Intensive and Critical Care Nursing (2015) 31, 250—257

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/iccn

Severity of delirium in the ICU is associated with short term cognitive impairment. A prospective cohort study

Hideaki Sakuramoto[a,*], Jesmin Subrina[b], Takeshi Unoki[a], Taro Mizutani[b], Hiroko Komatsu[c]

[a] *Intensive Care Unit, University of Tsukuba Hospital, Tsukuba, Ibaraki, Japan*[1]
[b] *Department of Emergency and Critical Care Medicine, Faculty of Medicine, University of Tsukuba, Tsukuba, Ibaraki, Japan*
[c] *Faculty of Nursing and Medical Care, Keio University, 35 Shinano-machi, Shinjuku-ku, Tokyo, Japan*[1]

Accepted 16 January 2015

KEYWORDS
Intensive Care Delirium Screening Checklists;
Delirium;
Cognitive impairment;
Critical illness

Summary
Objectives: To examine the hypothesis that severity of delirium in the intensive care unit (ICU) is positively associated with cognitive impairment at the time of hospital discharge.
Design: A prospective cohort study.
Setting: Adult medical and surgical ICU of a tertiary-care teaching hospital in Japan in ICU patients who were enrolled and admitted for more than 48 hours.
Methods: Severity of delirium was represented as a score of the Intensive Care Delirium Screening Checklist (ICDSC) during the patients' stay in the ICU under the assumption that higher ICDSC score indicated severe delirium. After discharge from the ICU, the patients were followed up for cognitive impairment using the Mini-Mental State Examination (MMSE).
Results: Of the 79 patients enrolled, 50 (63.3%) developed delirium during their stay in the ICU. Patients who developed delirium had higher rates of cognitive impairment (28.0% vs. 3.4%, $p = 0.03$). After adjusting for covariates, the averaged ICDSC score during the ICU stay indicated a positive association between severity of delirium and cognitive impairment at the time of hospital discharge (adjusted odds ratio (OR) 1.6; 95% confidential interval (CI), 1.02—2.54; $p = 0.041$).
Conclusions: Our findings indicate that severity of delirium during ICU stay may be associated with cognitive impairment at the time of discharge from the hospital in ICU survivors.

* Corresponding author at: Intensive Care Unit, Tsukuba University of Hospital, Tsukuba, Ibaraki 305-8575, Japan. Tel.: +81 29 853 3210/3081; fax: +81 29 853 3092.
E-mail address: gongehead@yahoo.co.jp (H. Sakuramoto).
[1] Formerly, Department of Adult Nursing, St Luke's College of Nursing, Chuo-ku, Tokyo, Japan.

http://dx.doi.org/10.1016/j.iccn.2015.01.001
0964-3397/

Implications for Clinical Practice

- A rise in ICDSC score (an indicator of severity of delirium) increased the odds of developing cognitive impairment by 1.6 times, at the time of hospital discharge. Based on insights gained from these observations, important steps can be taken that could improve the care of critically ill patients. Such measures may subsequently lead to a decrease in ICDSC score by preventing the risks related to delirium in the ICU, such as untreated pain; heart failure and prolonged immobilisation.
- In 19% patients, after critical illness, cognitive impairment was observed at the time of hospital discharge and 34.2% patients were found to have improved cognitive status during the first week after they were discharged from the ICU. This implies that one week post-discharge, critically ill patients may need special care in order to prevent falls and for cognitive rehabilitation.
- The severity of cognitive impairment, as observed in the present study, was between mild to moderate. Despite the high incidence of cognitive impairment, as reported here (mild to moderate), it is surprising that many health care providers fail to recognise cognitive impairment in post ICU settings. Thus cognitive impairment needs to be evaluated in critically ill patients during hospitalisation.

Introduction

Numerous studies have documented that persistent cognitive impairment affects 4—78% of intensive care unit (ICU) survivors from six months to six years post-hospital discharge (Hopkins et al., 1999, 2004, 2005; Jackson et al., 2003; Rothenhausler et al., 2001; Sukantarat et al., 2005; Wolters et al., 2013). Cognitive impairment after critical illness can reduce quality of life (Hopkins et al., 1999, 2005), increase health care costs (Jonsson et al., 1999) and lead to institutionalisation (Chodosh et al., 2004).

To date, very little information that addresses the severity of delirium and its relationship with cognitive impairment in ICU patients is available. Although a number of previous studies have demonstrated a positive association between duration of delirium and cognitive impairment (Girard et al., 2010; Jackson et al., 2004; Pandharipande et al., 2013), to date, no single study has examined the association between *severity* of delirium and cognitive impairment. Longer durations of delirium are particularly closely associated with smaller brain volumes, which, in turn, are associated with long term cognitive impairment (Gunther et al., 2012).

Sub-syndromal delirium, a clinically important syndrome diagnosed by Intensive Care Delirium Screening Checklists (ICDSC), identifies patients that fall on a continuum between those with no neuropsychiatric symptoms and those with DSM IV-defined delirium (Ouimet et al., 2007). Notably, patients with sub-syndromal delirium have a mortality and length of stay that lies between normal patients and those with delirium, and represents a cohort of patients especially responsive to treatment measures for delirium. Thus, based on these observations, we speculate that higher ICDSC score may indicate severe acute brain dysfunction (Ouimet et al., 2007) and that severity of delirium is represented as a score of ICDSC during the ICU stay. Indeed, the outcome of patients with delirium has been linked to the particular delirium symptoms identified with ICDSC evaluation (Marquis et al., 2007). In view of the above, we hypothesise that *severity* of delirium during ICU stay is positively associated with cognitive impairment after critical illness. The present study aims to examine the relationship between *severity* of delirium as assessed by ICDSC in ICU and cognitive impairment at hospital discharge.

Methods

Design and sample

In the present study, a prospective cohort design was used and the study was pre-approved by the St Luke's College of Nursing Institutional Ethical Review Board. Prior to the study, the patients or their surrogates reviewed a comprehensive brochure that explained the purpose of the registry and the intended use of the data, including interviewing the patient's nurse and abstraction of their charts for a full clinical data set, as well as follow-up interviews on cognitive impairment. Informed consents were then obtained. If patients were unable to provide their informed consents, due to unarousal or comatic conditions, informed consents were obtained from their surrogates, and patients were later informed of this development when they re-gained consciousness. Enrollment criteria included all patients admitted $\geq$48 hours to the medical and surgical ICUs of the St Luke's International Hospital between the dates of July and December 2009. All patients were carefully screened and assessed prior to enrollment by a research nurse.

Exclusion criteria were: (a) pre-existing cognitive impairment; (b) intellectual disability; (c) brain lesions; (d) neurologic disorders affecting cognitive function and (e) major psychiatric illness. Screening for pre-existing cognitive impairment was performed at the time of enrollment through surrogate interviews that included the Modified Blessed Dementia Rating Scale (mBDRS) (scale range, 0—17) (Blessed et al., 1968). Patients were defined as having suspected pre-existing cognitive impairment if their mBDRS score was $\geq$3.5 or if they had a history of dementia, based on the information obtained from review of their medical records and other available information. A cutoff point of 3.5 was used for the mBDRS, rather than the recommended cutoff point of 4, to provide a more sensitive criterion to detect suspected pre-existing cognitive impairment. It was determined a priori that patients who met this criterion would be excluded from further analysis.

Delirium assessment in the ICU patients

The ICDSC tool used in the present study was developed in 2001 by Bergeron et al. (2001). The validity of ICDSC