Heart & Lung 44 (2015) 45–49

Contents lists available at ScienceDirect

Heart & Lung

journal homepage: www.heartandlung.org

Care of Critically Ill Adults

The number of mechanically ventilated ICU patients meeting communication criteria

Mary Beth Happ, PhD, RN, FGSA, FAAN [a,b,*], Jennifer B. Seaman, BSN [b], Marci L. Nilsen, PhD, RN [b], Andrea Sciulli, BA [b], Judith A. Tate, PhD, RN [a], Melissa Saul, MS [d], Amber E. Barnato, MD, MPH, MS [c]

[a] Center of Excellence in Critical and Complex Care, The Ohio State University College of Nursing, 378 Newton Hall, 1585 Neil Ave., Columbus, OH 43210, USA
[b] University of Pittsburgh School of Nursing, USA
[c] University of Pittsburgh School of Medicine, USA
[d] Department of Biomedical Informatics, University of Pittsburgh, USA

ARTICLE INFO

Article history:
Received 7 July 2014
Received in revised form
29 August 2014
Accepted 30 August 2014
Available online 26 September 2014

Keywords:
Intensive care unit
Communication
Nursing
Artificial respiration
Patient communication

ABSTRACT

Objectives: (1) Estimate the proportion of mechanically ventilated (MV) intensive care unit (ICU) patients meeting basic communication criteria who could potentially be served by assistive communication tools and speech-language consultation. (2) Compare characteristics of patients who met communication criteria with those who did not.
Design: Observational cohort study in which computerized billing and medical records were screened over a 2-year period.
Setting: Six specialty ICUs across two hospitals in an academic health system.
Participants: Eligible patients were awake, alert, and responsive to verbal communication from clinicians for at least one 12-h nursing shift while receiving MV $\geq$ 2 consecutive days.
Main results: Of the 2671 MV patients screened, 1440 (53.9%) met basic communication criteria. The Neurological ICU had the lowest proportion of MV patients meeting communication criteria (40.82%); Trauma ICU had the highest proportion (69.97%). MV patients who did not meet basic communication criteria ($n = 1231$) were younger, had shorter lengths of stay and lower costs, and were more likely to die during the hospitalization.
Conclusions: We estimate that half of MV patients in the ICU could potentially be served by assistive communication tools and speech-language consultation.

Introduction

Communication impairment presents a common, distressing problem for patients who receive mechanical ventilation (MV) during critical illness and for the clinicians who care for them.[1–6] New hospital accreditation standards for patient communication include the communication disability *acquired* as a result of endotracheal or tracheal intubation during critical illness as a condition requiring provider assessment and accommodation.[7] Augmentative and Alternative Communication (AAC) tools can be used successfully by clinicians and ICU patients to transmit or receive messages.[8–13] Our previous work showed significant improvements in nurse-patient communication with training and the use of AAC.[14] Although measures of sedation, coma, and severity of illness are commonly reported in critical care research, few studies have documented the proportion of mechanically ventilated ICU patients who are awake, aware and responsive to verbal communication and who therefore could be served by these simple assistive communication tools. This information is necessary to (1) appropriately plan communication supplies and support programs, (2) prepare clinicians, and (3) provide benchmarking data from which to evaluate communication support initiatives in the ICU.

The purpose of this paper is to estimate the proportion of mechanically ventilated ICU patients who meet basic communication criteria and thus could potentially benefit from the use of assistive communication tools or referral for evaluation and intervention by a speech-language pathologist. Specifically, we used communication eligibility screening data from a quality improvement study to estimate the proportion of mechanically ventilated patients who are awake, alert and responsive to verbal communication across six

* Corresponding author. Tel.: +1 614 292 8336.
E-mail address: happ.3@osu.edu (M.B. Happ).

0147-9563/$ – see front matter © 2015 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.hrtlng.2014.08.010

different specialty ICUs in two University of Pittsburgh Medical Center hospitals.

Methods

This is a descriptive analysis of the eligibility screening data from a stepped wedge crossover cluster randomized trial of nurse training in the use of assistive communication tools. The study was approved by the University of Pittsburgh Institutional Review Board. The implementation was staggered over 8 quarters in 6 ICUs (neurological, neurotrauma, trauma, transplant, cardiovascular, general medical) across two University of Pittsburgh Medical Center (UPMC) hospitals in Pittsburgh, PA. Details of the communication intervention are available online at http://go.osu.edu/speacs2 and description of the parent study design are published separately.[15] In brief, the intervention consists of a 1-h web-based communication skills training program for nurses with content on assessment of communication function with nonvocal patients and augmentative and alternative communication (AAC) techniques and tools to facilitate communication with ICU patients who may have multiple impairments. "Communication carts" with low tech communication tools (e.g., communication boards, hearing aid batteries, notebooks, clipboards and felt-tip pens) were supplied to each ICU and restocked weekly during intervention phases. Table 1 describes each study ICU.

Data collection

We identified all mechanically ventilated patients before, during, and after the intervention implementation whose first ICU admission during their hospital stay was to a study ICU during the study period and involved two consecutive days of billing for mechanical ventilation using billing records maintained by UPMC's Medical Archival System (MARS).[16] We then randomly sampled these potentially eligible patients by ICU, by study quarter, for detailed eligibility screening using a random number generator. We abstracted charts from the electronic medical record (EMR) sequentially until we had identified 30 eligible patients per unit per quarter, yielding the prespecified sample of 1440 after 24 months. We report here results from 24 months of eligibility screening from August 1, 2009 to July 31, 2011.

Eligibility criteria confirmed by the EMR included: (1) first ICU admission during the hospital stay in a study unit; and (2) invasive mechanical ventilation via endotracheal tube (ET tube) or tracheostomy for 2 or more calendar days (e.g., non-invasive mechanical ventilation or invasive mechanical ventilation for < 2 days excluded). Once these criteria were confirmed, we screened the EMR for a maximum of 28 ICU days for basic communication criteria, reflecting the patient's potential to have been served by the assistive communication tools taught as part of the intervention study.

Table 1
Study intensive care units.

Unit	Beds	Specialty population focus
Transplant	28	Abdominal transplant pre/post-surgery; surgical oncology and, head-neck surgery
NeuroTrauma	10	Traumatic brain and spine injuries,
Neurological	20	Stroke, subarachnoid hemorrhage, brain surgery
Trauma	22	Traumatic injury, some neurological overflow
Cardiovascular	24	Cardiovascular surgery/medical cardiology
General medical	20	Mixed medical illness, respiratory failure, sepsis
Total	124	

Basic communication criteria consisted of the patient being awake, alert, and responsive to verbal communication from clinicians. We operationalized this criteria as being awake for at least one 12-h nursing shift while receiving MV. Evidence of wakefulness included any of the following: (1) the patient responding to and/or following commands, (2) nursing note description of patient as alert, arousable, anxious, or awake, (3) a score of 6 (obeys verbal commands) for the Best Motor Response on the Glasgow Coma Scale,[17] (4) a score of $\geq$4 on the Riker Sedation Agitation Scale,[18] (5) a score of 1–3 on the Modified Ramsay Sedation Scale,[19] and/or (6) responsive to verbal communication from clinicians via head nods, gestures, or other nonvocal method.

Statistical analysis

Data analysis was conducted using IBM SPSS Statistics (version 20.0, IBM Corp., Armonk, NY). We descriptively summarized the number of patients identified using billing records, those further screened for detailed eligibility criteria using the EMR, the frequency of eligibility, and the frequency and reason for ineligibility. The data were screened for accuracy, missing values, outliers, and underlying statistical assumptions. The distribution of the continuous variables age, ICU length of stay, hospital length of stay, and cost-adjusted charges were not normally distributed therefore medians and interquartile ranges were reported. Frequency count and percentages were calculated for categorical variables.

We calculated the proportion of MV patients who were awake, alert, and responsive to verbal communication from clinicians overall and by unit by subtracting those confirmed ineligible (who were not actually mechanically ventilated for 2 days, were admitted first to a non-study ICU or time period, were children or prisoners) from the denominator, then dividing the number of patients who met basic communication criteria by the total number screened. We used Pearson chi-square and Mann–Whitney *U* tests to compare demographic and clinical characteristics of MV patients who were awake and, alert, or responsive to verbal communication from clinicians with those who were not.

Results

Billing records identified 5476 potentially eligible patients over a period of 24 months; 3087 were screened to achieve the prespecified sample size of 1440. Reasons for study ineligibility included less than 2 days of mechanical ventilation ($n = 274$), a previous ICU admission during the hospital stay ($n = 92$), non-study ICU ($n = 30$), age < 18 years or prisoner ($n = 20$) and not awake and alert or responsive to verbal communication from clinicians ($n = 1231$) (Fig. 1).

Among 2671 MV patients in 6 study ICUs in 2 hospitals, 53.9% met basic communication criteria (Table 2). The neurological ICU had the lowest proportion of MV patients meeting communication criteria (40.82%) and the Trauma ICU had the highest proportion (69.97%). Patients who met communication criteria were more likely to have diagnoses of septicemia, and pneumonia; while patients who did not meet criteria were more likely to have an intracerebral hemorrhage, cerebral occlusion with infarct, and alcoholic cirrhosis of the liver. Those MV patients who did not meet basic communication criteria ($n = 1231$) were younger, had shorter lengths of stay and lower costs, and were more likely to die during the hospitalization. Patients who met communication criteria were more often discharged to skilled nursing facility or long term acute care hospitals (Table 3).