Original Article

Predictors of Thirst in Intensive Care Unit Patients

Nancy A. Stotts, RN, EdD, Shoshana R. Arai, PhD, RN, Bruce A. Cooper, PhD, Judith E. Nelson, MD, JD, and Kathleen A. Puntillo, RN, PhD

University of California San Francisco (N.A.S., S.R.A., B.A.C., K.A.P.), San Francisco, California; and Icahn School of Medicine at Mount Sinai (J.E.N.), New York, New York, USA

Abstract

Context. Thirst is a pervasive, intense, and distressing symptom in intensive care unit (ICU) patients. Although thirst may be avoided and/or treated, scant data are available to help providers identify patients most in need.

Objectives. This study was designed to identify predictors of the presence, intensity, and distress of thirst in ICU patients.

Methods. This descriptive cross-sectional study enrolled 353 patients from three ICUs (medical-surgical, cardiac, and neurological). To measure outcomes, patients were asked to report the presence of thirst (yes/no) and, if present, to rate its intensity and distress on zero to 10 numeric rating scales (10 = worst). Predictor variables were demographic (e.g., age), treatment-related (e.g., opioids), and biological (e.g., total body water). Data were analyzed with logistic regression and truncated regression with alpha preset at 0.05.

Results. Thirst presence was predicted by high opioid doses (≥50 mg), high furosemide doses (>60 mg), selective serotonin reuptake inhibitors, and low ionized calcium. Thirst intensity was predicted by patients not receiving oral fluid and having a gastrointestinal (GI) diagnosis. Thirst distress was predicted by mechanical ventilation, negative fluid balance, antihypertensive medications, and a GI or "other" diagnosis.

Conclusion. Thirst presence was predicted by selected medications (e.g., opioids). Thirst intensity and/or thirst distress were predicted by other treatments (e.g., mechanical ventilation) and medical diagnoses (e.g., GI). This is one of the first studies describing predictors of the multidimensional characteristics of thirst. Clinicians can use these data to target ICU patients whose thirst might warrant treatment. J Pain Symptom Manage 2015;49:530–538.

Key Words

Thirst, ICU, symptom, palliation

Introduction

Thirst is a prevalent, intense, distressing, and underappreciated symptom in intensive care (ICU) patients.[1] Thirst is closely tied to regulation of the body's fluid balance.[2] Increases in osmolality and decreases in volume increase levels of angiotensin II. Fluid balance is tightly regulated; fluctuations in fluid status remain at less than 1%.[3] However, ICU patients undergo many treatments that are not only essential for their recovery but that also may result in derangement of the neuroendocrine pathways that regulate fluid balance and thirst.[4] Medications such as diuretics and analgesics also may predispose patients to fluid imbalance and thirst.[5] Older age is a recognized risk factor for fluid imbalance and decreased thirst sensation.[6,7]

In a study of 50 chronically critically patients, 36 were able to report symptoms and almost 90% of those reported thirst.[8] Thirst also has been reported in 70% or more of critically ill cancer patients ($n = 100$),[9] ICU patients at high risk of dying ($n = 171$),[10] and mechanically ventilated ICU patients ($n = 15$).[11] Thirst intensity was moderate to severe across these various groups. Moderate-to-severe thirst distress also was

Address correspondence to: Nancy A. Stotts, RN, EdD, 2 Koret Way #631, University of California San Francisco, San Francisco, CA 94143-0610 USA. E-mail: nancy.stotts@nursing.ucsf.edu

Accepted for publication: July 23, 2014.

0885-3924/$ - see front matter
http://dx.doi.org/10.1016/j.jpainsymman.2014.07.001

reported in cancer patients,[9] chronically critically ill patients,[1] and patients at high risk of dying in the ICU.[10]

Despite its frequency, thirst is not routinely assessed or treated. Thirst presence, intensity, and distress, like pain, are treatable and could be reduced. Understanding the contribution of factors that can impact thirst may help clinicians target ICU patients who would benefit from thirst assessment and treatment.

This study was part of a larger trial that tested an intervention to relieve thirst.[12] The participating institution provided ethical approval for the study. Patients ($n = 349$) or surrogates ($n = 4$) provided written consent. Data were gathered from January 2010 to May 2012. The overall aim of this study was to identify predictors of thirst in ICU patients. Three hypotheses were tested, namely demographic, treatment-related, and biological variables predict 1) thirst presence, 2) thirst intensity, and 3) thirst distress.

Methods

Research nurses recruited patients from three ICUs (medical-surgical, cardiac, and neurological) of a major West Coast medical center. The sample included English-speaking adults (≥18 years) who were oriented to name, date of birth, and location and were in the ICU at least 24 hours at enrollment. We sought patients who could self-report thirst, as self-report is the gold standard for symptom assessment; thus, we included patients who were oriented and scored between −1 and +1 on the Richmond Agitation Sedation Scale (i.e., not sedated or agitated).[13] We enrolled patients who reported no thirst and those whose thirst intensity or thirst distress score was three or higher on a zero to 10 numeric rating scale (NRS; worst = 10). Patients with an NRS score of one or two were not included so there would be a clear delineation between those with and without thirst. Patients with electrical devices (e.g., pacemaker) were excluded, as these instruments preclude use of bioelectrical impedance analysis (BIA), the measure of total body water (TBW).

The research nurse asked each patient whether he/she was thirsty and the patient answered yes or no to measure thirst presence. For those with thirst, thirst intensity and distress were separately measured using zero to 10 NRS. Anchor words for thirst intensity were "no thirst" and "worst possible thirst" and for thirst distress were "no distress" and "very distressing." Validity of the NRS is established.[14–16]

The BIA measured resistance and reactance (Quantum II; RJL Systems, San Diego, CA) as the basis for calculating TBW (liter)[17] and hydration status (hypovolemia, normovolemia, or hypervolemia).[18] The BIA accurately measures water in the fluid compartments[19,20] and volume status is related to thirst.[7] Resistance and reactance accuracy of the Quantum II is ±1.0 Ω (Quantum II Manual). Patients' weight and height were measured (tape measure or knee-height calipers)[21] to calculate body mass index (BMI; normal, overweight, or obese).

The research nurse abstracted demographic, treatment-related, and biological data from patients' medical records for the day of enrollment (7 AM until 6:59 AM the next day). Demographic and health variables were age (years; ≤65 or >65), gender (male/female), race/ethnicity (white, African-American, Asian, other, or Hispanic), total days in ICU, whether the patient died in ICU (yes/no), primary diagnosis at ICU admission (neurological, cardiovascular, respiratory, gastrointestinal [GI], or other [infection, organ failure, or cancer]), and severity of illness (Acute Physiology and Chronic Health Evaluation II [APACHE II]).[22–24]

Treatment-related variables included oral care (yes/no; none, minimal, or standard), which was recorded because of the potential effect on reducing thirst by stimulating oropharyngeal osmoreceptors.[25] Sources of fluid intake (specifically the presence of a nil per os [NPO] order [yes/no], oral intake of fluid over the enrollment day [volume in milliliters (mL)], and fluid balance [intake − output/100 mL]) also were recorded because of their known effect on thirst.[2] Medications that might affect fluid balance or thirst and their doses were documented and classified, that is, opioids (later translated into morphine equivalents, yes/no; mean 24 hour opioid dose; none, ≤50 mg, or >50 mg); diuretics, serotonin reuptake inhibitors (SSRIs); antihypertensive medications; steroids; and proton pump inhibitors. Of the diuretics, only furosemide was retained in later analyses (yes/no; none, ≤30 mg, 31−60 mg, or >60 mg). Mechanical ventilation at enrollment (yes/no) was another treatment-related variable.

In addition to TBW and BMI, the biological variables recorded were electrolytes (sodium, potassium, and ionized calcium), blood urea nitrogen (BUN), and glucose to calculate plasma osmolality.[26] Serum osmolality was calculated using the formula (2 [Na + K]) + (BUN/2.8) + (glucose/18). Creatinine was recorded as a measure of renal function.

Statistical Analysis

Hypothesis 1 (thirst presence) was tested using the patients divided into thirst and no-thirst groups. Hypotheses 2 (thirst intensity) and 3 (thirst distress) were tested within the thirst group. All hypothesis testing was two sided.

All data were de-identified and double entered into IBM Statistical Package for the Social Sciences (SPSS) for Windows® Version 22 (IBM Corp; Armonk, NY).[27] Data were cleaned, files compared with SPSS Stats Builder, and descriptive statistics calculated.