Confusion assessment method to analyze delirium in intensive care unit. Literature review

Confusion assessment method para analisar delirium em unidade de terapia intensiva. Revisão de literatura

INTRODUCTION

Delirium is a neurological disorder often found in critically ill patients admitted in intensive care units (ICU). Its relevance is not only due to high incidence but essentially to its outcomes such as: influence on the morbidity and mortality rates and prolonged length of stay resulting in higher treatment costs. Variation in sensitivity was of 93% to 100% and variation in specificity, 89% to 100% of the Confusion Assessment Method for Intensive Care Unit, an important tool for detection, characterization and control of delirium and its impact. The aspects of delirium studied by means of the Confusion Assessment Method for Intensive Care Unit were: the performance index, identification, management, cost of treatment, morbidity and mortality due to delirium.

Keywords: Delirium; Nursing; Intensive care unit

ABSTRACT

Delirium is frequently observed in intensive care unit patients and its occurrence is related to increased morbidity and mortality, length of stay, functional decline and high costs. The Confusion Assessment Method for Intensive Care Unit is a tool that facilitates early identification and occurrence of delirium among intubated patients. Objective: To verify the aspects of delirium studied by means of the Confusion Assessment Method for Intensive Care Unit. A literature review was conducted in the LILACS, MedLine, PubMed and CINAHL databases, from 2001, when the Confusion Assessment Method for Intensive Care Unit was validated, to 2008. Descriptors used for LILACS, MedLine and PubMed were delirium and intensive care unit, while for the CINAHL database, delirium and intensive care were used. From 293 articles, 35 were selected. The aspects analyzed disclosed, different types of delirium in different intensive care units. Variation in sensitivity was of 93% to 100% and variation in specificity, 89% to 100% of the Confusion Assessment Method for Intensive Care Unit, an important tool for detection, characterization and control of delirium and its impact. The aspects of delirium studied by means of the Confusion Assessment Method for Intensive Care Unit were: the performance index, identification, management, cost of treatment, morbidity and mortality due to delirium.

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intubated and under mechanical ventilation (MV) in intensive care environments and then called Confusion Assessment Method for the Intensive Care Unit (CAM-ICU). It has four items: 1 - acute onset, 2 - inattention, 3 - disorganized thinking and 4 - altered level of awareness. The proposed assessment comprises observation of the patient’s non verbal response pattern to simple orders, recognition of figures by applying the Attention Screening Examination (ASE), surveillance and logical replies with yes and no to simple questions.\(^1\)

Considering the importance of delirium consequences in the follow-up status of the critically ill patient, existence of a tool for early detection of this disorder and in order to provide subsidies for daily practice of the ICU professionals related to CAM-ICU regarding performance and scope of utilization, the aim of this study was to verify the aspects of delirium already studied using the CAM-ICU.

**METHODS**

This is a literature review, conducted by searching the LILACS, MedLine, PubMed and CINAHL databases. The period under study was from CAM-ICU validation, July 2001 to March 2008, with no language restriction. The keywords delirium and intensive care unit were used for the search in LILACS, MedLine, PubMed and delirium and intensive care were used in CINAHL. Selection criteria were description of CAM-ICU or its use for study of delirium.

**RESULTS**

No publications on CAM-ICU were found in LILACS database, 144 studies were identified in PubMed, 25 were selected; in MedLine, 142 publications were found, of which 24 were selected. However, 17 of these had already been selected in PubMed, as such seven were selected. In the CINAHL seven articles were found and three were selected. Thus, a total of 35 studies was selected (Chart 1).

**Chart 1 – Studies about the Confusion Assessment Method for Intensive Care Unit from June 2001 to March 2008**

<table>
<thead>
<tr>
<th>Journal (reference)</th>
<th>Quantity</th>
<th>Year</th>
<th>Country</th>
<th>Type of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acta Anaesthesiologica Scandinavica(^{35})</td>
<td>1</td>
<td>2007</td>
<td>England</td>
<td>Descriptive exploratory</td>
</tr>
<tr>
<td>Anaesthesia(^{17})</td>
<td>1</td>
<td>2007</td>
<td>England</td>
<td>Prospective cohort</td>
</tr>
<tr>
<td>Anesthesiology(^{3})</td>
<td>1</td>
<td>2006</td>
<td>USA</td>
<td>Prospective cohort</td>
</tr>
<tr>
<td>Archives of Internal Medicine(^{19,26})</td>
<td>2</td>
<td>2007</td>
<td>USA</td>
<td>Prospective cohort</td>
</tr>
<tr>
<td>Chest(^{29})</td>
<td>1</td>
<td>2007</td>
<td>USA</td>
<td>Narrative review</td>
</tr>
<tr>
<td>Clinical Pulmonary Medicine(^{39})</td>
<td>1</td>
<td>2002</td>
<td>Canada</td>
<td>Narrative review</td>
</tr>
<tr>
<td>Critical Care(^{6,15,32,40})</td>
<td>4</td>
<td>2007</td>
<td>USA</td>
<td>Prospective cohort</td>
</tr>
<tr>
<td>Critical Care Medicine(^{1,2,6,8,14,16,22,31})</td>
<td>8</td>
<td>2008</td>
<td>USA</td>
<td>Prospective cohort</td>
</tr>
<tr>
<td>Critical Care Nurse(^{24})</td>
<td>1</td>
<td>2003</td>
<td>USA</td>
<td>Descriptive exploratory</td>
</tr>
<tr>
<td>Critical Care Nurse Q(^{30,33})</td>
<td>2</td>
<td>2003</td>
<td>USA</td>
<td>Narrative review</td>
</tr>
<tr>
<td>Current Opinion in Critical Care(^{38})</td>
<td>1</td>
<td>2005</td>
<td>USA</td>
<td>Case study</td>
</tr>
<tr>
<td>Current Opinion in Critical Care(^{38})</td>
<td>1</td>
<td>2005</td>
<td>USA</td>
<td>Narrative review</td>
</tr>
<tr>
<td>Hu Li Za Zhi(^{34})</td>
<td>1</td>
<td>2007</td>
<td>China</td>
<td>Descriptive exploratory</td>
</tr>
<tr>
<td>Intensive Care Medicine(^{30,36})</td>
<td>2</td>
<td>2007</td>
<td>USA</td>
<td>Prospective cohort</td>
</tr>
</tbody>
</table>

Continue...
Validation of CAM-ICU and detection of delirium in daily routine

The process of CAM-ICU validation was presented in two studies, in both it was carried out by nurses and physicians or specialists in delirium, independently, in adult ICU patients with no previous history of neurological dysfunction. Patients under study had Acute Physiologic Chronic Health Evaluation II (APACHE II) score of 17.1 in average in one study and of 22.9 in the other. Incidence of delirium was 87% and 83.3% and performance of CAM-ICU to detect the disorder, achieved by assessing sensitivity, ranged from 95% to 100% and 93% to 100% and specificity of 89% to 93% and 98% to 100%, respectively. (1,13)

For the purpose of assessing patients for delirium, two studies were carried out on implementation of a daily assessment routine for nurses using CAM-ICUs. These studies proved the importance and efficacy of this care for detection of the disorder, in addition to encouraging constant attention to the patient’s mental status. It was observed that reports on the disorder were more frequently made by nurses than by the medical staff and that there was a better communication with the multiprofessional team according to the nurses’ report. (14, 15)

Notwithstanding acknowledgment of delirium as a serious issue in an intensive care environment because of its high incidence and consequence, a study evaluating practices and beliefs on the disorder by ICU professionals noted that 78% admitted to not having properly diagnosed the condition and only 32% endeavored to improve their knowledge on how to handle delirium. (16) Among 40% of professionals who reported routine assessment of the patient regarding delirium, 67% made the assessment daily, but only 16% used specific tools. The Mini Mental State Examination (50%) was most often used, followed by the Glasgow coma scale (28%), sedation scale (16%) and only 7% used the CAM-ICU. (16)

Characterization of delirium with use of CAM-ICU

In the studies using CAM-ICU to detect delirium, mostly in clinical and coronary ICU with critically ill patients it was found that incidence ranged from 14.8% to 89%. (2,8,13,17,21) The condition developed in the first five days (8) in the ICU and lasted from one to three days (2,20) the length of stay was increased from one to 10 days compared to patients who did not develop delirium. (2,9,21,22) Hypoactive form of delirium was essentially observed in clinical older patients who were MV dependent (51.8%), in comparison to the young (26.6%). The mixed type of delirium was more frequent among younger persons (54.9%). (23) In surgical and trauma ICU there was a higher prevalence of the hypoactive form (64% surgical and 60% trauma), followed by the mixed form (9% and 6% respectively). (20) In studies that assessed development and exacerbation of delirium related to use of drugs, it was observed that benzodiazepines and narcotics impaired cognition and worsened the disorder, (24-26) having, furthermore, a significantly greater effect than opioids on development of delirium. (3) In contrast, another study observed a certain protective effect against development of delirium. (5) In contrast, another study observed a certain protective effect against development of delirium in post-surgical patients in ICU who had been given general anesthesia or sedation. (21) Administration of lorazepam (20 mg) was associated to a 100% probability of developing delirium. (3,27) On the other hand it was noted that use of dexmedetomidine reduces the prevalence and duration of delirium, as well as mortality in patients under MV, when compared with use of lorazepam. (28,29) Among these drugs, haloperidol together with an assessment routine of the patient’s mental status, is recommended. (30) Analysis about influence of the practice of physi-
cal restraint on development of delirium discloses that even when this practice is used carefully for restraint of agitated patients, it may collaborate to development and worsening of delirium in addition to aggravating agitation and confusion.\(^{25,27}\)

Factors related to genetic aspects were also studied, analyzing the relationship between apolipoprotein E (APOE) and the duration of delirium. It was verified that APOE represents the first genetic factor to genetically influence the long duration of the disorder in humans.\(^{31}\)

When analyzing the relation between delirium and mortality in ICU patients it was noted that the disorder is an independent predictor for mortality in patients under MV. Mortality rates in patients who developed it ranged from 19% to 63.6% while in those who did not present it ranged from 6% to 32.5%.\(^{8}\) Patients who manifested at least one episode of delirium presented higher hospital expenses. Hospital cost of patients who developed delirium was 31% higher and the cost, specifically in ICU, was 39% higher than those without delirium.\(^{6}\)

CAM-ICU was also used to elucidate other disorders such as post-traumatic stress disorder, in case studies about delirium and in studies of translation and validation of this tool into another language.\(^{32-34}\)

**DISCUSSION**

In the past, changes in the neurological pattern of patients in the ICU were usually called an ICU syndrome or psychosis. Over time, studies were carried out to better understand the disorder and, it is now known that it is a neurological dysfunction named delirium.

To make identification of delirium easier in an objective way, some tools have been developed among them CAM-ICU. This tool is characterized by ease of usage, high sensitivity and specificity. It does not require complex training and only 2-3 minutes are needed for its application,\(^{1,13,35}\) making it quite attractive as a tool to be used in clinical practice. However, to reach a decision, the limitations of CAM-ICU must also be known.

In the validation studies of the tool, patients who presented dementia, psychosis or neurological disease that could be confused with delirium were excluded, which may have influenced results related to its high specificity. Another limitation was that for assessment with the tool the patient must be able to reply to the questions. However, if the patient presents an impaired level of awareness due to intermittent administration of sedatives, false diagnosis of the type of delirium may occur, as these agents promote its fluctuation, hindering continued assessment of the disorder.\(^{1,13,36}\)

Comparative analysis of six validation tools for detection of delirium in critically ill patients, including CAM-ICU, disclosed considerable differences in relation to time needed for assessment, sensitivity and specificity of each.\(^{36}\) Although CAM-ICU presented a high specificity, another tool may be better suited to identify the hypoactive type, because, in addition to assessing the level of perception, it includes the level of psychomotor lentification. With regard to the time needed for application, it was seen that CAM-ICU requires less time for assessment of delirium.\(^{36}\)

An often noted, a limiting factor in the method of the studies was that data collection was made in a single unit and results might not be applicable in other settings.\(^{19,21}\) However, regardless of limitations, the tool has been important for a better understanding of delirium, its organic consequence, costs related to treatment, as well as the causes and therapeutic measures.

Although CAM-ICU presents characteristics that favor easy use, application is not recommended for critically ill patients not under MV. For those, the CAM-ICU is recommended as it permits to detect subtle delirium cases as found in a study that compared performance of both tools for detection of delirium in elderly patients in the ICU.\(^{37}\)

Regarding drugs used for delirium control, some variables were not analyzed and could affect results, such as degree of renal and hepatic function, hypoxemia, sleep deprivation and administration of doses above plasma concentration. However, the importance of assessing delirium more frequently must be stressed, to better observe transition of the cognitive status due to drug administration.\(^{29}\)

For the adequate prevention, detection and treatment of delirium, physicians and nurses must take leadership of actions for continued education of the team professionals on the disorder, as well as for implementation of monitoring and treatment routines.\(^{24,31,38}\) Among these preventive and therapeutic measures for delirium in critically ill patients, it is necessary to highlight, periodic assessment of the mental condition by using a tool,\(^{18,20,28,31,39-40}\) identification of risk factors related to the patient’s personal data,
decrease of excessive noise and other factors that collaborate to increase anxiety and stress and could trigger development of delirium.\(^{[24,31]}\) Further measures are balanced administration of sedatives and analgesics to reduce unnecessary doses and careful use of physical restraint of the patients.\(^{[3]}\)

With CAM-ICU, it was perceived that delirium is a disorder frequently found in intensive care environments and its development may often be related to inadequately used therapeutic measures and the importance of these effects on the patient’s evolution. The importance of the multiprofessional team to carry out continued assessment of patients using tools and protocols and the adequate therapeutic measures as required, is again stressed. Also highlighted is the importance of constant updating of the professionals to enhance performance with a more efficient intervention that contributes for better prognosis of these intensive care patients.

**CONCLUSION**

The aspects about delirium studied with CAM-ICU were performance of the tool itself, identification, treatment, cost, morbidity and mortality resulting from delirium. Thus, it was noted that CAM-ICU is an important tool to detect delirium and, when used by the team brings about a more efficient control of critically ill patients who present the disorder, as well as those under risk of developing it.

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