Evaluating the Confusion Assessment Method for Intensive Care Unit (CAM-ICU) Tool: A Comprehensive Literature Review

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Abstract

Delirium can be defined as a disturbance of consciousness demonstrated by acute onset and fluctuating course of inattention accompanied by either an alteration in cognition or a perceptual disturbance. The purpose of this literature review is to evaluate the gaps that exist within the literature and the need for further research to be conducted pertaining to the usability and knowledge testing of the CAM-ICU.

Keywords: Delirium; Consciousness; Cognitive; Diagnosis

Introduction

Delirium can be defined as a disturbance of consciousness demonstrated by acute onset and fluctuating course of inattention accompanied by either an alteration in cognition or a perceptual disturbance triggering an individual's ability to receive, process, store, and recall information to be compromised [1-4]. In the intensive care unit (ICU) patients are at a higher risk for the development of delirium, as this altered state of consciousness occurs in up to 80% of the critically ill patients found in the ICU environment [5]. The early detection of delirium is essential to enable prompt treatment that may assist in reducing some of its life altering consequences. Nurses are often the first group of health care providers to identify delirium in ICU patients, as they are present at the patient's bedside 24 hours a day, with the opportunity to closely observe the patient's behaviour for extended periods of time. There are numerous tools available to assist nurses in the detection and diagnosis of delirium including the Confusion Assessment Method for Intensive Care Unit (CAM-ICU) [6].

The purpose of this literature review is to evaluate the gaps that exist within the literature and the need for further research to be conducted pertaining to the usability and knowledge testing of the CAM-ICU. This will be completed by reviewing the literature that places its primary focus on delirium, the diagnosis of delirium, as well as delirium screening tools, particularly CAM-ICU, and its ability to detect delirium within the ICU setting. Furthermore, it will assess existing barriers that inhibit healthcare professionals from employing delirium-screening tools, specifically the CAM-ICU.

Literature Review

A comprehensive literature search was conducted using Google scholar as well as two additional databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PubMed. The search was completed using a combination of the following keywords: 'delirium,' 'critical care,' and 'nursing.' The initial, broad search revealed that there is an abundance of nursing literature, yielding 139 references, focusing on exploring delirium within the critical care area. The search was then broken down into a more defined search using the keywords: 'delirium,' 'screening,' 'critical care,' and 'nursing.' This search yielded a total of 36 references, 33 of which were used for this review. Exclusion criteria is further explained below.

This search was limited to English-language articles with inclusion criteria being set to the following: (1) adult ICU patients over 18 years of age, (2) involvement of the screening tool, CAM-ICU in any aspect of detecting delirium, and (3) published from the year 1990 to 2016. Articles were excluded if they concentrated on the pediatric population, examined delirium screening with screening tools other than CAM-ICU, did not include nursing involvement, was set in other clinical areas besides the ICU, or was published before the year 1990. Limitations were placed on setting and date published given that the delirium screening tool, CAM-ICU, being reviewed in this paper is tailored specifically for the critical care area and was developed in the year 1990; therefore, research concerning delirium prior to this time period would not be applicable to this particular review. The purpose of this review was to evaluate the current evidence found on delirium and utilization of delirium screening tools in the ICU. The first section, delirium and diagnosis, will include: (a) presence of delirium in subtypes of ICU, (b) subtypes of delirium, (c) overview of risk factors and adverse outcomes of delirium, (d) overview of screening tools, (e) information pertaining to the CAM-ICU; and, (f) overview of barriers present that inhibit

utilization of the CAM-ICU. The second section, challenges and limitations, will include an overview of the existing challenges and limitations concerning the usability of the CAM-ICU. The articles found for the intentions of this study were evaluated based on the study's overall purpose, the sample population, methods, research design, key findings, and results.

Delirium and Diagnosis

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), the diagnostic criteria for delirium includes acute condition, disturbances of consciousness, and changes in cognition caused by the direct physiological consequences of a general medical condition [7]. The DSM-V is a standard classification of mental disorders utilized by health care providers specializing in mental health and considered the gold standard for delirium diagnosis. The prevalence of delirium in the general population is a mild 0.4% compared to the prevalence of delirium in general wards within the hospital, which ranges from 19% to 87%, and the prevalence of delirium within the intensive care unit (ICU), which ranges from 60% to 80% [3,4,8]. Delirium is seen in numerous sub-types of ICU patients including cardiac surgical patients [9], general surgical patients [10,11], burn patients [12], neurology patients [13], and post-stroke patients [14].

There are three subtypes of delirium that currently exist: hypoactive, hyperactive, and mixed delirium. Hypoactive delirium is observed when the patient is hypoactive or lethargic, while hyperactive delirium is recognized by fluctuating states of hyperactivity and agitation. Alternating or mixed delirium is recognized by fluctuating states of hyperactive and hypoactive delirium [1,15]. A study conducted by Van Den Boogaard et al. [13] has found that the incidence of mixed delirium was highest at 53%, while hypoactive delirium represented 36% of the population followed by hyperactive delirium at 11% of the population. A number of other studies, however, identified that hypoactive delirium had the highest incidence [9,16,17] with the frequency of hypoactive delirium being easily over 95% [17]. Evidently, hyperactive delirium is easily detected in patients. There is a lack of diagnosis with hypoactive delirium as practitioners find it to be much more difficult to detect hypoactive delirium in ICU patients, as one may overlook hypoactive delirium and believe it to be lethargy of the patient [10].

Several risk factors have been identified for the development of delirium in the ICU setting including: hypertension, stroke, dementia, medications, substance abuse, and high severity of acute illness. There is no one specific etiology of delirium, but potential physiological stress factors include sepsis, hypoxemia, structural brain injury, sleep deprivation, and medication effects [17]. Additionally, delirium in ICU settings is a predictor of several adverse outcomes including increased mortality, increased length of stay in the ICU, increased time kept on a ventilator, increased long-term cognitive impairment, and increased number of patients being discharged to long-term care facilities instead of home, which all lead to increased costs to the health care system [18]. Observational data reveals that the risk of persisting cognitive

disorders and mortality increased by roughly 10% with each day that the delirium persists [19]. The reality of this demonstrates the presence of pressing issues that require the utilization of screening tools, when attempting to detect and diagnose delirium to improve the quality of care and treatment of ICU patients.

Screening Tools

The vast majority of the literature reviewed focuses on the utilization of delirium screening tools. Approaches to decrease the reported high prevalence of delirium in ICU patients, such as treatments using various sedatives and/or multi-component intervention programs to treat once recognized, all depend on a correct diagnosis [20,21]. Although delirium is common in the ICU setting and has considerable effects on the patient, it often goes undiagnosed and unrecognized hindering the treatment of the patient [22]. Since the early nineties, there have been a growing number of bedside screening tools that have been constructed to allow for the early diagnosis of delirium by non-psychiatrist health care professionals [23]. Multiple studies regarding diagnosis of delirium suggest that delirium-screening tools are more precise than clinical assessment alone [24]. Without the use of a delirium-screening tool, approximately 65% of delirious patient-days in the ICU are overlooked [25].

Sensitivity and specificity of delirium screening tools

For the adult ICU, there are two delirium-screening tools that have been proven effective in practice: the CAM-ICU and the Intensive Care Delirium Screening Checklist (ICDSC) [26]. Notably, Gusmao-Flores, Salluh, Chalhub, and Quarantini in 2012 [27] conducted a study in which the CAM-ICU and ICDSC were evaluated for their accuracy in diagnosing delirium in critically ill patients. This study was conducted by measuring the sensitivity of each tool, which is considered the ability of each tool to correctly detect patients with delirium, and the specificity of each tool, which is considered the ability of each tool to correctly detect patients without delirium. The ability of the delirium-screening tool exhibited higher sensitivity at 80%, compared to the 74% exhibited by the ICDSC, and higher specificity at 95% versus 81.9% for the ICDSC. In a subsequent study, the CAM-ICU revealed lower sensitivity (75% compared to 80.1% for the ICDSC) and higher specificity (95.8% compared to 74.6% for the ICSCD) [28].

The diagnostic precision of the CAM-ICU compared to the DSM-V was examined in a systematic review with meta-analysis and was supported for delirium diagnosis with a combined sensitivity of 81% and specificity of 98% [29]. This means the CAM-ICU is an effective bedside assessment tool to replace the DSM-V in detecting patients with delirium and detecting patients without delirium.

Features of the CAM-ICU tool

The CAM-ICU screening tool is comprised of four features. Feature one of the CAM-ICU assesses whether or not there is an acute change or fluctuating course of mental status. This feature is present if the patient is different than his or her baseline mental status. Feature two of the CAM-ICU measures the inattention of the patient by spelling out a word to them and instructing them to squeeze the hand of an assessor every time they hear a specific letter such as "A." This feature is present if the patient fails to squeeze the hand of the assessor on the letter "A," or squeezes on any other letter than "A." Feature three of the CAM-ICU assesses altered level of consciousness. This feature is present if the patient is in any state of consciousness besides alert and calm.

Feature four measures the disorganized thinking of the patient. The patient is asked a series of questions, such as: "Does a rock float on water?" and "Are there fish in the sea?" This feature is present if the patient incorrectly answers one of the questions. A patient is deemed to have delirium and be CAM-ICU positive when feature one plus feature two, and either features three or four are present. The patient's level of consciousness must be moderately sedate (able to move or open eyes to voice) to alert in order to assess for delirium using the CAM-ICU screening tool [1].

Barriers to the Utilization of the CAM-ICU

Despite the documented validity of delirium screening tools, such as the CAM-ICU, there exist several barriers identified in the literature that can prevent health professionals, especially nurses, from utilizing it. The issue of delirium within the ICU setting is a substantial one; where regular, official delirium screening is suggested for all ICU patients. Research recommends that nurses, as primary care providers, should be assessing each ICU patient for delirium at least once per shift or every 8-12 hours [19]. However, in an exploratory study of staff nurses' knowledge of delirium in the medical ICU, Christensen in 2013 identified that majority of nurses viewed the delirium screening tool [30], CAM-ICU, as a task to be completed rather than a tool that is of great benefit to the patient. Additionally, nurses involved in this particular study viewed the delirium screening tool as being both complicated and problematic to utilize as a result of time constraints related to an increased workload. Nelson in 2009 describes the dominant challenge associated with teaching delirium assessment to nurses is "to assist them to embrace the tool as part of their routine assessment [31], rather than as something to be added on to existing procedures". Furthermore, Pun et al. in 2005 conducted a large-scale study involving delirium screening in two medical centers [32]. It was found that nurses' perspectives on the perceived barriers associated with the poor implementation of delirium screening included time, physicians' value of data, and confidence level. Throughout this study, physician buy-in was consistently seen as a problem that needed to be addressed and dealt with. As well, more than half of the nurses

participating in this particular study could not give a definition of delirium due to the low confidence levels exhibited by nurses concerning the understanding of delirium and how to utilize the screening tool was also reported as being a barrier by Balas et al. in 2013 [33], while the physicians' value of data being presented by nurses was also highlighted as a major barrier in a study conducted by Scott, McIlveney, and Mallice in 2013 [34].

Not all studies presented in the literature search reported barriers associated with delirium screening tools. In a survey conducted of nurses three months post implementation of a delirium screening tool, the majority of nurses (85.1%) seen the CAM-ICU as easy to use, they had confidence utilizing the tool (74.4%), and they believed that the CAM-ICU allowed them to perform a more thorough assessment [34]. However, results of this study may be affected by the presence of self-selection sampling bias.

Challenges and Limitations

After a comprehensive review of the literature, it is evident that a number of challenges and limitations exist regarding the usability of the CAM-ICU in the ICU setting. There are four key limitations: the existence of a medical-nursing communication gap, lack of specialized education amid nurses concerning diagnosis of delirium and utilization of the screening tool, as well as a lack of generalizability of findings to other ICU settings.

Medical-nursing communication gap

Research indicates that communication between nurses and physicians is essential in order to successfully address delirium by Eastwood et al. in 2012. Notably, a number of studies highlighted that one of the major barriers to nurses using the CAM-ICU delirium screening tool was the lack of value that the physicians placed on the screening findings [6,32]. The discontinuity between nurses' assessment findings and physicians' response to these findings is a major issue that needs to be further studied and analyzed. Further studies should assess the potential need for a mental health liaison nurse in closing the communication gap between physicians and bedside ICU nurses. A mental health liaison nurse could also help to emphasize the importance of mental health needs within the ICU setting and provide the bedside nurses with more education regarding delirium and the appropriate use of delirium screening tools.

Lack of specialized education and training

Although this review discloses that nurses are efficient in detecting delirium and its fluctuating symptoms [35], it also reveals that more specialized education and training is needed among nurses in the ICU [36]. Nurses practicing within the ICU setting complete a generalized critical care course, which places little focus on delirium and using the CAM-ICU screening tool. Additionally, nurses working within the ICU setting do not receive specialized training within the psychiatric or neurological care areas. Devlin, Fong, Fraser, and

Riker in 2008 [36] reported that nurses received little or no education on assessing delirium in the ICU and the little education they did receive was, for the most part, in a university lecture rather than at the bedside. Naturally, bedside education was found to be the most effective way to link theory and practical interventions. There exists a need for further research to be conducted on the effectiveness of extensive training of nurses in the area of delirium and the screening of delirium. This could potentially be addressed by conducting weekly discussions concerning real-life scenarios on how to best handle and provide effective caregiving strategies to patients with delirium.

Time management

Multiple studies [6,30,32] have identified a lack of time as a barrier to nurses using the delirium-screening tool in practice. A number of studies have found that nurses view the tool as simply another task to be completed, not as important or as valuable as other tasks that ICU nurses are responsible for. More research needs to be conducted to fully understand the current attitudes of nursing regarding delirium, in an effort to help identify and recognize signs and symptoms of delirium, as relevant to patient care and treatment.

Lack of generalizability

The majority of studies included in this literature review were international studies conducted in countries outside of Canada, with the majority of studies having taken place in one specific hospital within that country. This limits the generalizability of results to all areas; thus, it is important to evaluate the usability and knowledge testing of the CAM-ICU in specific ICU settings. At the same time, it could be determined that the state of delirium and the diagnosis of delirium is universal. However, in saying this, there is still a difference in the way of health care delivery in the clinical environment is delivered; for example, the role of the nurse in clinical decision-making may differ from culture to culture. Greater value may be placed on a nurse's assessment findings in one culture as compared to the next, therefore, it is imperative to know what is being studied and practiced in specific cultures in order to effectively assess and manage delirium in a cultural context [30].

Conclusion

In this area of practice, research indicates that the prevalence of delirium is a major concern for nurses caring for patients in the ICU. For the prevalence of delirium negatively affects not only the patient, but also the healthcare system as a whole. As a result of this, it is imperative that healthcare professionals, especially nurses, promptly detect and diagnose delirium. Delirium screening tools, more specifically the CAM-ICU, has been researched and highlighted as an effective tool for the early detection of delirium in patients in the ICU environment. Although delirium risk factors are well known and the condition may be preventable in many ICU patients

this has not, for the most part, been translated into specific action at the unit level.

Barriers to the utilization of the CAM-ICU still exist despite being proven effective in the literature and practice. There are copious amounts of literature available concerning delirium and the use of delirium screening tools such as the CAM-ICU. However, there is a continued need to address the literature gaps that exist concerning the medical-nursing communication gap, the lack of specialized education and training, time management, and lack of generalizability among available research, in order for nurses in the ICU setting to appropriately initiate this assessment to provide early diagnosis and treatment of delirium in ICU patients.

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