Effect of a Scheduled Nurse Intervention on Thirst and Dry Mouth in Intensive Care Patients

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Background Thirst is a common, intense symptom reported by hospitalized patients. No studies indicate frequency of use of ice water and lip moisturizer with menthol to ameliorate thirst and dry mouth. In an audit of 30 intensive care unit patients at a 580-bed community teaching hospital, 66% reported dry mouth with higher thirst distress and intensity scores than in published studies.

Objectives To evaluate the effectiveness of scheduled use of ice water oral swabs and lip moisturizer with menthol compared with unscheduled use in relieving thirst and dry mouth for intensive care unit patients.

Methods In a quasi-experimental design, adult patients admitted to 2 intensive care units at a community hospital were provided with ice water oral swabs and lip moisturizer with menthol upon request. The intervention was unscheduled in 1 unit and scheduled in the other unit. The scheduled intervention was provided hourly during a 7-hour period (n = 62 participants). The unscheduled intervention consisted of usual care (n = 41 participants). A numeric rating scale (0-10) was used to measure thirst intensity, thirst distress, and dry mouth before and after 7 hours in both groups.

Results The scheduled-use group had significant lessening of thirst intensity ($P = .02$) and dry mouth ($P = .008$). Thirst distress in the scheduled-use group did not differ from that in the unscheduled-use group ($P = .07$).

Conclusion Scheduled use of ice water oral swabs and lip moisturizer with menthol may lessen thirst intensity and dry mouth in critical care patients. (*American Journal of Critical Care.* 2019;28:41-46)

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Thirst can be defined as "a perception that provokes the urge to drink fluids"[1] and "is a prevalent, intense, distressing, and underappreciated symptom in intensive care patients."[2] Dry mouth, or xerostomia, can be associated with thirst.[1] Thirst and dry mouth are common symptoms and may affect patients' experience in intensive care unit (ICUs).[3] In a study of 171 ICU patients by Puntillo et al,[4] thirst was one of the most common and intense symptoms reported.

A more recent retrospective, descriptive study[5] of patients who had cardiac surgery and received mechanical ventilation confirmed that dry mouth and thirst cause discomfort. The researchers[5] suggested that these symptoms could be addressed by nursing staff, but studies were needed to identify interventions. In a phenomenological study, Kjeldsen et al[6] found that patients treated with mechanical ventilation experienced powerlessness and frustration because of the inability to satisfy thirst.

Patients in ICUs are predisposed to thirst and dry mouth for a variety of reasons, including mechanical ventilation, receiving nothing by mouth, specific classes of medication, and certain medical conditions.[7]

Patients receiving mechanical ventilation experience powerlessness and frustration because of the inability to satisfy thirst.

Little research has been done on nonpharmacological interventions to manage and minimize thirst and dry mouth in hospitalized adults, especially ICU patients, resulting in a lack of solid evidence for practice. Cold water was the most common approach, with a variety of application techniques.[1,3,8,9] Menthol was also cited as an intervention for its cooling sensation.[10] Puntillo et al[1] used a menthol lip moisturizer as part of an intervention bundle to prevent thirst and dry mouth. No evidence-based recommendations for a standardized frequency of use were reported.

A thirst intervention bundle consisting of ice water spray, oral swab wipes, and menthol lip moisturizer was tested in a randomized control study in 252 ICU patients.[1] Overall, use of the bundle resulted in a statistically significant decrease in thirst intensity, thirst distress, and dry mouth. These findings are strengthened by the randomized control design of the study and assessment of potential confounders.

In a quality improvement audit, we assessed for thirst distress, thirst intensity, and dry mouth in 30 patients who were not receiving mechanical ventilation and whose status was nothing by mouth. Mean scores for thirst distress and thirst intensity were 5.5 and 6.1 (on a numeric rating scale [NRS] of 1-10), respectively. Dry mouth was reported by 66% of patients. Usual care consisting of oral swabs moistened with ice water and lip moisturizer containing methyl lactate (a derivative of menthol) are provided to patients upon request at this facility. More than half of the patients reported using these interventions to relieve thirst and dry mouth.

Our aim in this study was to compare the effectiveness of scheduled use of ice water oral swabs and lip moisturizer with menthol with the effectiveness of unscheduled, as-needed use of the same interventions (usual care) at relieving thirst intensity, thirst distress, and dry mouth in ICU patients. We hypothesized that providing patients with regularly scheduled applications of ice water oral swabs and lip moisturizer with menthol would decrease the patients' perception of thirst intensity, thirst distress, and dry mouth more than would providing these interventions upon patients' request.

Methods

Design, Setting, and Sample

We used a quasi-experimental study design with a convenience sample of patients admitted to 2 medical ICUs at WellSpan York Hospital, York, Pennsylvania, a 580-bed acute care community teaching hospital. One unit provided the scheduled-use intervention and the other unit provided usual care to patients as needed. Both units provide care for ICU patients with a variety of medical diagnoses. The study was approved by the appropriate institutional review board.

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Patients were eligible if they were more than 18 years old, spoke English, were able to provide informed consent, had an ICU stay of 12 hours or more, had a score of -1, 0, or +1 on the Richmond Agitation-Sedation Scale, and had a baseline thirst intensity or thirst distress score of 3 or greater (on a 0-10 NRS). The exclusion criteria mirrored those of the study of Puntillo et al[1]: a history of dementia; open lesions or desquamation on the mouth or lips; or a medical condition, such as recent oral surgery, that contraindicated the intervention. We did an a priori power analysis for a paired *t* test with an α of .05, a power of 0.80, and an effect size of 0.35 (small-moderate). The results indicated that 66 patients would be needed for each group.

A total of 296 patients were evaluated for eligibility from February through September 2017. Of these patients, 219 met eligibility criteria, and 134 (61%) were enrolled in the study. The Figure is a flowchart of enrollment in the study. A total of 31 participants were lost to follow-up because of transfer from the unit before completion of data collection. The 2 groups did not differ significantly ($\chi^2_1 = 0.3$; $P = .59$) in the number who were lost to attrition: 22% in the intervention group (n = 17) and 26% in the control group (n = 14). The final sample consisted of 103 patients who completed the study: 62 in the intervention group and 41 in the control group. Participants who completed the study (n = 103) and those who were lost because of attrition (n = 31) did not differ significantly in age; sex; ventilator status; or scores for thirst intensity, thirst distress, and dry mouth obtained before the start of the study.

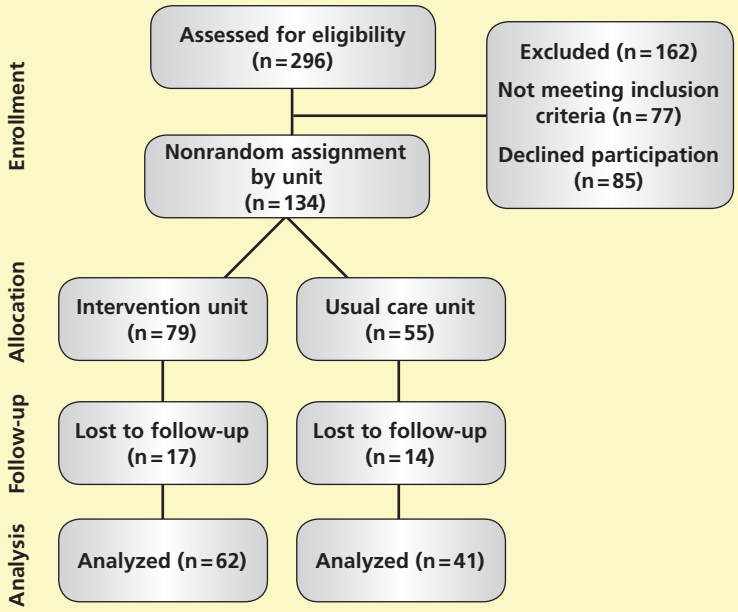

Figure Flowchart of participants enrolled in the study.

Procedures

Five research nurses were trained to enroll patients and collect data. These nurses used a researcher-developed data collection tool to ensure precision in collection. Potential participants were identified each morning by a research nurse in collaboration with the unit charge nurse. Baseline data were collected to determine eligibility. Patients who agreed to participate completed an informed consent form.

Intervention. The research nurses informed participants in the intervention group that clinical staff members would provide freshly obtained ice water oral swabs and would apply lip moisturizer with menthol every hour with the first application at 10 AM and the last application at 5 PM. The research nurses informed the unit charge nurse and each patient's primary nurse of the patient's enrollment in the study. Participants in the intervention group received a packet containing 8 swabs and lip moisturizer with menthol. A reminder card was placed at each participant's bedside to ensure completion of scheduled treatments. Clinical staff in the intervention unit were provided education about the intervention and its frequency for participants.

Control (Usual Care). Providing ice water oral swabs and lip moisturizer with menthol when requested by a patient was the usual care. Study participants within the ICU that provided usual care were notified that they could ask the clinical staff for ice water oral swabs and lip moisturizer with menthol when needed. The charge nurse and each participant's primary nurse in the usual-care ICU were notified that the participant was enrolled in a study. No additional education was provided to the nursing staff because no change in usual care was required. A research nurse returned to the usual-care unit to evaluate the study participants' thirst intensity, thirst distress, and dry mouth 7 hours after enrollment (between 5:30 PM and 6 PM)

> The intervention group received hourly ice water oral swabs and lip moisturizer with menthol.

Instruments

Construct validity of the NRS was established through factor analysis.[11,12] Concurrent validity was evidenced by strong correlations between scores on the NRS and scores on a visual analog scale, current pain intensity word scales, and simple descriptive scales.[11,12] We chose an NRS rather than a visual

Table 1
Group demographics

Characteristic	Intervention group[a] (n = 62)	Control group[a] (n = 41)	*P* value
Male sex	33 (53)	24 (59)	.60
Ventilator status	1 (2)	1 (2)	> .99
Nothing by mouth status	10 (16)	6 (15)	> .99
Age, mean (SD), y	60.3 (17.1)	62.8 (11.3)	.41

[a] Values are No. (%) of patients unless otherwise indicated in first column.

Table 2
Paired samples results for intervention and control groups[a]

Group	Outcomes	Score, mean (SD)		*Z*	*P* value[b]
		Before	After		
Intervention	Thirst intensity	6.48 (2.45)	3.65 (2.84)	-5.10	< .001
	Thirst distress	5.21 (2.95)	2.73 (3.03)	-4.57	< .001
	Dry mouth	6.63 (2.57)	3.48 (2.84)	-5.36	< .001
Control	Thirst intensity	7.10 (2.41)	5.42 (2.87)	-3.29	.001
	Thirst distress	5.83 (3.20)	4.18 (3.40)	-2.57	.01
	Dry mouth	6.76 (2.95)	5.20 (2.97)	-2.66	.008

[a] Scores were on a numeric rating scale.
[b] Wilcoxon signed rank test.

Table 3
Comparison of mean difference scores for thirst intensity, thirst distress, and dry mouth[a]

Outcomes	Group	Score		Mean difference	*P* value
		Before	After		
Thirst intensity	Intervention	6.48	3.65	-2.84	.02
	Control	7.10	5.42	-1.68	
Thirst distress	Intervention	5.21	2.73	-2.48	.07
	Control	5.83	4.18	-1.65	
Dry mouth	Intervention	6.63	3.48	-3.15	.008
	Control	6.76	5.20	-1.56	

[a] Mann-Whitney test.

analog scale (as used by Puntillo et al[1]) because patients are familiar with the 0 to 10 NRS. Measures for thirst intensity and thirst distress mirrored those used by Puntillo et al.[1] Thirst intensity was scored as 0 (no thirst) to 10 (worst possible thirst); thirst distress as 0 (no distress) to 10 (worst possible distress); and dry mouth as 0 (no dryness) to 10 (worst possible dryness). Participants who were unable to communicate verbally because of endotracheal intubation were shown a paper copy of the NRS and asked to point to the number that corresponded to their thirst intensity, thirst distress, and dry mouth or to nod affirmatively when the research nurse pointed to the numbers, as done in an earlier study.[1]

Data Analysis

We used IBM SPSS Statistics for Windows, version 24.0, (IBM Corp) to maintain and analyze data. To evaluate differences between the scheduled-use group and the control group for demographics (sex, ventilator status, and nothing by mouth status), we used the Pearson χ^2 test or the Fisher exact test as appropriate. Differences in age between the 2 groups were evaluated by using an independent samples *t* test. The outcome variables (number of ice water swabs used and number of times lip moisturizer with menthol was used), along with scores for thirst intensity, thirst distress, and dry mouth, were examined to assess assumptions for parametric testing. These data violated the assumptions of normality (kurtosis ≥ 1.0; Shapiro Wilk test < .05), so nonparametric analyses were used. The Wilcoxon signed rank test was used to identify differences in scores before and after the intervention in both the intervention and the control groups. The Mann-Whitney test was used to detect significant differences in the mean use of ice water oral swabs and lip moisturizer with menthol between the intervention and control groups and to detect differences in mean difference scores before and after the intervention in the intervention and control groups for thirst intensity, thirst distress, and dry mouth. Statistical significance was established as *P* less than .05.

Results

Sample Characteristics

A total of 103 patients completed the study, 62 in the scheduled-use group and 41 in the control group. The 2 groups did not differ significantly in sex ($P = .60$), ventilator status ($P > .99$), nothing by mouth status ($P > .99$) or age ($P = .41$; see Table 1).

Findings

In the total sample, thirst intensity, thirst distress, and dry mouth were reported as substantial symptoms, with mean NRS scores of 6.73 (SD, 2.4), 5.46 (SD, 3.1), and 6.68 (SD, 2.7), respectively. Mean use of ice water oral swabs and lip moisturizer with menthol was significantly greater in the intervention group than in the control group: oral swabs, 5.4 vs 1.7 ($P < .001$); lip moisturizer with menthol, 4.4 vs 0.5 ($P < .001$). The 2 groups did not differ significantly in the mean preintervention scores obtained within 1 hour of the time the study began for thirst intensity ($P = .22$), thirst distress ($P = .22$), or dry mouth ($P = .68$). Although both the intervention and the control group had significant decreases in all 3 outcomes (Table 2), the magnitude of the differences was greatest in the intervention group (Table 3), with

significant statistical differences for thirst intensity (-2.84 vs -1.68, $U = 941.5$, $Z = -2.24$, $P = .02$) and dry mouth (-3.15 vs -1.56, $U = 877.5$, $Z = -2.66$, $P = .008$). These findings were also clinically significant, with medium-effect sizes for thirst intensity (Cohen $d = 0.4$) and dry mouth (Cohen $d = 0.5$).

Discussion

Thirst and dry mouth are substantial symptoms experienced by patients in ICUs. Our preintervention mean scores for thirst intensity, thirst distress, and dry mouth are similar to those reported by Wang et al,[5] who used a visual analog scale to measure thirst and dry mouth associated with discomfort in patients receiving mechanical ventilation. The mean value for thirst and dry mouth in their multiple regression analysis was 5.789 ($P = .04$), indicating that these 2 symptoms were significant predictors of discomfort in patients treated with mechanical ventilation. Wang et al[5] recognized thirst and dry mouth as a problem and recommended further research for interventions.

Puntillo et al[1] investigated interventions. Of note, Puntillo et al[1] measured thirst intensity and thirst distress by using a 0 to 10 NRS as we did but measured dry mouth by using a dichotomous (yes-no) measure, whereas we used an NRS. Our preintervention findings for thirst intensity and thirst distress scores were higher than those of Puntillo et al[1]; however, both their study and ours indicated improvement in each group. Puntillo et al[1] found significant improvement with use of interventions in thirst intensity, thirst distress, and dry mouth, whereas we found significant improvement in thirst intensity and dry mouth only. This difference may be due to participants' difficulty in understanding the concept of thirst distress. Data collectors in our study reported the need to explain and use various terms for clarification.

A strength of our study is that the clinical staff who provided the intervention could readily incorporate these practices with hourly rounding, a situation that supports the feasibility of implementing these interventions in the clinical setting. Our study has limitations. Because of challenges with staffing and patient enrollment, the sample did not meet the recommended size of 66 for each group as determined by the a priori power analysis. Although power was sufficient to detect a significant difference for thirst intensity and dry mouth in both the intervention and control groups, the lack of statistical significance for thirst distress may be due to a type II error related to insufficient power. Variations occurred in clarifying thirst distress to participants, a situation that may have affected the participants' rating of thirst distress. In addition, possible underlying differences between the 2 units could have inadvertently confounded the findings. Randomization to groups was not done; clear separation of the intervention group and the control group ensured intervention fidelity. Also, some study participants might have received cold water swabs rather than ice water swabs; we did not require measurement of water temperature to confirm use of ice water. Our study was limited to 2 ICUs in a single hospital; therefore, our findings cannot be generalized to other types of acute inpatient units. Our study sample had few patients receiving mechanical ventilation. Puntillo et al[1] also had few patients receiving mechanical ventilation and suggested that interventions for thirst intensity, thirst distress, and dry mouth may be beneficial to these patients. Therefore, additional research is needed to generalize our interventions for other populations of patients.

> Thirst intensity, thirst distress, and dry mouth were reported as substantial symptoms.

Conclusions

Thirst and dry mouth are the result of illness, medications, and other interventions that patients receive in ICUs. These symptoms are uncomfortable and distressing, but they are not routinely assessed or treated. Thirst must compete with a cadre of other symptoms that have greater potential to adversely affect patient outcomes. Our findings confirm that thirst intensity, thirst distress, and dry mouth are common distressing symptoms among patients in ICUs. Nurses play a pivotal role in the assessment and identification of these symptoms. Compared with as-needed interventions, implementation of a simple, scheduled protocol to reduce these symptoms can increase patient comfort. Scheduled, hourly applications of ice cold water oral swabs and lip moisturizer with menthol are simple interventions that can easily be incorporated with other hourly rounding interventions. These interventions can be used to engage patients and patients' families to participate more actively in the plan of care. Further research with larger sample sizes is needed to generalize our findings to other populations of patients.

> Implementing a simple scheduled protocol to reduce symptoms of thirst and dry mouth can increase patient comfort.

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