

GOOD CLINICAL PRACTICES

Assessment of delirium in adult patients in Intensive Care Unit

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ABSTRACT

Introduction: delirium is a clinical syndrome characterized by transitory and reversible mental confusion associated with a severe space-time disorientation, disrupted attention and disorganized thinking. Delirium is frequent in patient in intensive care (ICU delirium) with an incidence ranging from 11% to 80% according to the populations of ICU patients studied and is associated with a worsening of the outcomes.

Objective: to provide some recommendations on professional good practices in the assessment of delirium in patients hospitalized in intensive care unit (ICU).

Material and Methods: after a carefully literature review, using an evidence based method, the best practice document was carried out by the Aniarti Scientific Committee and revised by some experts. Five recommendations were created whose evidence level was evaluated by an instrument adapted from the one of American Association of Critical Care Nurses.

Results: (1) to assess the risk of delirium onset in patients at their admission to the ICU using predictable models (PRE-DELIRIC and/or E-PRE-DELIRIC model). (2) To recognize the factors associated to ICU delirium. (3) To routinely assess and record ICU delirium in all ICU patients using validated instruments: CAM-ICU or ICDSC. (4) The critical care nurse promotes team work in a multidisciplinary team using shared protocols for the prevention and treatment of ICU delirium. (5) The critical care nurse encourages non pharmacological interventions to prevent and treat ICU delirium.

Conclusions: the document, approved by Aniarti Executive Committee, despite the evidence low level of recommendations should be known and applied by all the healthcare professionals who take care of intensive care patients.

Key words: delirium, assessment, intensive care unit, critical care, nurses.

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OBJECTIVE

The aim of this document is to provide some recommendations on professional good practices in the assessment of delirium in patients hospitalized in intensive care unit (ICU).

APPLICATION FIELD

These recommendations can be useful for all nurses and healthcare professionals trained in the delirium assessment in ICUs.

DEFINITION AND IMPORTANCE OF THE PROBLEM

In the Diagnostic and Statistical Manual (DSM V)^[1] the American Psychiatric Association describes the acute cerebral dysfunction (delirium) as a "clinical syndrome characterized by transitory and generally reversible mental confusion associated with an important space-time disorientation, changes in attention and disorganized thinking."

The clinical characteristics are the following:

- A. Disturbances in attention (reduced ability to direct, focus, maintain and shift attention) and in awareness (reduced orientation to the environment).
- B. Onset of the disturbance over a short period of time (within hours or a few days) with an acute change of baseline attention, awareness and a trend to fluctuate in seriousness during the day.
- C. An additional disturbance in cognition (e.g. memory deficit, disorientation, altered language, visuospatial ability or perception).
- D. The disturbances (criteria A and C) of neurocognitive disorders are not better explained and do not occur in the context of a severely reduced level of arousal such as coma.
- E. There is evidence from the clinical history, physical examination or laboratory tests, that the disturbance is a direct consequence of another medical condition, substance intoxication or withdrawal (due to drug abuse or to medications).

This definition can be comparable to the one defined by the World Health Organization^[2].

Delirium is extremely frequent among critical care patients (ICU delirium)^[3]. The scientific literature is extensive about this topic and the specific one, concerning ICU delirium patients, highlights a lot of grey areas^[4]. *Delirium* occurs with an incidence ranging from 11% to 80% according to the population of critical patients studied^[5] and appears to be an independent predictive factor of:

- worsening in long-term neurological recovery (Intensive Care-induced dementia)^[6-9].
- longer hospitalization^[10];
- increased hospital costs^[11].

In critically ill adult patients delirium has not been proved to be associated with Post Traumatic Stress Disorders (PTSD)^[12,13] or Post Intensive Care Unit Syndrome (PICS)^[14], lengthening of ICU stays (ICU LOS)^[8], depression^[15] or increased mortality^[16].

The typical characteristics of delirium are: rapid onset, lack of attention, fluctuating alterations of the mental state, disorientation, worsening during the night hours^[17].

There are a lot of tools to assess ICU delirium. The validated ones, according to the DSM V criteria are: Intensive Care Delirium Screening Checklist (ICDSC), Confusion Assessment Method for the Intensive Care Unit (CAM-ICU), Nursing Delirium Screening Scale (Nu-DESC), Delirium Detection Score (DDS) and Cognitive Test for Delirium (CTD)^[18,19].

Each tool varies in content, delirium symptom assessment methods (e.g. standardized assessment compared to observational assessment), duration of assessment time and psychometric properties. The ICDSC^[20] and CAM-ICU^[21] are the instruments used in the screening of ICU delirium in adults patients. These are the most developed and widely implemented worldwide^[22,23] and are the two delirium screening tools recommended by the recently updated guidelines^[16].

Based on the results of the assessment instruments used, combined with the sedation level of patients using the Richmond Agitation Sedation Scale (RASS)^[24], three sub-types of *delirium*, depending on the consciousness or agitation level of the patients, have been identified^[25]:

1. *Hyperactive delirium*: characterized by agitation, restlessness, risk of the displacement of the medical devices (RASS > 0).
2. *Hypoactive delirium*: characterized by estrangement, emotional flatness, apathy, lethargy, reduced responsiveness (RASS ≤ 0).
3. *Mixed delirium*: occurs when the patient alternates his or her state between the two previous types described.

In Intensive Care, mixed and hypoactive delirium are most common and are often underdiagnosed if a daily monitoring is not applied. Few ICU patients (< 5%) suffer from pure hyperactive delirium^[26]. Recently an ulterior

subtype of "rapidly reversible" delirium has been defined and occurs as a separate entity which rapidly lowers after the interruption of sedation with a RASS score ≤ -1 and seems not to influence the clinical outcomes^[27]. The identification of different subtypes of delirium may be important because these ones may have different outcomes^[26].

RECOMMENDATIONS**Legend of the evidence levels**

Level A* - Metanalysis of quantitative or metasynthesis of qualitative studies with results that consistently support a specific action, intervention or treatment (including systematic revisions of experimental randomized clinical studies).

Level B* - Well-designed, controlled clinical studies with results that consistently support a specific action, intervention or treatment.

Level C* - Qualitative, descriptive studies of correlation, integrative reviews, systematic reviews or randomized, experimental clinical studies with inconsistent results.

Level D* - Professional and organizational standards based on peer reviews with recommendations supported by clinical studies.

Level E* - Multiple case reports, evidences based on theories of experts' opinions, or professional and organizational standards based on peer reviews with clinical studies to support the recommendations.

Level M* - Only recommendations from the manufacturing companies.

Deontological standard /normative* - Not classifiable recommendations based on levels of scientific evidence but also ethically advised.

* Levels of evidence adopted by the American Association of Critical Care Nurses

≠ Evidence level modified compared to those used by the American Association of Critical Care Nurses

1. To assess the risk of delirium onset in patients at their admission to the ICU using predictable models (PRE-DELIRIC and/or E-PRE-DELIRIC model). (Level C)

Rationale

The delirium onset in patients admitted to the ICU is associated with various modifiable and non-modifiable risk factors, specific for the typology of patients^[28]. The PAD guidelines

(clinical practice guidelines for the management of Pain, Agitation and Delirium in adult patients in the ICU)^[29] followed by the PADIS guidelines (clinical practice guidelines for the prevention and management of Pain, Agitation/sedation, Delirium, Immobility and Sleep disruption in adult patients in the ICU)^[16] recommend the use of validated models which consider these factors and allow the assessment of the risk of the delirium onset. Van den Boogaard et al.^[14] developed and validated the predictive PRE-DELIRIC model (PREdiction of DELIRium in ICU patients <https://www.evidencio.com/models/show/608>). The tool was tested on 1,613 consecutive critical care patients in a Dutch hospital and validated on 549 patients of the same hospital. For the external validation, the data of 894 patients of other four hospitals were collected. The model showed an area within the curve (ROC) of 0.87 (CI at 95% between 0.85 and 0.89) and 0.86 after the resampling. The time and the external validation produced results within the curve of 0.89 (0.86-0.92) and 0.84 (0.82-0.87). Not considering the health changes the PRE-DELIRIC is a static model which produces a delirium calculated probability 24 hours after admission to the ICU.

In 2015, Wassenaar et al.^[30] developed and validated a model based on data available at the time of admission to the ICU with the objective of predicting delirium development during hospitalization and determining the predictive value of the model, in relation to the delirium development time (E-PRE-DELIRIC <https://www.evidencio.com/models/show/981>). The ROC area was 0.76 (CI of 95% 0.73-0.77) in the development dataset and 0.75 (CI at 95% 0.71-0.79) in the validation dataset. The model was well calibrated. The ROC increased from 0.70 (CI 95% 0.67-0.74) for delirium that developed in less than 2 days, to 0.81 (CI 95%, 0.78-0.84) for delirium developed in more than 6 days.

The E-PRE-DELIRIC model is able to predict the risk of delirium in patients for their whole stay in the ICU from admittance, allowing early preventive interventions aimed at reducing the incidence and severity of delirium.

2. To recognize the factors associated to ICU delirium. (Level C)

Rationale

The delirium onset in ICU patients is associated with various predisposing and precipitating risk factors which are both modifiable and non-modifiable. Many high quality studies have demonstrated strong evidences of possible delirium risk factors.

PREDISPOSING RISK FACTORS:

Old age is a factor independently associ-

ated to the transition towards delirium^[7,25,31-33].

Preexisting dementia before admission to the ICU is strongly related to the risk of delirium manifestations (incidence of 30.9%)^[34,35].

High scores of the ASA (American Society of Anesthesiologists, a predictive index for surgical risks) are considered a delirium risk factor. The patients who develop delirium have a higher ASA score (86% against 63% were ASA III / IV, $p < 0.001$)^[36]. In a lot of studies, high APACHE (Acute Physiology And Chronic Health Evaluation) scores are significantly correlated to delirium^[31,37,38].

PRECIPITATING RISK FACTORS:

The state of coma appears to be a factor associated with the onset of delirium; the patients who were previously in coma have a 45 times greater probability of becoming delirious compared to the normal population who has not showed this pathological state^[39].

Having suffered a trauma or being subjected to emergency surgery before ICU admittance is associated with the delirium development^[40,41]. In Veiga's study of 2012^[36] emergency surgery was proved to be a remarkably significant marker in the delirium onset (OR 2.65, ICU 95% 1.55-4.53, $p < 0.001$)^[36].

The probability to develop delirium increases according to the dosage of benzodiazepine administered in the previous 24 hours. The development of delirium was elevated at low dosages and stabilized at about 50 mg/day of midazolam^[34,39,41,42].

Blood or plasma transfusions are an additional risk factor. Patients who received inter-surgical blood transfusions have greater probabilities to become delirious, suggesting that they are more vulnerable to cardiovascular instability^[33,36,43].

3. To routinely assess and record ICU delirium in all ICU patients using validated instruments: CAM-ICU or ICDSC. (Level C)

Rationale

The main advantage in monitoring delirium is the possibility of making an early diagnosis which allows appropriate interventions. Early diagnosis may lead to the rapid identification and correction (when possible) of the etiology, thus improving the patient safety who manifests delirium symptoms to their treatment (pharmacological or not) and to the assessment of the treatment's effectiveness. Many studies conducted in and out ICU settings, have proved that without validated screening tools, nurses and doctors find it difficult to recognize delirium^[16]. Eighty-five percent of the nurses state that assessment of delirium can be possible every 12 hours using validated tools^[44].

ICU delirium is not assessed by healthcare workers in 75% of the cases without a validated tool^[45,46]. Assessment is fundamental for effective management. Many studies report deficits in evaluation, e.g. the use of clinical observations or validated tools^[47] or the total lack of diagnostic routinely assessments for all ICU patients^[48].

The factors hindering early assessment mainly consist in the lack of familiarity with the validated delirium assessment scales, followed by the difficulties of nurses in assessing intubated patients and sedated patients and organizational types of problems (lack of time, support from the department heads and intervention of the medical staff)^[49].

Different scales have been studied and validated for daily clinical practice, such as the Confusion Assessment Method for the ICU (CAM-ICU), Delirium Detection Score (DDS), Intensive Care Delirium Screening Checklist (ICDSC), Cognitive Test for Delirium (CTD) and the Neelon and Champagne Confusion Scale (NCCS)^[50]. At present the scales with the best validity and reliability scores are the CAM-ICU^[51] and the ICDSC^[20]. The use of these two scales was also recommended by the latest PADIS Guidelines^[16].

It is necessary to also consider the possible disadvantages of the ICU delirium screening: an assessment with a false-positive outcome, even though this is rare when using the CAM-ICU or the ICDSC may lead to an unnecessary pharmacological and/or non-pharmacological treatment. But the benefits of regular assessment with these tools significantly exceed any disadvantage^[16]. Critical care nurses must be trained in the correct use of these tools to avoid possible wrong assessments^[52,53].

The CAM-ICU and ICDSC scales are both validated in the Italian language^[54,55] and computer-based tools may be more effective for ICU-delirium detection compared the paper-based ones^[56].

4. The critical care nurse promotes team work in a multidisciplinary team using shared protocols for the prevention and treatment of ICU delirium. (Level C)

Rationale

In literature multifactor interventions based on efficacy trials, aimed at reducing ICU delirium, were proposed. For example, the use of the ABCDEF bundle (Assess, prevent, and manage pain, whether spontaneous awakening trials and spontaneous breathing trials, Choice of analgesia and sedation, Delirium assessment, prevention and management, early mobility and Exercise and Family engagement and empowerment) has been associated with a reduction in the duration of ICU delirium and mechanical ventilation. A

before and after study on the implementation of the ABCDEF bundles has shown further benefits with an increase of survival^[57,58].

Another care bundle is the eCASH approach, which means Early implementation of Comfort and Analgesia using minimal Sedation and Human Care, or the "early implementation of comfort and analgesia with minimum sedation and patient-centered treatments"^[59]. This relatively new approach has still to be evaluated in clinical practice^[4].

A multidisciplinary collaboration and a standardized approach may improve the identification of ICU delirium. To reduce risk factors, actions like ICU delirium diagnosis, initiation of suitable treatments, and use of validated screening tools at the patient's bedside, must be implemented in the daily practice by all healthcare workers in the ICU. Following updated guidelines, interdisciplinary team work has proved to be valid in minimizing ICU delirium^[60].

The Society of Critical Care Medicine recommends the identification of the causes as the first phase in ICU delirium management. The acronym, THINK, may be useful to remember the possible causes when the patient manifests delirium: Toxic situations (heart failure, shock, dehydration, deliriant drugs, new organ failure), Hypoxia, Infections/sepsis (nosocomial) and Immobilization, Non pharmacological interventions (hearing aids, eyeglasses, protocols favoring sleep, music, noise control, mobility), and K that is potassium and electrolytes^[61].

5. The critical care nurse encourages non pharmacological interventions to prevent and treat ICU delirium. (Level C)

Rationale

Despite the low level of efficacy support tests, the PADIS guidelines suggest the non-pharmacological use of a strategy of multifactor interventions and ones which focus on the reduction of the modifiable risk factors of ICU delirium in critically ill adult patients, improving their cognitive capabilities and optimizing sleep, mobility, hearing and sight^[16]. These multifactor interventions include strategies to reduce or shorten delirium (e.g. reorientation, cognitive stimulation, use of the watch), to improve sleep (e.g. reducing light and noise) and the level of wakefulness (e.g. reducing sedation), to reduce immobility (e.g. early mobilization, physiotherapy) and hearing and visual impairments (e.g. use of hearing aids, eyeglasses). In various studies these multifactor interventions, grouped in bundles, have demonstrated improved outcomes in adult critically ill patients^[57,62-66].

Non-pharmacological interventions aimed at specific treatment aspects in high

risk elderly patients were seen to be effective^[60]. Non-pharmacological interventions may reduce the risk of developing delirium up to 40%. Although the studies were conducted on patients not hospitalized in the ICU, the components of these interventions may also be applied to ICU patients^[60].

Pilot studies have suggested that non-pharmacological interventions with an early cognitive therapy combined with the physical treatments during their stay in the ICU are feasible and safe^[67,68]. Overall, the efficacy level of the supporting evidence of mono or multifactor interventions is low. However, given that ICU delirium has always a very articulated etiology, and there being no possibility to attribute it to a single cause, multifactor interventions would be more promising than single factor interventions^[16].

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