Geriatric Nursing 37 (2016) 180–185

Contents lists available at ScienceDirect

Geriatric Nursing

journal homepage: www.gnjournal.com

Feature Article

# The effect of range of motion exercises on delirium prevention among patients aged 65 and over in intensive care units

Canan Karadas, MSc *, Leyla Ozdemir, RN, PhD

*Hacettepe University Faculty of Nursing, Ankara, Turkey*

ARTICLE INFO

*Article history:*
Received 27 June 2015
Received in revised form
7 December 2015
Accepted 14 December 2015
Available online 4 January 2016

*Keywords:*
Intensive care
Mobility
Range of motion
Delirium
Geriatrics

ABSTRACT

The purpose of this study was to determine the effect of range of motion exercises on preventing delirium and shortening the duration of delirium among patients in the intensive care unit who are aged 65 and over. The study was conducted in the intensive care unit on patients with non-invasive mechanical ventilation. The sample size included 47 patients from the intervention group and 47 from the control group. The incidence of delirium was 8.5% in the intervention group and 21.3% in the control group. The duration of delirium was 15 h for patients in the intervention group and 38 h for those in the control group. Although delirium incidence and duration decreased by 2.5-fold in the intervention group compared to the control group; there was no significant relationship between the intervention and control groups. In conclusion, as the decreases in delirium occurrence and duration were not statistically significant, the effect of range of motion exercises was limited.



## Introduction

Delirium, as an acute state of confusion, is a severe geriatric syndrome common among older patients in the intensive care unit (ICU) that is caused by a decrease in functional, metabolic and cognitive activities.[1,2] Delirium is a complicated clinical syndrome affected by patients' physiological parameters and their health conditions. These parameters are utilized to develop a model to predict delirium. Inouye et al.'s model to predict delirium includes four risk factors for delirium: the presence of cognitive and vision impairment, an Acute Physiology and Chronic Health Assessment II (APACHE II) score of 16 or above, and a blood–urea nitrogen (BUN)/serum creatinine ratio of 18 or above.[3] Delirium occurs at a high incidence in patients with ventilation support. In invasive mechanic ventilation (IMV), the patient is supported via an endotracheal tube that provides positive pressure from a ventilator.[4] In non-invasive mechanic ventilation (NIMV), the patient is supported by a face mask that provides positive pressure from a ventilator. NIMV has certain advantages, such as a decreased need for sedation, a reduced use of physical restraints, a decreased number of tubes, low anxiety levels due to the patient's speaking ability, improved nutrition levels by oral feeding, and a decreased risk of respiratory infections.[5,6] Delirium incidence differs as to the type of ventilation support. Although its incidence in patients with NIMV is 20%–50%, in patients with IMV this ratio is 60%–80%.[7] Among elderly populations, the incidence is also high. More than 20% of people aged 65 and over suffer from delirium at the time of admission to the emergency room.[8] This number varies from 20% to 79% in the ICU.[9–11]

Although delirium screening is important,[10,12,13] it does not ensure an improvement in health outcomes. Therefore, the clinical guidelines of the National Institute for Health and Care Excellence (NICE) and the ABCDE bundle recommend early mobility to prevent delirium.[12,13] The ABCDE bundle is a set of evidence-based practices designated by an acronym that represents ABC: awakening and breathing coordination, D: delirium monitoring and management, and E: early mobility.[12] The ABC component contains sedation awakening and spontaneous breathing trials. The D component includes delirium screening by a validated tool such as the Intensive Care Delirium Screening Checklist or the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU). The E component contains early mobility encouragement and safety screening for vital and hemodynamic signs.[7,14] Early mobility refers to the mobilization of patients in the first 48 h after ICU admission, and it includes movements varying from passive range of motion (ROM) exercises to ambulation in the unit.[15] The ABCD components are implemented in many ICUs as part of routine care, but the E component has certain implementation deficits.[7] Although exercise

Conflict of interest: The authors have no financial disclosures to declare and no conflicts of interest to report.

* Corresponding author. Adnan Saygun Cad., D-Bloklar-1, Kat 06100 Samanpazarı, Ankara, Turkey. Tel.: +90 534 348 40 34.
*E-mail address:* karadas.canan@gmail.com (C. Karadas).

0197-4572/$ – see front matter © 2015 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.gerinurse.2015.12.003

is beneficial and highly recommended for patients with delirium, it is time consuming. Therefore, its feasibility is considered to be low by health care professionals.[16] Indeed, early mobility prevents complications of immobility by encouraging the patient to move and improve vital functions.[17] Mobility has positive effects such as improving the venous return and stroke volume, increasing the amount of oxygen distributed to tissues, reducing ventilation time and enhancing cognitive abilities.[17,18]

The research regarding the effect of exercise on delirium mostly centers on patients with IMV.[19,20] Schweickert et al found that patients who underwent physical therapy, including the passive ROM exercises, sitting balance and tolerance, pre-ambulation exercises and ambulation have shorter durations of delirium and more ventilator-free days compared to patients who did not receive this therapy.[20] Another study emphasized that the patients with acute respiratory failure who receive physical therapy benefit from improved delirium status and a decreased length of hospital stay.[19]

Although patients with NIMV suffer from delirium at a high incidence, this patient group has not been sufficiently investigated. The literature does not include any studies concerning the effect of exercises on decreasing delirium incidence or preventing delirium among older adults with NIMV.[7] Therefore, we aimed to determine the effect of ROM exercises on preventing delirium and shortening the delirium duration among patients in the ICU aged 65 years and over with non-invasive mechanical ventilation. The hypotheses of the study were generated as follows:

**H1**. ROM exercises would prevent the development of delirium in the intervention group compared to the control group.

**H2**. ROM exercises would shorten the duration of delirium in the intervention group compared to the control group.

## Materials and methods

### *Study setting and design*

This study was performed in the adult medical ICUs of a university hospital in Turkey. Our study was a randomized, controlled clinical trial. A stratified randomization was used in this study. Patients were stratified and matched based on their BUN/serum creatinine ratios (>18 and ≤17.9), their APACHE II scores (>16 and ≤15) and the existence of visual impairments (present or absent) via the delirium predict model.[3] All patients meeting the inclusion criteria were matched according to their BUN/serum creatinine ratios, their APACHE II scores and the existence of visual impairments. The first patient was assigned to the intervention group, and a subsequent similar patient was matched in the control group. The groups were homogeneous according to the BUN/creatinine ratio ($t = 0.271$, $p = 0.787$), the APACHE II score ($t = -1.449$, $p = 0.151$) and visual impairments ($X^2 = 1.138$, $p = 0.286$).

### *Population and sample*

A power analysis was utilized to determine the sample size for this study. Accordingly, the analysis revealed that the intervention and control groups should each include 47 patients, resulting in a test power of 0.80 ($\alpha = 0.05$). Within the scope of the study, 199 patients were approached between January 2015 and April 2015 (Fig. 1). A total of 102 patients were excluded from the study based on their ineligibility. Three patients refused to participate because they declined the exercise intervention. Therefore, the study was conducted with 94 patients who were consented.

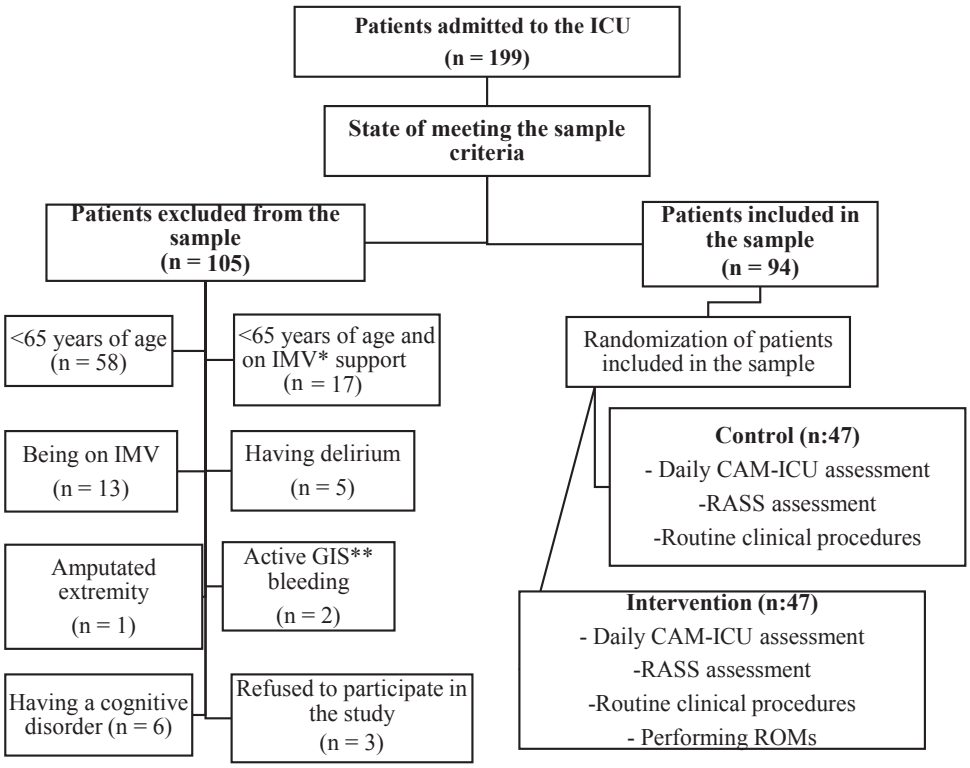


**Fig. 1.** Procedure flow chart.