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Incidence and short-term consequences of delirium in critically ill patients: A prospective observational cohort study☆

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ABSTRACT

Background: Delirium is a serious and frequent psycho-organic disorder in critically ill patients. Reported incidence rates vary to a large extent and there is a paucity of data concerning delirium incidence rates for the different subgroups of intensive care unit (ICU) patients and their short-term health consequences.
Objectives: To determine the overall incidence and duration of delirium, per delirium subtype and per ICU admission diagnosis. Furthermore, we determined the short-term consequences of delirium.
Design: Prospective observational study.
Participants and setting: All adult consecutive patients admitted in one year to the ICU of a university medical centre.
Methods: Delirium was assessed using the Confusion Assessment Method-ICU three times a day. Delirium was divided in three subtypes: hyperactive, hypoactive and mixed subtype. As measures for short-term consequences we registered duration of mechanical ventilation, re-intubations, incidence of unplanned removal of tubes, length of (ICU) stay and in-hospital mortality.
Results: 1613 patients were included of which 411 (26%) developed delirium. The incidence rate in the neurosurgical (10%) and cardiac surgery group (12%) was the lowest, incidence was intermediate in medical patients (40%), while patients with a neurological diagnosis had the highest incidence (64%). The mixed subtype occurred the most (53%), while the hyperactive subtype the least (10%). The median delirium duration was two days [IQR 1–7], but significantly longer ($P < 0.0001$) for the mixed subtype. More delirious patients were mechanically ventilated and for a longer period of time, were more likely to remove their tube and catheters, stayed in the ICU and hospital for a longer time, and had a six times higher chance of dying compared to non-delirium ICU patients, even after adjusting for their severity of illness score. Delirium was associated with an extended duration of mechanical ventilation, length of stay in the ICU and in-hospital, as well as with in-hospital mortality.
Conclusions: The delirium incidence in a mixed ICU population is high and differs importantly between ICU admission diagnoses and the subtypes of delirium. Patients with

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delirium had a significantly higher incidence of short-term health problems, independent from their severity of illness and this was most pronounced in the mixed subtype of delirium. Delirium is significantly associated with worse short-term outcome.

What is already known about this topic

- Delirium occurs frequently in critically ill patients and is categorised in a hyperactive, hypoactive and mixed subtype and associated with serious short-term health problems. The mixed subtype occurs most frequently, but incidences per ICU diagnosis and the extent of short-term health problems are unknown.

What this paper adds

- Delirium incidence rates varies between the different ICU admission categories with the highest incidence rate in neurological patients and the lowest in cardiac surgery patients.
- Cardiac surgery patients most likely suffer from the hyperactive delirium subtype, which is less common in other admission categories.
- Patients with mixed delirium subtype suffered the most from short-term consequences.
- Delirium in ICU patients is significantly associated with extended duration of mechanical ventilation, length of stay in the ICU and in-hospital, and with in-hospital mortality.

1. Introduction

Patients in the intensive care unit (ICU) are severely ill and need support of one or more organ functions. In the last decade, there is an increasing interest in brain dysfunctions such as delirium. Delirium is a syndrome defined as an acute onset of disturbances in consciousness and changes in cognition with a fluctuating course (American Psychiatric Association, 1994). Three subtypes of delirium can be distinguished (Peterson et al., 2006). A hyperactive delirium subtype with symptoms of hyperalertness, agitation, delusions and hallucinations, a hypoactive subtype in which the patient is hypoalert, lethargic, motorically slow and has inappropriate speech and the alternating or mixed subtype. The latter subtype of delirium is characterised by alternating symptoms of hyperactive and hypoactive delirium. The Richmond Agitation Sedation Scale (RASS) ranging from +4 (heavily agitated) to −5 (coma) in combination with the delirium diagnose (Ely et al., 2003) is used to distinguish between the three delirium subtypes (Pandharipande et al., 2007; Peterson et al., 2006). Only positive RASS scores indicates a hyperactive delirium subtype. Delirious patients who only have RASS scores between 0 and −3 are defined as hypoactive delirious patients. Patients with fluctuating RASS scores, between +4 and −3 in combination with a positive delirium screening, are defined as mixed or alternating subtype. These delirium subtypes have different implications for nurses since the hyperactive subtype is easy to recognize but causes more nursing problems and inconvenience. While patients with the hypoactive subtype are, due to their lethargic state, easy to nurse but therefore also easily missed or misdiagnosed as sedation of depression (American Psychiatric Association, 1994). Meagher and Trzepacz (Meagher et al., 2000; Meagher and Trzepacz, 2000) suggest that the different delirium subtypes in hospitalized patients represent a difference in severity of delirium. They argue that, since the duration of a hyperactive delirium is shorter than the duration of the mixed subtypes, and the length of stay in hospital is also shorter, the hyperactive subtype is less severe than the other subtypes. Whether this difference in severity of delirium is also true for ICU patients is not known.

Delirium in ICU patients is associated with short-term health consequences such as prolonged duration of mechanical ventilation and length of stay and higher mortality rates (Dubois et al., 2001; Ely et al., 2001a; Ouimet et al., 2007). The duration of delirium is associated with prolonged cognitive failure (Girard et al., 2010) and each additional day with delirium is associated with a 10% increase in mortality (Pisani et al., 2009).

The delirium incidence in ICU patients ranges from 11 to 89% (Aldemir et al., 2001; Dubois et al., 2001; Ely et al., 2007; McNicoll et al., 2003; Ouimet et al., 2007). Despite the generally high delirium incidence rate accompanied and the serious health consequences there is lack of evidence for prevention of delirium ICU patients. Preventive measures consisting of a multicomponent intervention strategy (Inouye et al., 1999) and prophylactic haloperidol (Kalisvaart et al., 2005) showed positive effects in older hospitalized patients with a high risk for delirium. The effects of these preventive measures are not determined yet in ICU patients.

The high incidence rate in critically ill patients is associated with the frequent occurrence of important risk factors for delirium (Van Rompaey et al., 2008) in ICU patients. The wide range of delirium incidence rates is likely related to case mix differences over studies. It is likely that overall delirium incidence rates and rates per subtype of delirium differ between (elective) surgical and medical patient groups. As these patient groups differ, e.g. regarding their pathophysiological disease processes, severity of illness, and chance of dying (Knaus et al., 1985) we expect them to also differ in their chances of developing delirium, or chances of developing a specific subtype.

Although the classification of the delirium subtypes according to Peterson et al. (2006) is commonly used in the ICU, little is known about incidence rates of the subtypes per ICU diagnosis group and its effects on delirium duration and short-term consequences.

The aim of this study is threefold. First, to determine the delirium incidence rate overall, per subtype of delirium and per ICU diagnosis group. Second, to determine the