Prevention & Management of Acute Cognitive Dysfunction in Critically Ill adults in ICU

Essay

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in General Intensive Care

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Abstract

Background: Delirium is defined by American Psychiatric Association's *Diagnostic & Statistical Manual of Mental Disorders*, as a disturbance of consciousness with the cornerstone component of inattention being the pivotal feature of the diagnosis. This alarmingly form of brain dysfunction often develops acutely (hours to days) in critically ill patients & fluctuates over time. Many different terms have been used to describe this spectrum of cognitive impairment in critically ill patients, including ICU psychosis, ICU syndrome, acute confusional state, septic encephalopathy, acute brain angina, and acute brain failure. The current consensus of many authorities is to use the unifying term *delirium* and subcategorize according to the level of alertness (hyperactive, hypoactive, or mixed).

Aims: The aim of this essay is to discuss acute cognitive dysfunction in critically ill patients as regards detection, prevention and proper management.

Summary The main four domains for diagnosing delirium as listed by the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-V) are; disturbance of consciousness, change in cognition, development over a short period, and fluctuation.

Conclusion: Pharmacologic therapy for delirium in the ICU may be a helpful adjunct to the needed multicomponent approach to patient care. Pharmacologic strategies primarily involve the use of dopamine antagonists – typical antipsychotic as haloperidol and atypical antipsychotics as olanzapine, quetiapine, risperidone, aripiprazol, and ziprasidone– or Alpha-2 agonists with a sedative effect as dexmedetomidine and clonidine.

Keywords: Acute Cognitive Dysfunction, Critically Ill Patients, ICU, Proper management

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List of Abbreviations

AACN	The American Association of Critical-Care Nurses
ABC study	The awakening and breathing controlled study
ACCM	American college of critical care medicine
ADL	Activities of daily living.
APACHE-II	Acute physiology and chronic health evaluation score
ASHP	American society of health-system pharmacists
BPS	The behavioural pain scale
CAM-ICU	Confusion assessment method for the intensive care unit
CHF	Congestive heart failure
CPAP	Continuous positive airway pressure
CPOT	Critical-care pain observation tool
DSM	Diagnostic and statistical manual of mental disorders
DSM-V	Diagnostic and statistical manual of mental disorders, 5^{th} edition
EEG	Electroencephalography
FDA	Food and drug administration
GABA	Gama amino-butyric acid
ICDSC	The intensive care delirium screening checklist
ICU	Intensive care unit
IL-1	Interleukin 1

IL-10	Interleukin 10
IV	Intravenous
K+	Potassium
LAT1	Independent large neutral amino acid transporter type 1
LNAAs	Large neutral amino acids
MENDS	Maximizing the efficacy of targeted sedation and reducing neurologic dysfunction
MODS	Multiple organ dysfunction syndrome
Nu-DESC	Nursing delirium screening scale
PAD guidelines	Guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit
PEEP	Positive end expiratory pressure
PRE-DELIRIC	Prediction of delirium in icu patients
RASS	Richmond agitation-sedation scale
REM	Rapid eye movement
ROM	Range of motion,
SAS	The sedation-agitation scale
SAT	Spontaneous awakening trials
SBT	Spontaneous breathing trials
SCCM	Society of critical care medicine
SEDCOM	Safety and efficacy or dexmedetomidine compared with midazolam
TNFα	Tumor necrosis factor-α

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Introduction

Delirium is defined by American Psychiatric Association's *Diagnostic & Statistical Manual of Mental Disorders*, as a disturbance of consciousness with the cornerstone component of inattention being the pivotal feature of the diagnosis. This alarmingly form of brain dysfunction often develops acutely (hours to days) in critically ill patients & fluctuates over time. Many different terms have been used to describe this spectrum of cognitive impairment in critically ill patients, including ICU psychosis, ICU syndrome, acute confusional state, septic encephalopathy, acute brain angina, and acute brain failure. The current consensus of many authorities is to use the unifying term *delirium* and subcategorize according to the level of alertness (hyperactive, hypoactive, or mixed) ***(Hipp and Ely, 2013)***.

Although the prevalence of delirium in medical ICU is reported to be between 20% and 80%, more general ranges are practical depending on the severity of illness and the delirium detection instrument used, such as 40% to 60% in non-ventilated and 60% to 80% in ventilated ICU patients. Delirium has shown to be a strong predictor of longer duration of mechanical ventilation, longer length of ICU stay, higher costs, prolonged neuropsychological

dysfunction, and even death. Every day a patient spends in ICU delirium portends a 10% higher risk of death even after adjusting for relevant covariates such as severity of illness, age, psychoactive medication use, and coma ***(Hipp and Ely, 2013)***.

The clinical approach to prevent and/or treat delirium is driven by different goals. These include prevention through controlling precipitating risk factors, early detection and management of delirium symptoms (psychosis or agitation), and/or treatment of delirium through resolution of the underlying cause ***(Smith et al., 2009*)**.

A bundled approach combining evidence-based practices in sedation management, ventilator weaning, delirium management and early mobility and exercise, which is referred to as the **ABCDE** approach, has been proposed to improve multiple outcomes, including preventing and reducing the duration of delirium in the ICU. It has also proven to shorten the duration of mechanical ventilation and ICU length of stay ***(Brummel and Girard, 2013).***

Pharmacologic treatment of delirium includes: *Haloperidol*, which is the drug of choice for treatment of hyperactive delirium as recommended by the Society of

Critical Care Medicine (SCCM). It is a "typical" antipsychotic, and it is the most widely used neuroleptic agent for delirium. *Newer "atypical" antipsychotic agents* (e.g., risperidone, ziprasidone, quetiapine, and olanzapine) have also proven to be helpful in treatment of delirium. The rationale behind use of the atypical antipsychotics rather than haloperidol (especially in hypoactive/mixed subtypes of delirium) centers on the fact that they affect other potentially key neurotransmitters such as serotonin, acetylcholine, and norepinephrine. A growing body of literature suggests a role for sedatives such as the α2-agonist *dexmedetomidine* in the management of delirium. Sedation with dexmedetomidine resulted in more days alive without coma or delirium and also reduced the daily risk of delirium, particularly in patients with sepsis ***(Hipp and Ely, 2013).***

The American College of Critical Care Medicine (ACCM), in collaboration with the SCCM and American Society of Health-System Pharmacists, have recently published a revised version of the "Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the Intensive Care Unit" (i.e. the PAD Guidelines). The recommendations of these guidelines aim to help ICU physicians advance the management of PAD in critically ill patients and improve patients' clinical outcomes ***(Barr et al., 2013).***

Aim of the Essay

The aim of this essay is to discuss acute cognitive dysfunction in critically ill patients as regards detection, prevention and proper management.

Chapter (1)

Delirium; Definition, Pathophysiology and Subtypes

Definition:

Delirium is defined by American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-V), as a disturbance of consciousness with the cornerstone component of inattention being the pivotal feature of the diagnosis. The main four domains of delirium as listed by the DSM-V are; disturbance of consciousness, change in cognition, development over a short period, and fluctuation. Delirium is a reversible condition ***(APA, 2013).***

The DSM-V diagnostic criteria for delirium include:

- **Criterion A:** a disturbance in attention (i.e. reduced ability to focus, sustain, or shift attention) and awareness.
- **Criterion B:** the disturbance develops over a short period of time usually hours to days), represents a change from baseline attention and awareness, and tends to fluctuate in severity during the course of the day.

- **Criterion C:** an additional disturbance in cognition (e.g. memory deficit, disorientation, language).

- **Criterion D:** the disturbances in Criteria A and C are not explained better by another pre-existing established or evolving neurocognitive disorder, and do not occur in the context of a severely reduced level of arousal (e.g. coma).

- **Criterion E:** there is evidence from the history, physical examination, or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal, or exposure to a toxin, or is due to multiple etiologies ***(APA, 2013).***

Delirium is defined by the National Institutes of Health as "sudden severe confusion and rapid changes in brain function that occur with physical or mental illness." Additional, although less common, features of delirium include hallucinations, delusions, and labile affect ***(King and Gratrix, 2009)***.

The word delirium comes from the Latin *de* away from *lira* furrow in a field, hence literally meaning going away from the ploughed track. This alarmingly common form of brain dysfunction often develops acutely (hours to