluded from the study. Additionally, patients who provided liquids through the mouth or had head/neck malignancies, previous dementia, a medical problem that hindered treatment procedures (e.g., dental surgeries), lip or mouth desquamation, and open sores were excluded from the study.

Data collection tools

The present tool comprises three main components:

The first part focused on the sociodemographic characteristics of patients who were admitted to the aforementioned ICUs. These details included gender, age, educational attainment, occupation, and marital status.

The second part utilized the Numerical Rating Scale (NRS) to evaluate patients' thirst levels before and after the intervention. This scale ranges from 0 (no thirst) to -10 (signifying intolerable thirst **(Lee et al., 2020).** No thirst to mild thirst (0–2 points), and moderate to severe thirst (3–10 points). This tool is suitable for application in the ICU setting.

The third section employed the Objective Oral Mucosa Scale (OOMS) to assess the hydration levels of the oral mucosa and the prevalence of dry mouth in ICU patients at both baseline and post-intervention stage. Patients were assessed according to the following scores: 1 (moist lips and mouth), 2 (dry lips and wet mouth), 3 (dry lips and mouth), and 4 (chapped lips and dry mouth) **(Ning et al., 2019).**

Validity and reliability of the study tool

Employing the interobserver approach, the levels of mouth dryness in the 10 ICU patients were rated separately by two research assessment nurses who applied the study tools. The scale's high level of reliability was indicated by the interobserver coefficient of correlation, which was r=0.87 for the NRS scale and r=0.89 for the OOM scale indicating reliable results **(Vakili & Jahangiri, 2018).**

Ethical consideration

The Research Ethics Committee of the Faculty of Nursing at Mansoura University provided ethical approval (No. P.0573"). Moreover, the PI explained the nature of the study, including the aim, procedure, benefits, and risks to the patients and obtained informed consent. Patients were informed that participation in the study was voluntary and that they had the right to withdraw at any time without any responsibility.

Data Collection Process

Preparing phase

Upon admission, the research nurse measured the baseline scores of the thirst level using the NRS scale for all patients by asking them to express the intensity of their thirst on a scale from 0 to 10, where 0 indicated no thirst feeling and 10 indicated the utmost thirst feeling. Mucosal hydration and mouth dryness levels were also assessed by a research nurse using the OOM scale by observing the patients 'oral cavity dryness, giving patients a score from 1 to 4 according to the intensity of dryness in the lips and mouth. The fieldwork lasted 3 months, from March to June 2024.

Implementation phase

Patients were randomly assigned to either the thirst bundle group or the control group using a code generated by a second nurse who was blinded to the study protocol. The study was conducted over two consecutive days, with three 15-minute sessions taking place during each day, across all three shifts (morning, afternoon, and night). The patients in the thirst bundle group were provided with an intervention bundle, which included a dose of vitamin C spray (10 mg/mL) applied to their mouths and lips **(Martín-Piedra et al., 2011)**, peppermint water mouthwash (5 g of peppermint leaves + 50 mL of boiling water chilled to 40 °C) **(Serato et al., 2019),** and a lip moisturizer with glycerine as its main component, administered every two hours **(Kvalheim, Marthinussen, et al., 2019)**. On the other hand, patients in the control group received standard care, which consisted of wetting their lips with saline cotton solution on an hourly basis. Both groups received two sessions of standard oral hygiene the following day, administered by an assistant nurse and documented by a research nurse.

Evaluation phase

After implementing the thirst bundle for two consecutive days, the study assessed the thirst intensity and oral condition of the two groups.

Statistical Analyses

Data was gathered, coded, and tabulated using the software (SPSS version 25). For sociodemographic characteristics, simple descriptive statistics were employed. The data was analyzed via a descriptive statistic that consists of means, standard deviation (SD), percentages, or frequencies. The relevant statistical test was carried out following the degree of normality of the data. The chi-square test was used to compare categorical variables, while the ANOVA test was used to compare quantitative variables. P-value represented the value of significance among variables. Statistical significance was set at $p < 0.05$.

Results

Socio-demographic data among the studied groups

Table 1 provides information on the sociodemographic characteristics of patients in both the thirst bundle and control groups. The average age of patients in the two groups was 59.92 ± 9.963 and 56.92 ± 10.04, respectively. In terms of gender, 50% of the patients in the thirst bundle group were male, while 54% in the control group were male. Most patients in both groups had a high level of education, with 62% of patients in the thirst bundle group and 78% in the control group having attained high levels of education. Concerning employment status, 68% of the patients in the thirst bundle group were employed, compared to 54% in the control group. A significant number of patients in both groups were married, with 84% in the thirst bundle group and 80% in the control group. However, the sociodemographic data of the patients in both the groups were not statistically significant ($p>0.05$).

Thirst severity scores among the studied groups at baseline and after the intervention.

Table 2 illustrates thirst severity among the thirst bundle and control groups at baseline and after the intervention. In the thirst bundle and control groups, 20% and 28 %, respectively, experienced severe thirst. A moderate level of thirst was observed in 64% of the patients in the thirst bundle group and in 40% of the patients in the control group. Notably, both groups exhibited elevated, yet non-significant, levels of thirst before the intervention, with no statistical differences between them ($p=0.051$). After the thirst bundle intervention, only 4% of the patients in the thirst bundle group showed severe thirst, while in the control group, the number of patients who expressed severe thirst was higher (42%). The number of patients with mild thirst was higher in the thirst bundle group (40%) than in the

control group (8%) post-intervention. This indicated that introducing the bundle to the thirst bundle group was more effective and showed better results than the usual care. The patients in both groups differed significantly according to their thirst severity scores ($p<0.001$).

Dry mouth severity at baseline and after intervention among the studied groups

Table 3 shows that both groups demonstrated a high level of dry mouth severity. Chapped lips and dry mouth were observed in 42% and 44% of the patients in the thirst bundle group, respectively, and these patients received standard care. Both groups had lower levels of moist lips and mouth (4% in the thirst bundle group and 6% in the control group). There were no significant differences between the two groups in terms of dry mouth level at baseline ($p=0.693$). After the intervention, patients who received the thirst bundle showed lower levels of dry mouth than control patients. Chapped lips and dry mouth were less frequently observed in patients with thirst bundle (4%) than in control patients (38%). Moist lips and mouth were higher in the thirst bundle patients (26%) than in the control patients (4%). Patients in the thirst bundle and those who received usual care differed significantly in dry mouth severity after intervention ($p<0.001$).

Comparison between thirst severity pre and post-intervention among the studied groups

Table 4 indicates that the mean score for thirst severity among patients who received the thirst bundle (5.28 ± 1.92) was not significantly different from that of the control group at baseline (4.74 ± 2.73), with a p-value of 0.256. However, following the intervention, the mean thirst severity score decreased significantly more in the thirst bundle patients (3.52 ± 2.03) than in the control group (5.74 ± 2.54), with a p-value of less than 0.001.

Comparison of dry mouth pre and post-intervention among the studied groups

Table 5 indicates that dry mouth severity decreased significantly among the thirst bundle groups, with a mean score of 1.96 ± 0.755, compared to the control group's mean score of 3.12 ± 0.849. The results demonstrate a statistically significant improvement in dry mouth severity from the baseline measurement of 3.18 ± 0.85 to 1.96 ± 0.755 after the intervention ($p<0.001$) within the thirst bundle group.

Table (1): Socio-demographic data among the studied groups

Variable	Parameter	Thirst bundle (n=50)	Control (n=50)	Test	p-value
Age	Mean ± SD	59.92 ± 9.963	56.92 ± 10.04	t-test=2.82	0.096
	Min-Max	39-88	33-75		
Sex, n (%)	Male	25 (50%)	27 (54%)	χ^2 =0.16	0.841
	Female	25 (50%)	23 (46%)		
Level of education, n (%)	High level	31 (62%)	39 (78%)	χ^2 =3.048	0.126
	Low level	19 (38%)	11 (22%)		
Profession	Employed	34 (68%)	27 (54%)	χ^2 =2.06	0.218
	Non-employed	16 (32%)	23 (46%)		
Marital status	Single	8 (16%)	10 (20%)	χ^2 =0.271	0.795
	Married	42 (84%)	40 (80%)		

Data are expressed as mean ± SD, min: minimum, max: maximum, and number (percentage). χ^2: Chi-square test; p-value indicates significance among groups. P was significant if <0.05.

Table (2): thirst severity score among the studied groups at baseline and after intervention

Variable	Parameter	Thirst bundle (n=50)	Control (n=50)	Test	p-value
At baseline					
None	N (%)	0 (0%)	4 (8%)	$\chi2$=8.236	0.051
Mild	N (%)	8 (16%)	12 (24%)		
Moderate	N (%)	32 (64%)	20 (40%)		
Severe	N (%)	10 (20%)	14 (28%)		
Total score	Mean ± SD	5.28 ± 1.92	4.74 ± 2.73		
	Min-Max	1-9	0-9		
After intervention					
None	N (%)	4 (8%)	4 (8%)	χ^2=26.56	<0.001*
Mild	N (%)	20 (40%)	4 (8%)		
Moderate	N (%)	24 (48%)	21 (42%)		
Severe	N (%)	2 (4%)	21 (42%)		
Total score	Mean ± SD	3.52 ± 2.03	5.74 ± 2.54		
	Min-Max	1-6	1-9		

Data expressed as Mean ± SD, min: minimum, max: maximum, number (percentage). $\chi2$: chi-square test, p-value indicated significance among groups. P considered significant if <0.05.

Table (3): Dry mouth severity score among the studied groups

Variable	Parameter	Thirst bundle (n=50)	Control (n=50)	Test	p-value
At baseline					
Moist lips and mouth	N (%)	2 (4%)	3 (6%)	χ^2=1.455	0.693
Dry lips and wet mouth	N (%)	8 (16%)	11 (22%)		
Dry lips and mouth	N (%)	19 (38%)	14 (28%)		
Chapped lips and dry mouth	N (%)	21 (42%)	22 (44%)		
Total score	Mean ± SD	3.18 ± 0.85	3.1 ± 0.95		
	Min-Max	1-4	1-4		
After intervention					
Moist lips and mouth	N (%)	13 (26%)	2 (4%)	χ^2=37.84	<0.001*
Dry lips and wet mouth	N (%)	28 (56%)	9 (18%)		
Dry lips and mouth	N (%)	7 (14%)	20 (40%)		
Chapped lips and dry mouth	N (%)	2 (4%)	19 (38%)		
Total score	Mean ± SD	1.96 ± 0.755	3.12 ± 0.849		
	Min-Max	1-4	1-4		

Data expressed as Mean ± SD, min: minimum, max: maximum, number (percentage). χ^2: chi-square test, p-value indicated significance among groups. P considered significant if <0.05.

Table (4): comparison between thirst severity pre and post-intervention among the studied groups

Variable	Parameter	Thirst bundle (n=50)	Control (n=50)	t-test	p-value
At baseline	Mean ± SD	5.28 ± 1.92	4.74 ± 2.73	t-test=1.304	0.256
After intervention	Mean ± SD	3.52 ± 2.03	5.74 ± 2.54	123.21	<0.001*
t-test		4.44	1.894		
p-value		<0.001*	0.061		

Data expressed as Mean ± SD. *P considered significant if <0.05. The p-value indicates the significance among the groups.

Table (5): Comparison of dry mouth pre and post-intervention among the studied groups

Variable	Parameter	Thirst bundle (n=50)	Control (n=50)	t-test	p-value
At baseline	Mean ± SD	3.18 ± 0.85	3.1 ± 0.95	t-test=0.196	0.659
After intervention	Mean ± SD	1.96 ± 0.755	3.12 ± 0.849	t-test=52.16	<0.001
t-test		7.59	0.11		
p-value		<0.001	0.912		

Data expressed as Mean ± SD. *P considered significant if <0.05. p-value indicated significance among groups.

Discussion

Symptoms often coexist in critically ill patients, with thirst being a primary symptom that frequently occurs, causing significant distress, and is closely associated with other symptoms **(Arai et al., 2013).** However, thirst is rarely effectively measured or managed. Similar to pain management, it is possible to manage the severity and intensity of thirst and the discomfort that it causes. In this study, a three-component bundle that was previously tested in ICU patients was used, and it was found to be an effective approach for managing thirst and dry mouth in the current investigation **(Zhang et al., 2022).**

In the present study, subjects with xerostomia were administered lip balm, peppermint mouthwash, and vitamin C spray. Recent studies have shown that topical salivary stimulants such as citric or ascorbic acid can effectively reduce thirst **(Maruthi, 2018).** These organic acids do not exhibit any pharmaceutical interactions or systemic adverse reactions, making them particularly useful for treating mild hyposalivation and dry mouth **(Walsh 2007).** The findings of this study are consistent with physiological data demonstrating that a 1% organic acid spray can quickly and temporarily come in contact with the oral mucosa, significantly decreasing the thirst score and increasing the rate of unstimulated salivary flow when treating mild, reversible thirst, and dry mouth **(Da Mata et al., 2019; Martín-Piedra et al., 2011).**

In this study, peppermint water was administered as a mouthwash to enable effective administration of menthol to the mucosal membrane of the oral cavity, resulting in longer-lasting cold stimulation of the glossopharyngeal and trigeminal areas. Consequently, salivary flow is controlled, which leads to rehydrated mucosa and a decrease in thirst sensations **(Arai et al., 2014).** The mouthwash with peppermint water used in this trial probably worked through similar processes to relieve thirst.

According to healthcare professionals in Norway, glycerol is recommended as a lip moisturizer because of its ability to maintain the balance of in vitro reconstituted normal human buccal mucosa and to preserve tissue integrity in patients. Although the short-term effectiveness of glycerol is limited, its frequent application can help to overcome this limitation. This is supported by recent studies conducted by **Kvalheim, et al. (2019) and Kvalheim, et al. (2019).**

Sharma and Kumar (2020) reported that both groups had similar feelings of thirst before the intervention, which was not statistically significant (p=0.051). There was also no significant difference in the level of dry mouth

between the two groups at baseline (p=0.693). It is important to note that these findings are based on Sharma and Kumar (2020) and should not be interpreted as claims of superiority over other studies or researchers. Instead, they provided valuable insights into the effectiveness of glycerol as a lip moisturizer and the prevalence of dry mouth in patients.

The current research initiative involves the development and implementation of a thirst bundle specifically designed for individuals experiencing both dry mouth and thirst. The outcomes of this study were consistent with those reported by Sharma and Kumar in 2020, who demonstrated that administering a thirst bundle to critically ill patients in ICUs resulted in a substantial reduction in the severity of thirst and mouth dryness (**Sharma & Kumar, 2020).** Statistically significant variations were observed in the severity of thirst and mouth dryness between and within study groups.

In the current study, a statistically significant decrease in the mean thirst severity score was observed in thirst bundle patients compared with controls. The results of the present investigation align with those of **Zhang et al. (2022),** who reported a reduction of 1.27 points in thirst severity following the intervention bundle **(Zhang et al., 2022).** According to **Puntillo et al. (2014),** an intervention led to a decrease in thirst severity from 5.9 to 3.6, a difference of 2.3 points **(Puntillo et al., 2014).** Another study revealed a significant reduction of 2.83 points in thirst severity following intervention **(VonStein et al., 2019).** Owing to differences in intervention bundles, protocols, evaluation timing, exclusion, and inclusion criteria, it is not always straightforward to compare the study results effectively. **Puntillo et al. (2014)** reported improvements in thirst severity scores following each 15-minute session, indicating that the therapeutic bundle had more immediate effects.

Ultimately, this study revealed that thirst levels in the two groups were significantly different. According to **Zhang et al. (2022),** there was a notable variance of 1.08 points on the NRS in the thirst levels between the two groups of participants **(Zhang et al., 2022).** In another study, **Puntillo et al. (2014)** reported a significant decrease of 1.7 NRS points among both groups. Furthermore, **VonStein et al. (2019)** found a significant difference of 1.15 NRS scores among the groups. This suggests that unlike other investigations where usual care therapies were used, the patients' thirst intensity decreased to a similar extent. Therefore, further attempts should be made to alleviate thirst among ICU patients.

The primary goal of this study was to investigate the effect of a thirst management bundle on mucosal hydration and mouth dryness. Utilizing OOMS, the intervention was found to significantly reduce mouth and lip mucosal dehydration and dryness levels in contrast to the usual care group. Previous research by **Atashi et al. (2018)** used a visual scale to evaluate the efficacy of hydrating gel in controlling symptoms of oral dryness, with positive results **(Atashi et al., 2018).** Mucosal dehydration and lip dryness are common indicators of thirst; however, there has been no quantitative evaluation of the mucosal hydration status among ICU patients. The OOMS was found to be a simple and effective tool for objectively assessing mucosal hydration status. Further research is needed to confirm these findings.

Limitation

A limitation of this study was that patients who were sedated or intubated were not included in the sample, which restricts the generalization of the study findings.

Conclusion

This study highlights the importance of managing the severity of thirst among patients in the Intensive Care Unit. In addition, the implementation of a thirst bundle intervention led to a substantial decrease in both the severity of thirst and intensity of dry mouth. Further research is necessary to determine the beneficial effects of this bundle in ICU patients.

Recommendations

Based on the research findings, the following recommendations are suggested

1. Develop a thirst care bundle protocol for preventing and managing thirst in ICU patients, particularly those who were sedated or intubated.
2. Healthcare providers should be trained on how to identify and assess thirst in ICU patients as well as how to implement the interventions outlined in the thirst care bundle protocol.

Declaration of Conflicting Interests

The authors state that they have no affiliations with or involvement in any organization or institution with financial interest in the subject matter or materials covered in this study.

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