The impact of delirium in the intensive care unit on hospital length of stay

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Abstract

Study objective: To determine the relationship between delirium in the intensive care unit (ICU) and outcomes including length of stay in the hospital.

Design: A prospective cohort study.

Setting: The adult medical ICU of a tertiary care, university-based medical center.

Participants: The study population consisted of 48 patients admitted to the ICU, 24 of whom received mechanical ventilation.

Measurements: All patients were evaluated for the development and persistence of delirium on a daily basis by a geriatric or psychiatric specialist with expertise in delirium assessment using the Diagnostic Statistical Manual IV (DSM-IV) criteria of the American Psychiatric Association, the reference standard for delirium ratings. Primary outcomes measured were length of stay in the ICU and hospital.

Results: The mean onset of delirium was 2.6 days (S. D. ± 1.7), and the mean duration was 3.4 ± 1.9 days. Of the 48 patients, 39 (81.3%) developed delirium, and of these 29 (60.4%) developed the complication while still in the ICU. The duration of delirium was associated with length of stay in the ICU (r = 0.65, P = 0.001) and in the hospital (r = 0.68, P < 0.001). Using multivariate analysis, delirium was the strongest predictor of length of stay in the hospital (P = 0.006) even after adjusting for severity of illness, age, gender, race, and days of benzodiazepine and narcotic drug administration.

Conclusions: In this patient cohort, the majority of patients developed delirium in the ICU, and delirium was the strongest independent determinant of length of stay in the hospital. Further study and monitoring of delirium in the ICU and the risk factors for its development are warranted.

Keywords: Delirium · Aging · Geriatrics · Cognitive impairment · Encephalopathy · Mechanical ventilation · Sedatives · Analgesics · Protocol · Respiratory diseases · Critical care

Abbreviations

APACHE Acute Physiology and Chronic Health Evaluation · DSM Diagnostic Statistical Manual (of American Psychiatric Association) · ICU Intensive Care Unit · mBDRS modified Blessed Dementia Rating Scale · MMSE Mini-Mental State Examination
Introduction

Patients in the intensive care unit (ICU) are at very high risk for the development of delirium due to factors such as multi-system illnesses and comorbidities, the use of psychoactive medications, and age. Among general medical or surgical patients, the frequency of delirium varies from 15% to 50% [1, 2, 3]. These demographic data reflect non-ICU patients and there are, unfortunately, sparse data concerning the demographics of delirium in the ICU [4, 5] and even less on its impact on outcomes among medical ICU patients. The incidence of acute respiratory failure requiring mechanical ventilation rises tenfold from the age of 55–85 years [6], resulting in greater numbers of elderly patients treated in our ICUs [7, 8]. Without appropriate preventive and management strategies, the aging of the population will likely result in an increased burden of delirium among mechanically ventilated patients across the country [9, 10, 11], a factor which could strongly effect discharge rates to nursing homes following hospital discharge [2, 12].

While recent studies have selected delirium and pharmacologic issues (which are inter-related) as two of the top three most important target areas for quality of care improvement in vulnerable older adults [13], nearly all delirium investigations have excluded medical ICU patients who are often receiving prolonged sedation on mechanical ventilators [1, 2, 14, 15, 16, 17]. Likewise, recent systematic reviews and clinical practice guidelines of sedation practices and consequences in the ICU have not even mentioned delirium [18, 19, 20].

As the medical community strives to advance many facets of care for both younger and older patients treated in the ICU, it is imperative that we improve our understanding of the frequency and duration of delirium on outcomes in the ICU. In this investigation of medical ICU patients, we assessed for the development of delirium in the ICU and the presence of persistent cognitive deficits at the time of hospital discharge. The main goal of this study was to determine the impact of delirium on commonly monitored clinical outcomes such as length of stay in the ICU and in the hospital.

Methods

Patients

The study population included both ventilated and non-ventilated adult medical ICU patients admitted to the Vanderbilt University Medical Center. Fifty-three consecutive patients were enrolled into the study out of the 68 patients admitted to the ICU during the study period. Exclusion criteria defined a priori included a history of chronic dementia, psychosis, mental retardation, or other neurologic diseases that would confound the diagnosis of delirium (e.g., cerebrovascular accident with residual cognitive impair-ment), and patient or family refusal to participate. Twelve patients were excluded due to underlying chronic dementia or psychosis, and there were three refusals, leaving the 53 patients who were enrolled. Five patients were never evaluated by the reference standard geriatric or psychiatric specialist and were therefore excluded from further analysis. This left 48 patients upon which to base the current report.

Study protocol

The institutional review board approved this study, and informed consent was obtained from the patient and/or the surrogate. Two study nurses enrolled patients each morning and recorded baseline demographics, severity of illness data using the Acute Physiology and Chronic Health Evaluation (APACHE) II score [21], activities of daily living [22], and risk factors for delirium derived from data in the literature [2, 3, 14, 15, 23, 24, 25, 26, 27]. The modified Blessed Dementia Rating Scale (mBDRS) [28] was used to screen for dementia via family or surrogate interviews. This use of the mBDRS is consistent with its original intent, as it was validated as a dementia screening instrument by comparing the structured mBDRS surrogate interview with the patients’ neuropathologic findings at autopsy. The surrogates also completed a set of global questions (rated on a 1–5 scale) that were related to their perceptions of the presence or absence of dementia and the likelihood of the development of delirium. While no patients with documented chronic dementia were enrolled in this investigation, it is possible that patients with mild dementia were admitted to the ICU without a prior diagnosis. To account for the possibility of such baseline cognitive deficits, we defined a priori a subgroup of patients as having “possible mild dementia” at enrollment if any of the following three criteria were met: (1) the geriatric psychiatric expert rated them as demented; (2) they had an mBDRS [28] of 3 or greater (lower than the usual cutoff of 4 or greater, thereby increasing sensitivity for detection of dementia); or (3) a rating on the question answered by the surrogate of 3 or greater out of 5 as “possibly having dementia.”

Once enrolled, patients were followed daily until hospital discharge (see Reference Standard evaluations below). At the time of hospital discharge, the patients completed the Folstein Mini-Mental State Examination (MMSE) [29], Geriatric Depression Scale [30], SF-12 [31], and Maugeri Respiratory Foundation-28 (MRF-28) [32] quality of life instruments. The SF-12 is summarized using mental and physical component scores, which range from 0 to 100 (100 = optimal). The MRF–28 is a disease-specific quality of life instrument designed for use in patients with chronic respiratory diseases [32], and it is scored from 0 to 100 with lower numbers indicating better quality of life (0 = optimal) based on respiratory disability.

Reference standard delirium evaluations

All cognitive assessments were conducted in the afternoon between 2 p.m. and 5 p.m. The geriatric or psychiatric experts served as the reference standard by completing the DSM IV [33] criteria for delirium (see Appendix) or a rating for a more severely impaired sensorium such as stupor or coma. These latter states were defined as follows: (1) stupor – difficult to arouse, unaware of some or all elements in the environment, or not spontaneously interacting with the interviewer; becomes incompletely aware and inappropriately interactive when prodded strongly; and (2) coma – unarousable, unaware of all elements in the environment, with no spontaneous interaction or awareness of the interviewer, so