

Korean Society of
Nursing Science

Contents lists available at ScienceDirect

Asian Nursing Research

journal homepage: www.asian-nursingresearch.com

Research Article

Case-control Study on Risk Factors of Unplanned Extubation Based on Patient Safety Model in Critically Ill Patients with Mechanical Ventilation

EunOk Kwon, RN, Ph.D.,^{1,*} KyungSook Choi, RN, Ph.D.²¹ Director of National Health Insurance Review Team, Seoul National University Hospital, South Korea² Professor Emeritus, Department of nursing, Chung-Ang University, South Korea

ARTICLE INFO

Article history:

Received 29 September 2016

Received in revised form

10 March 2017

Accepted 10 March 2017

Keywords:

endotracheal extubation

intensive care units

patient safety

risk factors

SUMMARY

Purpose: This study aimed to identify risk factors of unplanned extubation in intensive care unit (ICU) patients with mechanical ventilation using a patient safety model.**Methods:** This study was designed to be a case-control study. Data collection sheets, including 29 risk factors of unplanned extubation in mechanically ventilation patients were retrospectively collected based on a patient safety model over 3 years. From 41,207 mechanically ventilated patients, 230 patients were identified to have unplanned extubation during their ICU stay. Based on the characteristics of the cohort of 230 patients who had unplanned extubation, 460 case control comparison groups with planned extubation were selected by matching age, gender and diagnosis.**Results:** Risk factors of unplanned extubation were categorized as people, technologies, tasks, environmental factors and organizational factors, by five components of the patient safety model. The results showed the risk factors of unplanned extubation as admission route [odds ratio (OR) = 1.8], Glasgow Coma Scale–motor (OR = 1.3), Acute Physiology and Chronic Health Evaluation score (OR = 1.06), agitation (OR = 9.0), delirium (OR = 11.6), mode of mechanical ventilation (OR = 3.0–4.1) and night shifts (OR = 6.0). The significant differences were found between the unplanned and the planned extubation groups on the number of reintubation (4.3% vs. 79.6%, $p < .001$), ICU outcome at the time of discharge ($\chi^2 = 50.7$, $p < .001$), and length of stay in the ICU (27.0 ± 33.0 vs. 43.8 ± 43.5) after unplanned extubation.**Conclusion:** ICU nurses should be able to recognize the risk factors of unplanned extubation related with the components of the safety model so as to improve patient safety by minimizing the risk for unplanned extubation.© 2017 Korean Society of Nursing Science, Published by Elsevier Korea LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Maintaining endotracheal intubation is the first priority in mechanically ventilated patients in order to save their lives, and unplanned extubation is considered a marker of quality assurance of mechanical ventilation [1,2]. Most cases of unplanned extubation are not accidental but are caused by patient actions. An unplanned extubation is a frequent and preventable adverse event during mechanical ventilation, and risk factors and patient outcomes

should be identified to improve patient safety in the ICU [3,4]. The rate of unplanned extubation in the ICU is reported to range from 3.4% to 22.5%. Questions about risk factors and outcomes remain to be addressed, as highlighted by inconsistent reports with different ICU settings and research designs.

Risk factors and patient outcomes related to unplanned extubation in the ICU have been reported in several studies related to critical care nursing [5,6], and serious complications resulting from unplanned extubation are reported to include reintubation. Reintubation is associated with complications including aspiration, fatal arrhythmia, cardiac arrest, and death [5,6]. Risk factors for unplanned extubation (even in the presence of physical restraints) also include disturbance in the fixation device, pain, sedation and weaning protocols, an impaired level of consciousness upon ICU

* Correspondence to: Eunok Kwon, RN, PhD, Seoul National University Hospital, 101 Daehang-ro, Jongno-gu Seoul, South Korea.
E-mail address: passioneun@gmail.com

admission, and the presence of nosocomial infection [7,8]. Unplanned extubation and reintubation are associated with increases in the likelihood of ventilator-associated pneumonia (13.8%–27.6%), length of stay in the ICU (9–22 days), length of stay in the hospital (18–34 days), and number of days on mechanical ventilation (6 days) [9].

Most of the previous studies on unplanned extubation did not focus on the working system of ICU. Hospitals are highly reliable organizations, and ICU safety issues are a very high priority in critical care nursing. ICU working systems consist of people, technologies, tasks, environmental factors, and organizational factors. Systems engineering approach is needed to evaluate the impact of the quality of care. This study aimed to identify the risk factors of unplanned extubation, based on 5 components of ICU working system, and compares the outcomes after unplanned extubation among ICU patients with mechanical ventilation.

Methods

Study design

The retrospective study using electronic medical records with case control comparisons were conducted based on the systems engineering initiative for patient safety (SEIPS) model [10]. The SEIPS model, developed by Carayon et al [10], was used as a theoretical framework in this study. The five components of this system are people, technologies, tasks, environmental factors and organizational factors. These components interact with and influence each other and can impact patient safety, including unplanned extubation [11]. Appropriate permissions were granted by the authors and the concerned journal for the use of the model in this study. Three nurse unit managers and three charge nurses, both with working experiences in the ICU for 5–10 years, reviewed all items, categories, and validity of the data based on the SEIPS model and literature review [12,13]. Finally, according to the five components of the framework used in classifying data from electronic medical records, 29 variables representing risk factors were selected as the variables of the data sheet (Figure 1 [10]). A case-control study was performed to compare these risk factors for ICU working systems, processes, and outcomes associated with unplanned extubation in mechanically ventilated patients.

Data collection

Setting and sample

This retrospective study was conducted on all mechanically ventilated patients in the 62-bed medical and surgical ICU of a

1,800-bed tertiary hospital. Data were collected from electronic medical records over a 3-year period from January 1st, 2010 through December 31st, 2012. In this study, unplanned extubation was defined as self-extubation or inadvertent extubation caused by patient actions. A total of 242 episodes (230 patients) of unplanned extubation occurred in 41,207 mechanically ventilated patients over the 3-year study period (frequency, 0.6%), with 12 patients having undergone unplanned extubation twice.

Instruments

Based on the characteristics of the cohort of 230 patients who had unplanned extubation, 460 case control comparison groups with planned extubation were selected by matching age, gender and diagnosis. A data collection sheet based on the SEIPS model was used (Figure 1). The data collection sheet items were developed and validated under the advisement of three charge nurses with specialized ICU licenses and three head nurses with 10 years of experience in the ICU.

Measures

The risk factors consisted of the components of SEIPS model, including patient, tasks, tools and technologies, physical environment, and organizational conditions, measured by Glasgow Coma Scale (GCS), Acute Physiology and Chronic Health Evaluation (APACHE) II score, Numeric Rating Scale, Richmond Agitation-Sedation Scale, Confusion Assessment Method for the ICU and Workload Management System for Critical Care Nurses (WMSCN) scores [19].

The outcome variables of unplanned extubation included patient-related variables measured by reintubation and ICU outcome at the time of discharge, organizational variables measured by length of stay in the ICU, and length of stay in the hospital.

Ethical considerations

This research was approved by the institutional review board of the Seoul National University Hospital (IRB no. H-1210-115-436) to ensure the privacy of the research subjects. Data from electronic medical records were provided by Seoul National University Hospital medical information team without patient identification information in compliance with permission guideline.

Data analysis

To identify risk factors influencing the occurrence and outcomes of unplanned extubation, characteristics were compared between the unplanned extubation and planned extubation groups by t test and χ^2 test. These groups differed significantly in variables

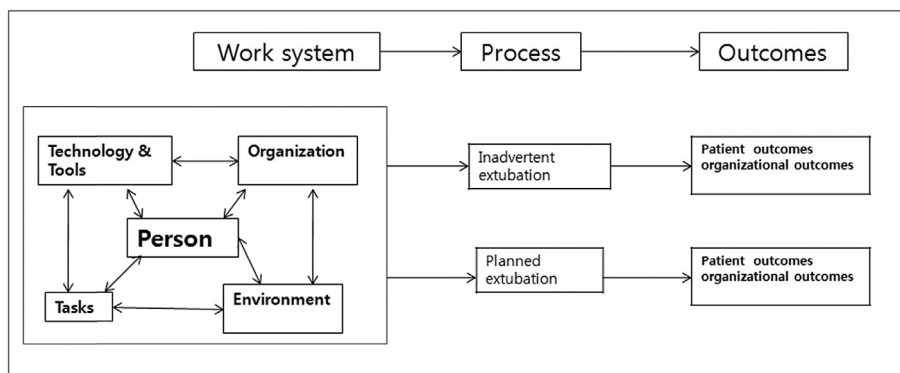


Figure 1. Conceptual framework of the study based on the SEIPS model described by Carayon et al [10].

Download English Version:

<https://daneshyari.com/en/article/8567949>

Download Persian Version:

<https://daneshyari.com/article/8567949>

[Daneshyari.com](https://daneshyari.com)