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Major Article

Critical care nurses' knowledge of, adherence to, and barriers toward institution-specific ventilator bundle

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Key Words:

Evidence-based practice
Adherence
Ventilator bundle
Barriers
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Background: Although evidence-based practices are known to improve the quality of care, making it cost-efficient and improving clinical results, barriers to transferring research into clinical practice have hindered this process.

Aims: To evaluate critical care nurses' knowledge of, adherence to, and barriers toward institution-specific ventilator bundle.

Material and methods: In 2015, we conducted an institution-specific, cross-sectional study in a 26-bed adult mixed medical-surgical intensive care unit (ICU) in Finland using quantitative survey of knowledge and self-reported adherence with qualitative gathering of barrier data. A pre-validated multiple-choice Ventilator Bundle Questionnaire was distributed to all registered nurses who were direct care providers (n = 155).

Results: The final response rate was 55.5% (n = 86), and 47.2% (n = 34) of respondents had more than 10 years of ICU experience. The levels of knowledge and self-reported adherence were 71.1% and 65.8% of the total score, respectively. The level of knowledge was higher among respondents who had received in-service education about ventilator bundle compared with respondents who had not received in-service education (27.0 vs 24.0 [$P = .012$]). Less experienced nurses reported significantly higher adherence than nurses with more ICU experience (29.0 vs 25.0 [$P = .034$]). The correlation between knowledge and adherence scores was low ($\rho = 0.48$ [$P < .001$]). The most well-known and adhered-to guidelines described patient positioning, daily chlorhexidine-based oral care, and strict hand hygiene. The least-known guidelines and those least adhered to described respiratory equipment, management of sedation and analgesia, and practices prior to and during endotracheal suctioning. The main barriers were related to the nurse respondents (e.g., lack of education [25.9%]), environment (e.g., role ambiguities [36.4%]) and inadequate resources [21.1%], and patients (e.g., patient discomfort [4.8%] and fear of adverse effects [4.6%]).

Conclusions: Self-reported adherence did not correlate with knowledge and was not related to work experience. Most of the barriers toward evidence-based guidelines indicated a need for changes that are beyond the control of individual nurses.

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BACKGROUND

Active implementation of intensive infection control programs, such as ventilator bundles (VBs), may reduce the risk of ventilator-associated complications (VACs) by increasing critical care nurses' knowledge and skills regarding current clinical guidelines and adherence to them.¹⁻³ VBs have been defined as a package of evidence-based guidelines (EBGs) aimed at preventing VACs in

critically ill and invasively ventilated adult patients. They include combinations of measures, such as daily sedation vacation and assessment of readiness to extubate,^{4,5} semi-recumbent positioning,^{5,6} daily chlorhexidine-based oral care,^{4,6} strict hand hygiene,^{4,6} and ulcer and deep vein thrombosis prophylaxis.⁵

Presently, however, institutional policies and procedures related to VBs are inconsistent and do not always reflect current research.⁷ In addition, the level of critical care nurses' knowledge of preventive measures has been relatively low.⁸⁻¹⁵ Similarly, the level of adherence to the implementation and use of EBGs has varied widely between practices and providers.^{12,16-18} In previous surveys, however, most critical care nurses reported positive attitudes toward evidence-based practices.^{17,19}

Despite considerable efforts to encourage and support providers to use clinical guidelines and protocols in clinical practice, the level of adherence is still suboptimal. According to a comprehensive study conducted in the United States, only 55% of patients received care as recommended in guidelines.²⁰ Barriers to adherence can stem not only from varying guidelines but also from varying recommendations within guidelines.

The aim of the study was to evaluate critical care nurses' knowledge of, adherence to, and barriers toward institution-specific VB, to deepen nursing leaders' and policymakers' understanding of the ways to improve and facilitate the use of clinical guidelines and protocols in clinical practice.

MATERIAL AND METHODS

In 2015, we conducted an institution-based, cross-sectional study using quantitative and qualitative methods at Oulu University Hospital (a 985-bed tertiary-level teaching hospital in Finland), in a 26-bed adult mixed medical-surgical intensive care unit (ICU). Patients were attended by intensivists who were present in the ICU for 24 hours per day, 7 days a week. Nurse-to-patient ratio was 1.25:1. Furthermore, an infectious disease physician performed daily rounds 5 days a week. During data collection, daily chlorhexidine-based oral care, strict hand hygiene, and ulcer and deep vein thrombosis prophylaxis were standard procedures. In addition, existing VB⁵ was expanded with updated practices prior to, during, and after endotracheal suctioning (ETS) (American Association for Respiratory Care, 2010).²¹

Study population

All registered nurses who were direct care providers (bedside) and who were at work during the data collection period were included in the study. The only exclusion criteria were nurses who refused (did not want) to participate in the study. Participants were invited to participate via letter and electronic mail by the principal investigator (M.J.). In addition, the principal investigator and nurse managers informed critical care nurses at staff meetings of study availability and encouraged participation.

Data collection and outcomes

Self-administered questionnaires were distributed to the participants' mailboxes with a cover letter outlining the ethical considerations of the study. The pre-validated Ventilator Bundle Questionnaire (VBQ) (CVI 0.998), developed by Jansson et al. (2014), was used to evaluate critical care nurses' knowledge of EBGs aimed at preventing VACs.²² The VBQ contains 38 multiple-choice questions, yielding a knowledge score ranging from 0 to 38 points. Every question was supplemented with closed-ended items about critical nurses' adherence to guidelines in the form of "Yes, I adhere to this guideline whenever it's possible" (1 point) and "No, adher-

ence within this guideline is hampered by:" (0 points), yielding a total adherence score (0-38 points). If any guideline item was not adhered to as recommended, the participants were asked to indicate 1 of 8 predefined barriers to implementation and use of EBGs (including disagreement with reported trial results, inadequate resources, fear of potential adverse effects, costs, patient discomfort, lack of education, and lack of guidelines). One of the 8 barriers was presented as an open-ended question ("Other reason; what?"). During the data collection period, a reminder was sent to nonrespondents several times via electronic mail.

Data analysis

Demographic and clinical data were presented using frequencies and percentages for categorical data and medians and 25th-75th percentiles for continuous data. The nonparametric *t* test was used to compare critical care nurses' knowledge and adherence scores within different groupings of age (<40 years vs. ≥40 years), sex (women vs. men), education (diploma vs. bachelor or master level), ICU experience (≤5 years vs. >5 years and ≤10 years vs. >10 years), and employment (permanent vs. nonpermanent and full-time vs. part-time). Relationships between knowledge and adherence scores were examined with the Spearman correlation coefficient. Two-tailed *P* values less than .05 were considered statistically significant. Statistical analyses were performed using SPSS 21.0 software for Windows (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.). The principles of inductive content analysis were used to analyze, categorize, and quantify the barriers toward guidelines.²³ First, all answers to the single open-ended question ("Other reason; what?") were collected in subcategories based on the respondents' descriptions (for example, hurry, urgency) using open coding. Second, similar open codes were grouped together into a generic category (for example, lack of time) and a main category (nurse respondents, environment, and patient-related factors) and labeled using content-specific keywords. The abstraction process continued as far as it was reasonable and possible.²³ Finally, the open codes were quantified within each generic category by calculating how many times each open code occurred.

Ethical considerations

Approval for the survey was obtained from Oulu University Hospital. In Finland, according to the Medical Research Act (488/1999 and amendments 295/2004), approval of the local ethics committee is not required in studies focusing on staff members. Returning a questionnaire was considered consent to participate in the study.

RESULTS

The VBQ was distributed to all available critical care nurses (*n* = 155). A total of 108 questionnaires were returned, yielding a response rate of 69.7%. However, 22 questionnaires were returned uncompleted and were not counted. Thus, the final response rate allowing analyses was 55.5% (*n* = 86). The main demographic data of the respondents are presented in Table 1. Most participants were women (85.1%) with a bachelor's degree (67.9%) and over 5 years [10.0 (5.0-19.3)] of ICU working experience (70.8%). The data between respondents and nonrespondents did not differ for the following demographics: women 85.1% vs. 80% (*P* = .52), permanent employment 74.7% vs. 77.6% (*P* = .71), and age 39.6 (32.0-50.0) years vs. 38 (32-46) years (*P* = .84), respectively. Eighty-seven percent of respondents (*n* = 75) reported that they had received education about EBGs aimed at preventing VACs.

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