

**EVALUATING THE USABILITY AND KNOWLEDGE TESTING OF THE
DELIRIUM ASSESSMENT TOOL, CONFUSION ASSESSMENT METHOD FOR
INTENSIVE CARE UNIT, FOR NURSES IN MEDICAL SURGICAL INTENSIVE
CARE UNIT**

by

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Abstract

Background: Delirium is an acute change in cognition, complemented by inattention, affecting up to 80% of critically ill patients. The Medical Surgical Intensive Care Unit (MSICU) within the Health Science Centre hospital utilizes the Confusion Assessment Method for Intensive Care Unit (CAM-ICU) as a screening tool in the assessment of delirium. There has been no prior evaluation conducted on the CAM-ICU at this centre.

Methods: 1) A comprehensive literature review was conducted to identify gaps that exist within the literature that warrant further research to be conducted pertaining to the usability and knowledge testing of the CAM-ICU; 2) information was obtained from key invested knowledge experts regarding the current employment of the CAM-ICU within the MSICU; 3) Staff nurses were consulted to obtain feedback as to how to address current existing barriers regarding the utilization of the CAM-ICU, and how to further evaluate the usability and knowledge testing of the CAM-ICU; and 4) an evaluation report was developed to provide recommendations to key stakeholders on how to continue and further evaluate the CAM-ICU within the MSICU of the Health Science Centre in St. John's, Newfoundland and Labrador.

Results: The findings from the literature review and consultations directed the development of the evaluation report, which involved the distribution of questionnaires to staff nurses of the MSICU, and provided recommendations on how to further evaluate the usability and knowledge testing of the CAM-ICU.

Conclusion: The proposed recommendations are ready for implementation at the end of Summer 2016. If successful, it would help to improve the quality of care that patients with delirium receive providing early diagnosis and treatment to patients with delirium.

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Background

Delirium is a disturbance of consciousness illustrated by acute onset and fluctuating course of inattention complemented by either an alteration in cognition, or a perceptual disturbance, causing an individual's ability to receive, process, store, and recall information to be compromised (ICU Delirium and Cognitive Impairment Group of Vanderbilt University Medical Center (VUMC), 2002; Inouye, 2006; Raju & Coombe-Jones, 2015; Young & Inouye, 2007). Delirium progresses over a short period of time, generally from hours to days. It is commonly reversible and can be a direct result of a medical condition, substance intoxication or withdrawal, use of a medication, toxin exposure, or a combination of these factors (ICU Delirium and Cognitive Impairment Group of VUMC, 2002). Delirium is present within the general population, as well as in hospital environments, and is most prevalent in individuals with pre-existing cognitive impairments and the elderly (Raju & Coombe-Jones, 2015). The prevalence of delirium in the general population is 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% (Raju & Coombe-Jones, 2015; Sharma, Malhotra, Grover, & Jindal, 2012; Young & Inouye, 2007). Delirium in ICU settings is a predictor of several adverse outcomes, including reported increases in: mortality, length of stay in the ICU, time kept on a ventilator, long-term cognitive impairment, and, number of discharges to long-term care facilities instead of home; resulting in predicted increased costs to the health care system (Limpawattana et al., 2016). Furthermore, it was found that with each day that delirium persists, the risk of persisting cognitive disorders and mortality increases by 10% (Ely et. al., 2001). The

reality of this demonstrates the presence of pressing issues that require the utilization of screening tools when attempting to detect and diagnose delirium.

There have been numerous tools developed to assist with the diagnosis of delirium within hospital settings. Specifically, the MSICU within the Health Science Centre hospital in St. John's, Newfoundland and Labrador utilizes the CAM-ICU. The Confusion Assessment Method (CAM) was developed in 1990 by Dr. Sharon Inouye from Vanderbilt University, in Nashville, Tennessee and was planned to be a bedside assessment tool operational by non-psychiatrists to assess delirium. The CAM-ICU is a revision of this tool for use in ICU patients both on and off a ventilator. Using this tool, delirium is described in terms of four indicative features and is considered positive when feature one plus feature two, and either features three or four are present (ICU Delirium and Cognitive Impairment Group of VUMC, 2002).

Upon consultation with the clinical educator of the MSICU, it was revealed that the nurses often feel “intimidated” when using the CAM-ICU to assess delirium because they do not completely understand all aspects of the assessment tool. It was identified that nurses were declaring that a patient was CAM-ICU negative (absence of delirium) when they were actually CAM-ICU positive (presence of delirium). This is why it is essential to evaluate the usability and knowledge testing of the CAM-ICU tool for nurses in MSICU, and ascertain areas where nurses need more education on how to appropriately and accurately initiate this assessment to provide early diagnosis and proper treatment of delirium.

The following report will include an overview of the practicum objectives, as well as the methods used to achieve these objectives. Summaries will also be included of the

completed literature review, consultations with key invested knowledge experts and staff nurses, evaluation report detailing recommendations on how to continue and further evaluate the CAM-ICU, constructed from findings obtained from consultations with the staff nurses of the MSICU. A discussion of the various competencies of Advanced Nursing Practice (Canadian Nurses Association [CNA], 2008) that were demonstrated throughout the practicum project will subsequently follow these sections. Finally, it will end with a discussion of the future plans of the practicum project.

Objectives

There were four objectives of this practicum project and they included:

- 1) To consult with invested key stakeholders within the MSICU;
- 2) To conduct an evaluation report based upon evidence based research and feedback from invested key stakeholders;
- 3) To communicate this report to School of Nursing faculty and key stakeholders through presentations in various forums; and,
- 4) To deliver recommendations, if necessary, for the clarification and adjustment of the CAM-ICU delirium assessment tool, in efforts to help increase the nurses' knowledge and ability to effectively assess for and treat delirium.

These objectives were developed in the early stages of the practicum project and following an informal assessment of the needs identified within the MSICU of the Health Science Centre. In addition to the consultation with key stakeholders within the MSICU, staff nurses were also consulted to gather data that was used to develop recommendations found within the Evaluation Report. Recommendations were not made for the

adjustment of the CAM-ICU tool itself, but were constructed on how to continue and further evaluate the usability and knowledge testing of the delirium assessment tool, as well as the promotion of ongoing education regarding delirium and the importance of the delirium screening tool and the importance of collaborating to develop standards of care and policies concerning delirium.

Methods

A comprehensive literature review was completed and a copy can be found in **Appendix A**. Consultations were undertaken with key invested knowledge experts from the MSICU within the Health Science Centre hospital. A copy of the consultation report can be found in **Appendix B**. The Health Research Ethics Authority (HREA) screening tool was completed and is included as a part of the Consultation Report. The interpretation of this tool indicated that review by an ethics board was unnecessary prior to completion of the consultations. The consultations were not completed for purposes of research; rather for the purpose of quality and evaluation plus the gathering of information specific to a particular program and a local population. A second round of consultations were undertaken with four staff nurses of the MSICU. Findings from these consultations were used in the development of an Evaluation Report (see **Appendix C**), which is comprised of recommendations on how to evaluate the CAM-ICU to improve the diagnosis and treatment of patients with delirium. Summaries of these reports are provided in the sections that follow.

Summary of 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, yielding 139 citations, revealed that there is an abundance of nursing literature that focuses 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.

The 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 paediatric population, examined delirium screening with screening tools other than CAM-ICU, did not include nursing involvement, was set in clinical areas other than 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.

Concerns with the Presence of Delirium

A number of researchers identified several risk factors 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 can include sepsis, hypoxemia, structural brain injury, sleep deprivation, and medication effects (Patel et al., 2014). 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 (Limpawattana et al., 2016).

Effectiveness of Screening Tools

The vast majority of the literature reviewed focuses on the utilization of delirium screening tools (Campbell et al., 2011; Pandharipande et al., 2007). 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) (Brummel et al., 2013). Notably, Gusmao- Flores, Salluh, Chalhoub, and Quarantini (2012) 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) (Neto et al., 2012).

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% (Shi, Warren, Saposnik & MacDermid, 2013). This means that the CAM-ICU can be an effective bedside assessment tool instead of the DSM-V in detecting patients with delirium and detecting patients without delirium.

Barriers to the Utilization of the CAM-ICU

Despite the known risk factors associated with delirium and the proven effectiveness of the delirium screening tool, several researchers have identified multiple barriers to the utilization of the CAM-ICU including: time, physicians' value of data, and lack of confidence among nurses using the tool. Two separate studies found that time was a barrier to the utilization of the CAM-ICU, concluding that the majority of the nurses in the studies viewed the tool as a task to be completed, rather than a tool that is of benefit to the patient (Christensen, 2013; Nelson, 2009). Several studies identified physicians' value of data and lack of confidence among nurses as barriers that keep nurses from utilizing the tool (Eastwood et al., 2012; Pun et al., 2005; Balas et al., 2005). The findings suggest that the discontinuity between nurses' assessment findings and physicians' response was a major issue, (Pun et al., 2005) while it was also found that more than half of the nurses participating in a large scale study could not give a definition of delirium as well as the presence of low confidence levels exhibited by nurses concerning the understanding of delirium and how to appropriately utilize the screening tool was seen as a barrier in a study conducted by Balas et al. (2005).

Limitations and Potential Solutions

After a comprehensive review of the literature, it is evident that a number of key challenges and limitations exist including: existence of a medical-nursing communication gap, lack of specialized education amid nurses concerning delirium and utilization of the screening tool, time management, and lack of generalizability of results. Eastwood et al. (2012) emphasized the importance of communication between nurses and physicians in successfully addressing delirium. However, studies (Eastwood et al., 2012; Pun et al., 2005) have highlighted lack of value that physicians place on nurses' assessment findings as being a barrier to utilization of the tool by nurses. Perhaps, further studies should assess the need for a healthcare professional such as, a mental health liaison nurse, an educator, or a social worker to assist in closing the communication gap between MSICU nurses and physicians. A mental health liaison nurse could also assist in providing MSICU staff nurses with more education on delirium and the importance of utilizing delirium screening tools.

Devlin et al. (2008) revealed that more specialized education and training is needed among nurses in the MSICU reporting that nurses receive little or no education on assessing delirium within the ICU and the little education they did receive was, for the most part, in a university lecture and not at the bedside. Nurses practicing within the MSICU in the Health Science Centre receive a generalized critical care course with no specific focus on neurology or psychiatry. There exists a need for further research to be completed to distinguish if extensive training of nursing in the area of delirium and delirium screening is effective.

Multiple authors (Christensen, 2013; Eastwood et al., 2012; Pun et al., 2005)

found time as a barrier to the utilization of the CAM-ICU. There is a need for more research to be conducted to fully understand current attitudes and beliefs of nurses concerning delirium in an effort to help identify delirium promptly.

The final limitation identified was the lack of generalizability of results as the majority of research conducted was outside Canada. It could be determined that diagnosis of delirium is universal in how delivery of health care may differ from culture to culture. Greater value may be placed on nurses' assessment findings in one culture compared to the next, therefore it is essential to know what is being studied and practiced in specific cultures in order to effectively assess and manage delirium within a cultural context.

Summary of Consultations with Key Invested Knowledge Experts

Consultation with five invested key knowledge experts was conducted to enhance the knowledge base constructed by the literature review. Data collection consisted of individual, semi-structured interviews consisting of ten questions. A cover letter detailing the practicum project, as well as the interview questions were distributed via email to five invested key knowledge experts within the MSICU: the manager, the clinical educator, the intensivist, a senior ICU nurse, and a junior ICU nurse. Completion of the questionnaire was considered agreement to consultation. All participants of this consultation process had experience with delirium and the utilization of the CAM-ICU in the clinical area.

Findings

Several common themes were identified through analysis of interview data. Invested key knowledge experts generally deemed the CAM-ICU as an effective screening tool. However, despite the agreed upon effectiveness of the CAM-ICU, the

invested key knowledge experts identified a number of key barriers to the utilization of the CAM-ICU, as well as significant improvements needed concerning the utilization and effectiveness of CAM-ICU, which they thought needed to be addressed. Discussed barriers included: nurses' attitudes and beliefs, sedation level, physicians' value of nurses' assessment findings, and lack of a coordinated structured approach to the management of patients with delirium. All experts in consultations agreed that 'nurse champions' and the clinical educator were the major facilitators for the utilization of the CAM-ICU in MSICU.

All experts agreed that the CAM-ICU, if used consistently, is effective in detecting and diagnosing delirium. It was also found that it enhanced patient outcomes, which in turn decreased the incidence of unplanned extubation and decreased number of nurse injuries. There was also a consensus among all experts that the tool improved communication interdisciplinary, notably between nurses and physicians.

Findings concerning the discussed improvements of the utilization and effectiveness of CAM-ICU has many implications for the practicum project, including better discussion in rounds between physicians and nurses regarding the neurological status of a patient. This could be done with the use of a checklist, as discussed by the invested key experts, to ensure that all aspects of the neurological assessment are discussed. A second improvement, reviewed by the experts, which could be an implication for the practicum project is the idea of strengthening educational strategies to 'frontline' staff regarding the importance of the CAM-ICU as a delirium assessment tool, and how to properly apply it to nursing practice. A final improvement examined by the experts as an implication for the practicum project, is linking nursing practice

to patient outcomes by performing quality care audits and measuring nurse attitudes to understand why nurses do not utilize the CAM-ICU in assessing delirium in MSICU patients; thus possibly eliminating the nurses' attitudes as one of the major barriers to the utilization of the CAM-ICU.

Summary of Evaluation Report

An Evaluation Report was developed using the evaluation strategy of consulting with staff nurses using self-reporting questionnaires. Self-reporting questionnaires were distributed to ten staff nurses of the MSICU with four of the ten completing the questionnaire securing a 40% response rate. Four open-ended questions were developed using components from the Knowledge to Action (KTA) Framework (Graham et al., 2006). Components included: barriers to knowledge use, evaluating outcomes, and sustaining knowledge use. Recommendations were delivered based on the findings from the self-reporting questionnaires completed by the staff nurses of the MSICU.

Findings

Findings from the collaboration with four staff nurses are presented using the focus of each question posed in the questionnaire. Questions focused on addressing barriers to the utilization of the CAM-ICU, assessing the effectiveness of quality care audit and measurement of nursing attitudes in improving the utilization of the CAM-ICU and lastly, how to ensure the use and continued use of the CAM-ICU when assessing delirium in clinical practice. Three thematic issues emerged from the discussion on how to address barriers to the utilization of the CAM-ICU. They were: performing assessment at the beginning of the shift, performing assessment during sedation vacation, and most significantly, the development of a standard of care concerning the treatment of a patient

with delirium to ensure that every patient with delirium is provided the same appropriate treatment based on evidence-based practice.

All participants offered that quality care audits and measurement of nursing attitudes would be effective in improving the utilization of the CAM-ICU, however, it was emphasized that results needed to be disseminated to the staff of the MSICU.

A second theme that emerged encompassed the implementation of case studies during down time in the unit to become familiar with how delirium presents in patients and how to manage this delirium effectively. The third theme that surfaced was the importance of senior staff in reinforcing and supporting the utilization of the CAM-ICU, especially with junior staff.

Reinforcement and communication were identified as possible solutions in sustaining the knowledge use and ensuring the use and continued use of the CAM-ICU in delirium screening. Communicating the results, especially long-term results, would be beneficial to the staff of MSICU as they are not involved in patient care once the patient is discharged from the MSICU. Participants also stressed the significance of education in sustaining knowledge use and how all staff, including nurses and physicians, should be aware of current evidence based practice on the diagnosis and treatment of patients with delirium.

Recommendations

Based on the results of the consultations with staff nurses, a table detailing a step-by-step outline was provided in the evaluation report as recommendations for the unit as a working template. If incorporated, managers and other key invested knowledge

informants of the unit can implement this working template. These steps were outlined as listed below.

Step one consisted of data collection including: post evaluation questionnaire results; the implementation of quality care audits concerning the use of the CAM-ICU delirium assessment tool in diagnosing delirium; and the conduction of a larger scale study to measure of nurses' attitudes concerning the CAM-ICU. Data collection should be continuous throughout the evaluation process. Step two consisted of data synthesis and interpretation including: the decision on how results of quality care audits and measurement of nursing attitudes will be disseminated to the staff of the MSICU; the conduction of team meetings including individuals from all disciplines; and the collaboration with the delirium working team. This step will take approximately six months to complete. Step three consisted of taking the results obtained from the audits and measurement of nursing attitudes can be applied to provide: additional clarification and education relating to delirium and treatment of delirium as well as a direction for the development of standards of care for patients experiencing delirium. The timeline for the initiation of these recommendations is six months to one year.

Advanced Nursing Competencies

Advanced Nursing Practice (ANP) is defined by the Canadian Nurses Association (CNA) (2008) as "...an advanced level of clinical nursing practice that maximizes the use of graduate educational preparation, in-depth nursing knowledge and expertise in meeting the health needs of individuals, families, groups, communities and populations" (p. 10). Advanced nursing competencies are "the specific knowledge, skills,

judgment and personal attributes required for a registered nurse to practice safely and ethically in a designated role and setting” (CNA, 2008, p. 21). The competencies are divided into four categories: clinical, research, leadership, and consultation and collaboration.

Nurses working within ANP produce and integrate new knowledge to create new standards of care, policies, and programs (CNA, 2008). Knowledge produced from consultations with key invested knowledge experts and staff nurses highlighted the need for the creation of standards of care and policies when caring for patients with delirium. Recommendations provided in the evaluation report underlined the importance of regular interdisciplinary meetings, such as the delirium-working group, to collectively develop policies and standards of care based on evidence based practice to ensure timely detection and diagnosis of delirium thus improving quality of care.

The ANP values evidence-based practice and promotes the construction and utilization of comprehensive nursing literature to direct numerous aspects of nursing practice (CNA, 2008). Although this project was not a research project, research methodologies were employed during the course of this practicum project. The comprehensive literature review and the consultation process with key invested knowledge experts provided data on current knowledge regarding delirium and the utilization of the CAM-ICU within the MSICU clinical area. Data obtained from the literature review and consultation process, in association with the KTA Framework, guided the development of the questionnaire presented to the staff nurses of the MSICU. Data from the consultation with staff nurses of the MSICU guided the

development of the evaluation report detailing an evaluation plan, including recommendations on how to continue evaluation of the usability and knowledge testing of the CAM-ICU. Understanding of research methodologies assisted in the development of two data collection tools, the consultation process as well as the collection, management, and analysis of data collected.

Nurses in advanced nursing practice roles must ensure leadership within their workplace by working as advocates and performing as instruments for change (CNA, 2008). Recommendations provided to the key stakeholders within the Evaluation Report focused on creating change by recommending the conduction of a larger scale study to measure nurses attitudes concerning the usability and knowledge testing of the CAM-ICU within the MSICU. The plan to continue evaluation of the usability and knowledge testing of the delirium assessment tool is to help ensure prompt detection and diagnosis of delirium thus, improving quality of care for patients with delirium.

The competency of consultation and collaboration entails a nurse's ability to communicate and collaborate efficiently on an interdisciplinary level across structural and geographical boundaries (CNA, 2008). To meet this competency, consultations were conducted with multiple health care professionals including: the nursing staff of MSICU, the medical team, management, as well as the clinical educator of the critical care area. This competency can be further elaborated on by the MSICU in the future through the collaboration with agencies such as the Canadian Patient Safety Institute. Such a collaboration, could provide the MSICU with tools and resources to aide in the development and implementation of a standard of care relating to the

appropriate detection and treatment of patients with delirium.

Future Plans

Presentation of the findings from the Evaluation Report is planned to occur after the completion of this practicum project. Ongoing evaluation of the CAM-ICU will commence at the end of Summer 2016. Evaluation will consist of quality care audits, including chart audits concerning the utilization of the CAM-ICU in detecting delirium within the MSICU, as well as the conduction of a larger scare study measuring nurses' attitudes regarding the use of the CAM-ICU in the clinical area. Based on the findings from this evaluation, it will be decided if further education on delirium and delirium screening tools is needed for nurses within the MSICU. Finally, collaboration with the nursing staff, medical team, management, the delirium working group, and agencies such as the Canadian Patient Safety Institute will be ongoing to develop delirium education protocols as well as delirium standards of care and protocols to follow with caring for patients with delirium. Collectively, the nursing staff, medical team, management, and the author are committed to the follow-up and implementation of evidence-based practice to ensure timely diagnosis and treatment of patients with delirium in the MSICU.

Conclusion

Multiple studies regarding diagnosis of delirium suggested that delirium-screening tools are more precise than clinical assessment alone (Mistarz, Elliott, Whitfield, & Ernest, 2011). Without the use of a delirium-screening tool, approximately 65% of delirious patient-days in the ICU are overlooked (Adamis et al., 2012). The correct and timely utilization of the CAM-ICU is essential in helping to ensure the prompt diagnosis and

management of delirium in MSICU patients. The comprehensive literature review that was conducted for this practicum project has highlighted that delirium is a major concern for patients within the MSICU, and the need for an effective delirium screening tool in correctly detecting patients with and without delirium. This literature review, despite documented validity of the CAM-ICU, highlighted several barriers that exist concerning the utilization of the CAM-ICU within the clinical area. Additionally, the literature review recognized the 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. Key invested knowledge experts of the MSICU deemed the CAM-ICU as an effective delirium assessment tool.

However, despite agreed upon effectiveness of the CAM-ICU, the invested key experts identified a number of key barriers to the utilization of the CAM-ICU, as well as significant improvements needed concerning utilization and effectiveness of CAM-ICU. Improvements in the utilization and effectiveness of the CAM-ICU were also discussed. Consultations with staff nurses of the MSICU examined possible solutions to address barriers that exist regarding the utilization of the CAM-ICU; how to evaluate outcomes; and how to sustain knowledge by ensuring the use and continued use of the CAM-ICU. Through the utilization of the data available in the literature, and consultations with several key knowledge experts, an Evaluation Report was developed to provide recommendations and aid in a more comprehensive evaluation of the usability and

knowledge testing of the CAM-ICU for nurses in MSICU. If proposed recommendations are followed, the continued evaluation of the utilization of the CAM-ICU has the potential to lead to increased education for the staff of the MSICU concerning delirium and delirium management, as well as the development of a standard of care when caring for patients with delirium, ultimately leading to improvement of the quality of care that patients with delirium receive; and, in turn helping to provide early diagnosis and treatment to patients with delirium.

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Appendix A- Literature Review and Literature Summary Tables

A Comprehensive Literature Review: Evaluating the Confusion Assessment Method for

Intensive Care Unit (CAM-ICU) Tool

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Appendix

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

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 (ICU Delirium and Cognitive Impairment Group of Vanderbilt University Medical Center (VUMC), 2002; Inouye, 2006; Jackson & Khan, 2015; Raju & Coombe-Jones, 2015; Young & Inouye, 2007). 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 (Palmieri, 2003). 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) (Eastwood, Peck, Bellomo, Baldwin, & Reade, 2012).

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 paediatric 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. See Appendices for literature summary tables.

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 (American Psychiatric Association, 2013). 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 19-87%, and the prevalence of delirium within the intensive care unit (ICU), which ranges from 60-80% (Raju & Coombe-Jones, 2015; Sharma, Malhotra, Grover, & Jindal, 2012; Young & Inouye, 2007). Delirium is seen in numerous sub-types of ICU patients including cardiac surgical patients (Smulter, Lingehall, Gustafson, Olofsson, & Engstrom, 2013), general

surgical patients (Pandharipande et al., 2013; Zhang, Pan, & Ni, 2013), burn patients (Agarwal et al., 2010), neurology patients (**van den Boogaard** et al., 2012), and post-stroke patients (Mitasova et al., 2012).

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 (ICU Delirium and Cognitive Impairment Group of VUMC, 2002; Peterson et al., 2010). A study conducted by **van den Boogaard** et al. (2012) 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 (McPherson et al., 2013; **Patel**, Poston, Pohlman, Hall, & Kress, 2014; Smulter, Lingehall, Gustafson, Olofsson, & Engstrom, 2013) with the frequency of hypoactive delirium being easily over 95% (**Patel** et al., 2014). 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. (Barr & Pandharipande, 2013).

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 includes sepsis, hypoxemia, structural brain injury, sleep

deprivation, and medication effects (**Patel** et al., 2014). 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 (Limpawattana et al., 2016). Observational data reveals that the risk of persisting cognitive disorders and mortality increased by roughly 10% with each day that the delirium persists (Ely et al., 2001). 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 (Campbell et al., 2011; Pandharipande et al., 2007). 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 (van Eijik et al., 2011). 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 (Schuumanns et al., 2003). Multiple studies regarding diagnosis of delirium suggest that delirium-screening tools are more precise than clinical assessment alone (**Mistarz** et al., 2011). Without the use of a delirium-screening tool, approximately 65% of delirious

patient-days in the ICU are overlooked (Adamis et al., 2012).

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) (Brummel et al., 2013).

Notably, **Gusmao- Flores**, Salluh, Chalhub, and Quarantini (2012) 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) (Neto et al., 2012).

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% (**Shi, Warren, Saposnik & MacDermid**, 2013). 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 (ICU Delirium and Cognitive Impairment Group of VUMC, 2002).

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 (Ely, 2001). However, in an exploratory study of staff nurses’ knowledge of delirium in the

medical ICU, **Christensen** (2013) identified that majority of nurses viewed the delirium screening tool, 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 (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, rather than as something to be added on to existing procedures” (p. 142). Furthermore, **Pun et al.** (2005) conducted a large-scale study involving delirium screening in two medical centers. 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.** (2013), while the physicians’ value of data being presented by nurses was also highlighted as a major barrier in a study conducted by **Scott, McIveney, and Mallice** (2013).

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 (**Scott**

et al., 2013). 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 (**Eastwood** et al., 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 (**Eastwood** et al., 2012; **Pun** et al., 2005). 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 (Elliott, 2014), it also reveals that more specialized education and training is needed among nurses in the ICU (Devlin et al., 2008). 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 (2008) 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 (**Christensen**, 2013; **Eastwood** et al., 2012; **Pun** et al., 2005) 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 (**Christensen, 2013**).

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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Incidence and short-term consequences of delirium in critically ill patients

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/ Rating
<p><u>Author</u></p> <p>van den Boogaard, M., Schoonhoven, L., van der Hoeven, J. G., van Achterberg, T., & Pickkers, P. (2012).</p> <p><u>Name</u></p> <p>Incidence and short-term consequences of delirium in critically ill patients</p> <p><u>Objective</u></p> <p>To reveal the total incidence and duration of delirium, per delirium subtype and per ICU admission</p>	<p><u>Sample</u></p> <p>All adult consecutive patients admitted in one year to the ICU university medical center. (2000-2500 surgical, cardiac surgery, neurosurgical, medical, and trauma ICU patients).</p> <p><u>Setting</u></p> <p>960-bed university hospital in The Netherlands that includes a level 3 ICU (highest level) with 33 ICU beds for adults.</p>	<p><u>Design</u></p> <p>Prospective observational study</p> <p><u>Methodology</u></p> <p>Delirium was assessed using the CAM-ICU three times a day. Delirium was divided into three subtypes: hyperactive, hypoactive, and mixed delirium. To measure short term consequence of delirium the authors registered duration of mechanical ventilation, re-intubations, incidence of unplanned removal of tubes, length of ICU stay and in-hospital</p>	<p><u>Key Findings</u></p> <p>1613 patients were included of which 411 (26%) developed delirium.</p> <p>Incidence rate in the neurosurgical (10%) and cardiac surgery group (12%) was the lowest; incidence was intermediate in medical patients (40%), while patients with a neurological diagnosis had the highest incidence (64%).</p> <p>Mixed subtype occurred the most (53%), while the hyperactive subtype the least (10%). The median delirium duration was two days [IQR 1–7], but significantly longer ($P < 0.0001$) for the</p>	<p><u>Strengths</u></p> <p>The performance of CAM-ICU screenings by the nurses was monitored to ensure the quality of data collection.</p> <p>The CAM-ICU score assessed by the attending intensive care nurse was compared with the CAM-ICU score assessed by an expert psychiatry nurse within a time-window of 1 h. One hundred-and-twenty interrater reliability measurements were performed at random resulting in a Cohen's kappa of 0.90 (95%CI 0.82–0.98).</p> <p>All data was analyzed using SPSS version 16.01.</p> <p><u>Limitations</u></p> <p>The CAM-ICU was used to diagnose instead of the ‘gold standard’ Study design too limited to draw strong conclusion</p>	<p><u>Conclusion</u></p> <p>“The delirium incidence in a mixed ICU population is high and differs importantly between ICU admission diagnoses and the subtypes of delirium. Patients with delirium had a significantly higher incidence of short-term health problems, independent from their severity of illness and this was most pronounced in the mixed subtype of delirium. Delirium is significantly associated with worse short-term outcome” (p. 775).</p> <p><u>Rating</u></p> <p><u>I would rate this study as moderate.</u></p> <p>Results were statistically significant, however results may not be generalizable to other populations.</p>

<p>diagnosis.</p> <p>To identify short-term consequences of delirium.</p>		<p>mortality.</p>	<p>mixed subtype.</p> <p><u>Other Findings</u></p> <p>More delirious patients were mechanically ventilated and for a longer period of time, were more likely to remove their tube and catheters, stayed in the ICU and hospital for a longer time, and had a six times higher chance of dying compared to non-delirium ICU patients, even after adjusting for their severity of illness score.</p> <p>Delirium was associated with an extended duration of mechanical ventilation, length of stay in the ICU and in-hospital, as well as with in-hospital mortality.</p>	<p>A number of participants died or were discharged home before the end of the study affecting the results of the study.</p>	
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Rapidly reversible, sedation-related delirium versus persistent delirium in the intensive care unit

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/ Rating
<p><u>Author/Date</u></p> <p>Patel, S. B., Poston, J. T., Pohlman, A., Hall, J. B., Kress, J. P. (2014).</p> <p><u>Name</u></p> <p>Rapidly reversible, sedation-related delirium versus persistent delirium in the intensive care unit.</p> <p><u>Objective</u></p> <p>To compare rapidly reversible, sedation-related delirium and persistent delirium.</p>	<p><u>Sample</u></p> <p>102 adult, intubated medical ICU subjects</p> <p><u>Setting</u></p> <p>Medical Intensive Care Unit in a tertiary care teaching hospital</p>	<p><u>Design</u></p> <p>Prospective, observational blinded study</p> <p><u>Methodology</u></p> <p>Confusion Assessment Method for the ICU evaluation was performed before and after daily interruption of continuous sedation (DIS).</p> <p>Investigators were blinded to each other's assessments and as to whether evaluations were before or after DIS. The primary outcome was proportion of days with no delirium versus rapidly reversible, sedation-related delirium versus persistent</p>	<p><u>Key Results</u></p> <p>The median proportion of ICU days with delirium was 0.57 before versus 0.50 after DIS (P <0.001).</p> <p>The Confusion Assessment Method for the ICU indicated patients are 10.5 times more likely to have delirium before DIS versus after (P <0.001).</p> <p>Rapidly reversible, sedation-related delirium showed fewer ventilator (P < 0.001), ICU (P = 0.001), and hospital days (P < 0.001) than persistent delirium.</p> <p>Subjects with no delirium and rapidly reversible, sedation-related delirium were more likely to be discharged home (P<</p>	<p><u>Strengths</u></p> <p>Investigators were blinded to each other's assessments and as to whether evaluations were before or after DIS.</p> <p><u>Limitations</u></p> <p>Did not account for other risk factors for delirium except sedative and analgesic</p> <p>This was a single-center study with a relatively small number of patients; however, the extremely high levels of statistical significance for the outcomes suggest that larger numbers would not likely lead to different results.</p>	<p><u>Conclusion</u></p> <p>“Rapidly reversible, sedation-related delirium does not signify the same poor prognosis as persistent delirium. Degree of sedation should be considered in delirium assessments. Coordinating delirium assessments with daily sedative interruption will improve such assessments' ability to prognosticate ICU delirium outcomes”</p>

		delirium. Secondary outcomes were ventilator, ICU, and hospital days; discharge disposition; and 1-year mortality.	0.001) Patients with persistent delirium had increased 1-year mortality versus those with no delirium and rapidly reversible, sedation-related delirium (P < 0.001).	-	(p. 658). <u>Rating</u> <u>I would rate this study as moderate-strong.</u> Results had high levels of statistical significance. However, the sample was quite small and lack generalizability to other populations.
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An exploratory study of staff nurses' knowledge of delirium in the medical ICU: An Asian perspective

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/Rating
<p><u>Author</u></p> <p>Christensen, M. (2013).</p> <p><u>Name</u></p> <p>An exploratory study of staff nurses' knowledge of delirium in the medical ICU: An Asian perspective</p> <p><u>Objective</u></p> <p>To determine ICU nurses' knowledge of delirium within an acute tertiary hospital within South East Asia.</p>	<p><u>Sample</u></p> <p>A purposive sample of 53 staff nurses from a 13-bedded medical intensive care unit.</p> <p><u>Setting</u></p> <p>A 13-bedded medical intensive care unit within an acute tertiary teaching hospital in South East Asia.</p>	<p><u>Design</u></p> <p>An exploratory study</p> <p><u>Methodology</u></p> <p>A 40 item 5-point Likert scale questionnaire was used to determine the participants' knowledge of the signs and symptoms; the risk factors and negative outcomes of delirium.</p>	<p><u>Key Results</u></p> <p>“The overall positively answered mean score was 27 (67.3%) out of a possible 40 questions. Mean scores for knowledge of signs and symptoms, risk factors and negative outcomes were 9.52 (63.5%, $n = 15$), 11.43 (63.5%, $n = 17$) and 6.0 (75%, $n = 8$), respectively” (p. 54).</p>	<p><u>Strengths</u></p> <p>Expert opinion was sought to ensure that content validity of the instrument was suitable for this clinical setting.</p> <p>A panel of five medical practitioners (2 geriatricians, 1 intensivist, 1 neurologist and 1 psychiatrist) who were considered to be clinical experts in the management of delirium and a panel of non-experts, comprising 3 registered nurses from the cardiac ICU were invited to review the questionnaire for readability, relevance and accuracy.</p> <p><u>Limitations</u></p> <p>Small and purposive sample affects generalizability to other</p>	<p><u>Conclusion</u></p> <p>“The ICU nurses in this study demonstrated limited knowledge of the signs and symptoms, risk factors and negative outcomes of delirium in the critically patient. The implications for practice of this are important given the outcomes of untreated delirium” (p. 54).</p> <p><u>Rating</u></p> <p><u>I would rate this study as weak-moderate.</u></p> <p>Despite the results being statistically significant there is presence of potential bias affects data collection accuracy, which may affect</p>

				populations. Chance of bias as a result of data being obtained from self- reported questionnaires.	validity of results.
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A questionnaire survey of critical care nurses' attitudes to delirium assessment before and after introduction of the CAM-ICU

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/Rating
<p><u>Author</u></p> <p>Eastwood, G. M., Peck, L., Bellomo, R., Baldwin, I., & Reade, M. C. (2012).</p> <p><u>Name</u></p> <p>A questionnaire survey of critical care nurses' attitudes to delirium assessment before and after introduction of the CAM-ICU.</p> <p><u>Objective</u></p> <p>To assess the attitudes of Australian critical care nurses when the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) was introduced.</p>	<p><u>Sample</u></p> <p>174 nurses</p> <p><u>Setting</u></p> <p>The study was conducted at the Austin Hospital, a tertiary academic hospital of the University of Melbourne</p>	<p><u>Design</u></p> <p>A questionnaire survey</p> <p><u>Methodology</u></p> <p>Surveyed all 174 nurses in the ICU using two questionnaires: first after a one-month period of mandated but unstructured delirium assessments, and then following one month of CAM-ICU assessments.</p> <p>Antipsychotic medication usage by inspecting pharmacy records was also quantified.</p>	<p><u>Key Results</u></p> <p>“The first survey response rate was 65/174 (37%). Most nurses (73%) thought active delirium assessment was important, and 93% thought their assessments were worth the time required. These assessments were largely unstructured, as only 20% knew a formal delirium test, and only 7% sometimes used one. The second survey response rate was 45/174 (26%). Most (89%) still thought delirium assessment was important, but only 75% thought the CAM-ICU worth the time required ($p = 0.01$ compared to unstructured assessments). Similar</p>	<p><u>Strengths</u></p> <p>Gender and experience profile of respondents was similar to the population of all ICU nurses. However, data was not shown.</p> <p><u>Limitations</u></p> <p>Surveys had low response rate resulting in the possibility of responder bias. Nurses answering the questionnaire were likely to be particularly interested in the topic.</p>	<p><u>Conclusion</u></p> <p>“Critical care nurses in our Australian ICU who responded to our survey think delirium assessment is important. Although they find unstructured assessments easier to perform, they wanted to persist with the CAM-ICU, in part because it facilitated more appropriate pharmacological treatment of delirium for their patients. We recommend the CAM-ICU as a tool to improve communication between nurses and physicians in the management of delirium” (p.163).</p>

			<p>proportions (75% and 73%) were confident in the accuracy of their assessments. Many (33%) found the CAM-ICU ‘quite’ or ‘very’ hard to perform, but despite this, 82% wanted to continue to use it. Free-text answers suggested this was because medical staff paid more attention to the CAM-ICU. Supporting this, prescriptions of antipsychotic medications increased significantly in the CAM-ICU period” (p. 162).</p>		<p><u>Rating</u></p> <p><u>I would rate this study as weak.</u></p> <p>Presence of potential bias affects data collection accuracy, which may affect validity of results.</p>
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Implementing the awakening and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle into everyday care: Opportunities, challenges, and lessons learned for implementing the ICU pain, agitation, and delirium guidelines.

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results	Strengths/ Limitations	Conclusion/ Rating
<p><u>Author</u></p> <p>Balas, M. C., Burke, W. J., Gannon, D., Cohen, M. Z., Colburn, L., Bevil, C., ... Vasilevskis, E. (2013).</p> <p><u>Name</u></p> <p>Implementing the awakening and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle into everyday care: Opportunities, challenges, and lessons learned for implementing the ICU pain, agitation, and delirium guidelines.</p> <p><u>Objective</u></p>	<p><u>Sample</u></p> <p>Inter-professional ICU team members at participating institution</p> <p><u>Setting</u></p> <p>Five adult ICUs, one step-down unit, and a special care unit located in a Midwestern 624-bed academic medical center</p>	<p><u>Design</u></p> <p>Prospective, before-after, mixed-methods study.</p> <p><u>Methodology</u></p> <p>In collaboration with the participating institution, the authors developed, implemented, and refined an ABCDE bundle policy. Over the course of an 18-month period, all ICU team members were offered the opportunity to participate in numerous, multimodal educational</p>	<p><u>Key Results</u></p> <p>“Factors believed to facilitate bundle implementation included: a) the performance of daily, interdisciplinary, rounds, b) engagement of key implementation leaders, c) sustained and diverse educational efforts, and d) the bundle's quality and strength” (p. 2)“Barriers identified included: a) intervention related issues (e.g. timing of trials, fear of adverse events), b) communication and care coordination challenges, c) knowledge deficits,</p>	<p><u>Strengths</u></p> <p>A leading ICU delirium expert and study consultant, presented at the institution's medical ground rounds.</p> <p>Focus group sessions were tape recorded, transcribed verbatim, and then analyzed line by line, labelling passages with theme labels, and comparing passages with similar themes</p> <p><u>Limitations</u></p> <p>Single, academic university. Lack of generalizability to</p>	<p><u>Conclusion</u></p> <p>“In this study of the implementation of the awakening and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle in a tertiary care setting, clear factors were identified that both advanced and impeded adoption of this complex intervention that requires inter-professional education, coordination, and cooperation. Focusing on these factors preemptively should enable a more effective and lasting implementation of the bundle and better care for critically ill patients. Lessons learned from this study will also help healthcare providers optimize implementation of the recent ICU pain, agitation, and delirium guidelines, which has many similarities but also some important differences as compared with the awakening</p>

<p>To identify facilitators and barriers to ABCDE bundle adoption and to evaluate the extent to which bundle implementation was effective, sustainable, and conducive to dissemination.</p>		<p>efforts. Three focus group sessions, 3 online surveys, and 1 educational evaluation were administered in an attempt to identify facilitators and barriers to bundle adoption.</p>	<p>d) workload concerns, and e)documentation burden” (p. 2). “Despite these challenges, participants believed implementation ultimately benefited patients, improved inter-disciplinary communication, and empowered nurses and other ICU team members” (p. 2).</p>	<p>other populations. Low participation rates in the focus group sessions and online surveys. Participants may be strongly for or against bundle implementation.</p>	<p>and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle” (p. 16). <u>Rating</u> <u>I would rate this study as weak-moderate.</u> Potential for sample bias and lack of generalizability to other populations.</p>
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Implementation of a validated delirium assessment tool in critically ill adults.

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/Rating
<p><u>Author</u></p> <p>Scott, P., McIlveney, F., & Mallice, M. (2013).</p> <p><u>Name</u></p> <p>Implementation of a validated delirium assessment tool in critically ill adults.</p> <p><u>Objective</u></p> <p>To evaluate the feasibility and effectiveness of the validated Confusion Assessment Method-ICU (CAM-ICU) delirium screening tool in a critical care unit.</p>	<p><u>Sample</u></p> <p>Nursing staff (n=78) of an 18-bed critical care unit comprising medical and surgical patients.</p> <p><u>Setting</u></p> <p>18 bed critical care unit comprising medical and surgical patients in a District General Hospital in Central Scotland.</p>	<p><u>Design</u></p> <p>A single center service evaluation design.</p> <p><u>Methodology</u></p> <p>Two self-report questionnaires were administered to nursing staff (n=78) one immediately prior to and then three months following delirium education and CAM-ICU practical training.</p>	<p><u>Key Results</u></p> <p>“The response rates of the questionnaires were 92% (72/78) and 60% (47/78) respectively, completed by predominantly females with a similar age range across the two groups.</p> <p>Prior to education and training 54% (39/72) of nurses agreed that delirium was a significantly under diagnosed problem.</p> <p>Few nurses (6%, 4/72) considered evaluating their patients for it and 69% (50/72) did not feel the need to routinely monitor.</p> <p>Following a simple educational intervention 68% (32/47) believed</p>	<p><u>Strengths</u></p> <p>Survey questions were piloted for clarity, consistency, and content validity by 10 critical care nurses and resulted in the final pre-education questionnaire.</p> <p><u>Limitations</u></p> <p>Lack of generalizability (results represent only nurses from a single UK medical and surgical critical care unit and may not be representative of critical care nurses in other critical care units).</p> <p>Results may be confounded by a self-selected sampling bias.</p>	<p><u>Conclusion</u></p> <p>“This service evaluation has shown that implementation of a delirium screening tool into daily nursing practice is achievable within a relatively short time period. A simple, educational intervention incorporating written and video information improved the capacity of critical care nurses to perform delirium assessments in a standardized way and reduced the discordance between the perceived importance of delirium and the practice of its evaluation. Such data is especially important since delirium assessments had not traditionally been part of daily nursing care”</p>

			<p>delirium was a very serious problem, 74.5% (35/47) frequently evaluated their patients and only 31% (15/47) felt that CAM-ICU assessments should not be part of routine nursing care.</p> <p>The majority (85.1%, 40/47) of nurses found the CAM-ICU easy to administer, were confident in using the tool (74.4%, 35/47) and felt it led to a more comprehensive patient assessment (83%, 39/47). Despite this, barriers to undertaking delirium assessment identified at the start of the project remained and included patient intubation (42%, 20/47), sedation level (40%, 19/47) and medical staff inability to act on CAM-ICU assessment data (25%, 12/47)" (p.96).</p>		<p>(p. 96)</p> <p><u>Rating</u></p> <p><u>I would rate this study as weak-moderate.</u></p> <p>Despite content validity of instrument and statistical significance of results, there is still potential for sampling bias affecting validity of results.</p>
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Bedside nurse—patient interactions do not reliably detect delirium: an observational study

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/Rating
<p><u>Author</u></p> <p>Mistarz, R., Elliott, S., Whitfield, A. & Ernest, D (2011).</p> <p><u>Name</u></p> <p>Bedside nurse—patient interactions do not reliably detect delirium: an observational study.</p> <p><u>Objective</u></p> <p>To determine if routine bedside nurse-patient interactions enable the detection of delirium.</p>	<p><u>Sample</u></p> <p>Convenience sample of 35 patients in the ICU</p> <p><u>Setting</u></p> <p>12 bed general Intensive Care Unit in a University teaching hospital, servicing eastern metropolitan Melbourne, Victoria.</p>	<p><u>Design</u></p> <p>A single center observational study</p> <p><u>Methodology</u></p> <p>Bedside nurses were asked to assess patients for delirium during routine patient care throughout their shift. This assessment was then compared to an independent assessment using the Confusion Assessment Method – ICU (CAM-ICU) performed by a nurse trained in this delirium detection tool.</p>	<p><u>Key Results</u></p> <p>There was analysis of the results of 35 matched assessments performed on 35 patients.</p> <p>The presence of delirium was identified by the bedside nurse in 27% of CAM-ICU delirium positive assessments, whereas the absence of delirium was identified by the bedside nurse in 92% of CAM-ICU delirium negative assessments.</p>	<p><u>Strengths</u></p> <p>The bedside nurse was asked to assess whether the patient had delirium based on interactions with the patient after four to five hours of care during an 8 or 12 hour shift. Within two hours of this assessment and without knowing the bedside nurse's assessment, the patient was assessed for the presence of delirium by one of the trained evaluators using the CAM-ICU tool</p> <p><u>Limitations</u></p> <p>Convenience sample</p> <p>The inter-rater reliability of the trained CAM-ICU evaluators was not evaluated which may affect the reliability of our</p>	<p><u>Conclusion</u></p> <p>There was a significant discrepancy between the ICU bedside nurses' assessment of delirium and the independent formal delirium assessment utilizing the CAM-ICU. We concluded that routine bedside nursing patient interaction do not reliably detect delirium in a critically ill patient.</p> <p><u>Rating</u></p> <p><u>I would rate this study as weak.</u></p> <p>Lack of statistical significance of results and convenience sampling affect validity of results.</p>

				findings. Lack of generalizability to other populations as it was a single centre study.	
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The confusion assessment method for the intensive care unit (CAM-ICU) and intensive care delirium screening checklist (ICDSC) for the diagnosis of delirium: A systematic review and meta-analysis of clinical studies.

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/ Rating
<p><u>Author</u></p> <p>Gusmao-Flores, D., Salluh, J. I. F., Chalhub, R. A., & Quarantini, L. C. (2012).</p> <p><u>Name</u></p> <p>The confusion assessment method for the intensive care unit (CAM-ICU) and intensive care delirium screening checklist (ICDSC) for the diagnosis of delirium: A systematic review and meta-analysis of clinical studies.</p> <p><u>Objective</u></p> <p>To evaluate the current evidence on the accuracy of the Confusion Assessment Method</p>	<p><u>Sample</u></p> <p>Nine studies evaluating the CAM-ICU (including 969 patients) and four evaluating the ICDSC (n = 361 patients) were included in the final analysis.</p> <p><u>Setting</u></p> <p>ICU</p>	<p><u>Design</u></p> <p>Systematic review</p> <p><u>Methodology</u></p> <p>A systematic review was conducted to identify articles on the evaluation of the CAM-ICU and the ICDSC in ICU patients. A MEDLINE, SciELO, CINAHL and EMBASE databases search was performed for articles published in the English language, involving adult populations and comparing these diagnostic tools with the gold standard, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria. Results were summarized by meta-</p>	<p><u>Key Results</u></p> <p>“Nine studies evaluating the CAM-ICU (including 969 patients) and four evaluating the ICDSC (n = 361 patients) were included in the final analysis. The pooled sensitivity of the CAM-ICU was 80.0% (95% confidence interval (CI): 77.1 to 82.6%), and the pooled specificity was 95.9% (95% CI: 94.8 to 96.8%). The diagnostic odds ratio was 103.2 (95% CI: 39.6 to 268.8). The pooled area under the summary receiver operating characteristic curve (AUC) was 0.97. The pooled sensitivity of the ICDSC was 74% (95% CI: 65.3 to 81.5%), and the pooled specificity was 81.9%</p>	<p><u>Strengths</u></p> <p>The QUADAS scale (first version) was employed to assess the quality of the studies</p> <p>The heterogeneity of the studies was checked by the chi-square test ($P \leq 0.05$).</p> <p><u>Limitations</u></p> <p>Studies published in non-English languages were excluded. A number of relevant studies may have been missed.</p>	<p><u>Conclusion</u></p> <p>“The CAM-ICU is an excellent diagnostic tool in critically ill ICU patients, whereas the ICDSC has moderate sensitivity and good specificity. The available data suggest that both CAM-ICU and the ICDSC can be used as a screening tool for the diagnosis of delirium in critically ill patients” (p. 1).</p> <p><u>Rating</u></p> <p><u>I would rate this study as strong.</u></p> <p>Results of this study were analyzed and statistically significant.</p>

<p>for Intensive Care Unit (CAM-ICU) and the Intensive Care Delirium Screening Checklist (ICDSC) for the diagnosis of delirium in critically ill patients.</p>		<p>analysis. The QUADAS scale was used to assess the quality of the studies.</p>	<p>(95% CI: 76.7 to 86.4%). The diagnostic odds ratio was 21.5 (95% CI: 8.51 to 54.4). The AUC was 0.89” (p. 1).</p>		
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Confusion assessment method: A systematic review and meta-analysis of diagnostic accuracy

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/Findings	Strengths/Limitations	Conclusion/Rating
<p><u>Author</u></p> <p>Shi, Q., Warren, L., Saposnik, G., & MacDermid, J. C. (2013).</p> <p><u>Name</u></p> <p>Confusion assessment method: A systematic review and meta-analysis of diagnostic accuracy</p> <p><u>Objective</u></p> <p>To evaluate the diagnostic accuracy of two delirium screening tools, the Confusion Assessment Method (CAM) and the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU).</p>	<p><u>Sample</u></p> <p>Twenty-two studies (n = 2,442 patients) met the inclusion criteria</p> <p><u>Setting</u></p> <p>ICU</p>	<p><u>Design</u></p> <p>A systematic review and meta-analysis</p> <p><u>Methodology</u></p> <p>A search of MEDLINE, EMBASE, and PsychInfo for relevant articles published in English up to March 2013 was conducted. There was a comparison of two screening tools, using Diagnostic and Statistical Manual of Mental Disorders IV criteria. Two reviewers independently assessed studies to determine their eligibility, validity, and quality. Sensitivity and specificity were calculated using a bivariate model.</p>	<p><u>Key Results</u></p> <p>“Twenty-two studies (n = 2,442 patients) met the inclusion criteria. All studies demonstrated that these two scales can be administered within ten minutes, by trained clinical or research staff. The pooled sensitivities and specificity for CAM were 82% (95% confidence interval [CI]: 69%-91%) and 99% (95% CI: 87%-100%), and 81% (95% CI: 57%-93%) and 98% (95% CI: 86%-100%) for CAM-ICU, respectively.</p>	<p><u>Strengths</u></p> <p>All data extraction and quality assessment were conducted by two reviewers (QS and LW). Discrepancies were resolved by discussion. A third reviewer (GS) was consulted if discrepancies remained.</p> <p><u>Limitations</u></p> <p>Studies published in non-English languages were excluded and studies detailing prevalence of delirium without diagnostic accuracy data, reference test other than DSM IV, or if the definition of delirium was unclear in the original paper. A number of relevant studies may have been missed.</p>	<p><u>Conclusion</u></p> <p>“Both CAM and CAM-ICU are validated instruments for the diagnosis of delirium in a variety of medical settings. However, CAM and CAM-ICU both present higher specificity than sensitivity. Therefore, the use of these tools should not replace clinical judgment” (p. 1359).</p> <p><u>Rating</u></p> <p><u>I would rate this study as strong.</u></p> <p>Results of this study were analyzed and statistically significant.</p>

Large-scale implementation of sedation and delirium monitoring in the intensive care unit: A report from two medical centres

Name, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results/ Findings	Strengths/Limitations	Conclusion/Rating
<p><u>Author</u></p> <p>Pun, B.T., Gordon, S.M., Peterson, J.F., Shintani, A.K., Jackson, J.C., Foss, J., Harding, S. D., Bernard, G. R., Dittus, R. S., & Ely, W. (2005).</p> <p><u>Name</u></p> <p>Large-scale implementation of sedation and delirium monitoring in the intensive care unit: A report from two medical centres.</p> <p><u>Objective</u></p> <p>To implement sedation and delirium monitoring via a process-improvement project in accordance with Society of Critical Care Medicine</p>	<p><u>Sample</u></p> <p>711 patients admitted to the medical ICUs for more than 24 hours and followed over 4163 days during a 21-month study period.</p> <p><u>Setting</u></p> <p>The medical ICUs at two institutions: the Vanderbilt University Medical Center (VUMC) and a community Veterans Affairs hospital (York-VA).</p>	<p><u>Design</u></p> <p>Prospective observational cohort study</p> <p><u>Methodology</u></p> <p>Unit-wide nursing documentation was changed to accommodate a sedation scale (Richmond Agitation-Sedation Scale) and delirium instrument (Confusion Assessment Method for the ICU).</p> <p>A 20-min introductory in-service was performed for all ICU nurses, followed by graded, staged educational interventions at regular intervals.</p> <p>Data were collected daily for compliance,</p>	<p><u>Key Results</u></p> <p>The implementation project involved 64 nurses (40 at VUMC and 24 at York-VA).</p> <p>Sedation and delirium monitoring data were recorded for 711 patients (614 at VUMC and 97 at York-VA).</p> <p>Compliance with the Richmond Agitation-Sedation Scale was 94.4% (21,931 of 23,220) at VUMC and 99.7% (5,387 of 5,403) at York-VA.</p> <p>Compliance with the Confusion Assessment Method for the ICU was 90% (7,323 of 8,166) at VUMC and 84% (1,571 of 1,871) at York-VA.</p> <p>The CAM-ICU was</p>	<p><u>Strengths</u></p> <p>High compliance in the study at both institutions and improved over time (Point-of-use reminders were necessary to sustain full compliance).</p> <p>Patients with dementia, primary neurologic disease, or baseline psychiatric illness were not included in this study. (This could also be consider a limitation)</p> <p><u>Limitations</u></p> <p>Data obtained from only two ICUs (represent diverse critical care settings-large university medical center vs. a smaller community VA hospital).</p>	<p><u>Conclusion</u></p> <p>"With minimal training, the compliance of bedside nurses using sedation and delirium instruments was excellent. Agreement of data from bedside nurses and a reference-standard rater was very high for both the sedation scale and the delirium assessment over the duration of this process-improvement project" (p. 1199).</p> <p><u>Rating</u></p> <p><u>I would rated this study as strong.</u></p> <p>Results of this study were analyzed and statistically significant despite lack of generalizabilty of results.</p>

<p>guidelines and to evaluate the challenges of modifying intensive care unit (ICU) organizational practice styles.</p>		<p>and randomly 40% of nurses each day were chosen for accuracy spot-checks by reference raters.</p> <p>An implementation survey questionnaire was distributed at 6 months.</p>	<p>performed more often than requested on 63% of shifts (5,146 of 8,166) at VUMC and on 8% (151 of 1871) of shifts at York-VA.</p> <p>Overall weighted-kappa between bedside nurses and references raters for the Richmond Agitation-Sedation Scale were 0.89 (95% confidence interval, 0.88 to 0.92) at VUMC and 0.77 (95% confidence interval, 0.72 to 0.83) at York-VA.</p> <p>Overall agreement (kappa) between bedside nurses and reference raters using the Confusion Assessment Method for the ICU was 0.92 (95% confidence interval, 0.90-0.94) at VUMC and 0.75 (95% confidence interval, 0.68-0.81) at York-VA.</p> <p>The two most-often-cited barriers to implementation were physician buy-in and</p>	<p>Doctors were not trained and monitored during this process, and physician involvement should be incorporated in future studies.</p>	
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Appendix B- Consultation Report

Consultation With Invested Key Knowledge Experts Within
Medical Surgical Intensive Care Unit (MSICU)
Ashlee Leonard
Memorial University of Newfoundland

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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 (ICU Delirium and Cognitive Impairment Group of Vanderbilt University Medical Center (VUMC), 2002; Inouye, 2006; Jackson & Khan, 2015; Raju & Coombe-Jones, 2015; Young & Inouye, 2007). 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 (Palmieri, 2003). 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) (Eastwood, Peck, Bellomo, Baldwin, & Reade, 2012).

The purpose of this report is to summarize the consultation process executed with multiple invested key knowledge experts in the Medical Surgical Intensive Care Unit (MSICU) within the Health Science Centre hospital. I begin this report by summarizing the background of the CAM-ICU including the purpose of the practicum project and rationale for consultation. Next, I describe the participants and methods of the consultation process, including recruitment method, data collection, data management,

and data analysis. Finally, I review the ethical considerations concerning this consultation process and summarize the results of the consultations with invested key knowledge experts. Furthermore, I conclude describing the implications of the consultation results and how they will be utilized within the practicum project.

Background

The Confusion Assessment Method (CAM) was developed in 1990 and it was planned to be a bedside assessment tool operational by non-psychiatrists, specifically nurses, to assess delirium. The CAM-ICU is a revision of this tool for use in ICU patients who are both on and off a ventilator. Using this tool, delirium is described in terms of four indicative features and is considered positive when feature one plus feature two, and either features three or four are present (ICU Delirium and Cognitive Impairment Group of VUMC, 2002).

In order for the CAM-ICU to be an indicator for the presence of delirium, the patient's level of consciousness must be moderately sedate (able to move or open eyes to voice) to alert. 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 your hand 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 letter other than "A." Feature three of the CAM-ICU assesses altered level of consciousness. This feature is present if the patient is any state of consciousness besides alert and calm. Feature four measures 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 (ICU Delirium and Cognitive Impairment Group of VUMC, 2002). This tool is typically utilized at least once per shift to assess delirium.

Practicum Purpose Statement

The overall purpose of this project is to conduct an evaluation report on the delirium assessment tool, CAM-ICU, while identifying areas where nurses need more education on how to adequately employ this tool within their practice, and to help enhance detection of undiagnosed delirium in MSICU. The project’s objectives are as follows: (a) to consult with invested key knowledge experts within the MSICU, (b) to conduct an evaluation report based upon evidence-based research and feedback from invested key knowledge experts; and (c) to communicate this report to university faculty and Eastern Health’s key knowledge experts through presentations in various forums, and (d) to deliver recommendations, if necessary, for the clarification and adjustment of the CAM-ICU delirium assessment tool, in efforts to help increase nurses’ knowledge and ability to effectively assess for and treat delirium.

Rationale for Consultation

Consultation with invested key knowledge experts is a key objective for this practicum project. It is essential to consult with these key knowledge experts within the MSICU in order to obtain valuable details from those employing the CAM-ICU delirium assessment tool on a daily basis. The consultation course is essential in the effective

development of an evaluation plan. Objectives of the consultation process included: (a) seek feedback from a team of key knowledge experts including the manager, the educator, the intensivist, a senior nurse, and a junior nurse of the MSICU on personal knowledge and experiences of the CAM-ICU; (b) seek feedback from the team of key knowledge experts on existing barriers and facilitators of the utilization of the CAM-ICU; (c) seek feedback from the team of key knowledge experts on measures that they would use as indicators of success of the CAM-ICU; and, (d) seek feedback from the team of key knowledge experts on ways to improve the utilization of the CAM-ICU in the detection and diagnosis of delirium. These key knowledge experts are skilled professionals within their area of practice and their input is imperative in the development of an evaluation plan. Data from these key experts, pertaining to the CAM-ICU delirium assessment tool in an ICU setting, is data that cannot be acquired elsewhere.

Participants

A total of five invested key knowledge experts were consulted for this process. All experts are employed within the MSICU of the Health Science Centre, which falls under the Eastern Health authority. The invested key knowledge experts are: the manager, the clinical educator, the intensivist, a senior ICU nurse, and a junior ICU nurse. Both the manager and the intensivist are members of a working group on delirium, where a major issue currently being addressed is the utilization of the CAM-ICU. The clinical educator of the MSICU was a key individual involved in bringing professionals from Vanderbilt University to the Health Science Centre Hospital and St. Clare's Hospital, in order to execute thirteen training sessions concerning delirium recognition and management among nurses and doctors. The clinical educator is also responsible for implementing the

CAM-ICU delirium assessment tool in all critical care areas within the Health Science Centre and is seen as a resource for the CAM-ICU delirium assessment tool. The senior nurse has been working within the MSICU for fifteen years and was present for the initial implementation of the CAM-ICU in 2003. The junior nurse has been working within the MSICU for two years. The senior and junior nurse bring clinical expertise as they are the healthcare providers utilizing the CAM-ICU delirium assessment tool in their practice daily.

Methods

In order to evaluate the usability and knowledge testing of the CAM-ICU for nurses in the MSICU, it was essential to consult invested key knowledge experts within the MSICU. Administrative approval was granted from manager Joanne Butler prior to initiation of the consultations. Invested key knowledge experts were recruited for consultation during the process of the practicum project and consultations officially began on March 14, 2016. Consultations and interview questions incorporated evidence-based practice informed by the previously conducted literature review.

Recruitment

The recruitment process commenced at the beginning of the practicum project. It was essential to have individuals with diverse roles within the MSICU. Knowledge experts were purposively selected through the identification of individuals who had professional involvement using the CAM-ICU. These key knowledge experts were selected by the clinical educator. The clinical educator was the first key knowledge expert to be identified due to the extensive involvement this individual had in introducing the

CAM-ICU delirium assessment tool to the MSICU. The clinical educator was helpful in identifying the other individuals utilized for the consultation process, by providing me with a list of names of senior and junior nurses from which I picked one senior and junior nurse to consult. A senior and a junior nurse was consulted to understand two different nursing perspectives pertaining to the utilization of the CAM-ICU, as the senior nurse was employed in the unit when the CAM-ICU was introduced as the delirium screening tool. Additionally, the manager of the MSICU and the chief intensivist were consulted to gain an understanding of the administrative and medical perspective of utilizing the CAM-ICU.

Data Collection

Data collection for the consultation process consisted of individual, semi-structured interviews consisting of ten questions. A letter of introduction concerning the purpose of the practicum project, rationale for consultation, how data will be collected and how data will be kept confidential were distributed to the team of key knowledge experts. In turn, these knowledge experts were contacted via telephone to ensure the interview questions were received via email and were then asked to remit the completed interview questions via email at their earliest convenience. See Appendix A for a copy of the Interview Questions.

Data Management and Data Analysis

Data obtained for the consultation process was the result of interview questions distributed to the identified five invested key knowledge experts. The analysis of the data included a quantitative analysis of the information obtained from the interview to highlight common themes. Data from the interview questions was analyzed at one time.

Ethical Considerations

Prior to initiation of the practicum project and consultations approval from manager of the MSICU, Joanne Butler, was obtained. Data collection did not require interaction with patients. The purpose of this project as determined by the Health Research Ethics Authority (HREA) screening tool is quality improvement/evaluation hence did not require Ethical Review in conducting this practicum project.

The letters of introduction to the consultation stated that completion of the interview questions indicated agreement to consultation and participation is voluntary. Protection of human rights was guaranteed by ensuring that the data collected from the interview questions was kept confidential. Data from the questionnaires was kept on a password-protected computer, and interview questionnaires were not identified using names, thus maintaining confidentiality.

Results

The five invested key knowledge experts that were employed within the MSICU of the Health Science Centre Hospital. All knowledge experts were familiar with the CAM-ICU. Their employment positions include management, education, medicine, and nursing. The findings from the consultation process are presented using the focus of each question posed in the questionnaire. The questionnaire was informed and guided by the previously conducted literature review.

Barriers and Facilitators

All knowledge experts identified existing barriers and facilitators concerning the utilization of the CAM-ICU within the MSICU. Expert 1, 2, and 5 all agreed that nursing attitudes and beliefs were a barrier to the utilization of the CAM-ICU. Expert 1 discussed

how nurses “feel silly” performing the assessment, while Expert 5 described how nurses felt the assessment was time consuming and not a priority, especially when short staffed and responsible for more than one critically ill patient. Expert 2 also considered how older nurses are, at times, hesitant to change the status quo by incorporating new assessment tools into their nursing practice. Prior to 2003, nurses were typically assessing orientation to person, place, and time to determine presence of delirium; and, if patients were able to identify person, place, and time, then they did not have delirium. However, orientation to the above does not actually assess presence of delirium. Additionally, Expert 2 felt that physicians did not value the nurses’ assessment findings from the CAM-ICU; thus deterring nurses from utilizing the delirium assessment tool.

Experts 3 and 4 addressed the barrier of sedation that keeps nurses from employing the CAM-ICU. It is not possible to employ the CAM-ICU in the assessment of delirium for patients who are very sedated and unable to move eyes or respond to voice. Furthermore, Expert 5 addressed the lack of a coordinated structured approach to the management of patients with delirium. There are currently no protocols developed within the MSICU to both physicians and nurses to follow. All invested key knowledge experts identified two facilitators. All experts agreed that ‘nurse champions’ were a major facilitator of the utilization of the CAM-ICU. The clinical educator was also identified as a major resource for the CAM-ICU.

Effectiveness of CAM-ICU

There was agreement among all experts that the CAM-ICU, if used consistently, can be effective in the detection and diagnosis of delirium, especially with the increased

detection and diagnosis of hypoactive delirium. Specifically, Experts 2 and 3 found that the tool was easily adaptable to practice and aided with the prompt diagnosis of patients leading to enhanced patient outcomes. Additionally, Expert 5 added to this by explaining that the enhanced patient outcomes in turn lead to a decreased need of sedation for the patient with delirium, decreased incidence of unplanned extubation that occurs due to aggressive behavior by the patient with delirium, and decreased number of nurse injuries, which can also be credited to the delirium.

Additionally, there was a consensus among all experts that the tool improved communication and documentation between all professionals involved in caring for the patient, notably between physicians and nurses. It was highlighted that physicians are more aware of delirium in MSICU patients since the incorporation of the CAM-ICU into delirium assessment.

Improving Utilization

Even though the experts found the CAM-ICU tool to be an effective tool, all agreed that there is still room for improvement. Better discussion in multi-disciplinary rounds was noted, by all experts, as being the best way to improve utilization. Experts 5 described how this could be done through the use of a checklist that would be completed for rounds, having the patient care coordinator as the individual responsible to ensure that all aspects of the checklist was discussed by the bedside nurse. Expert 1 and 4 discussed other methods such as, better documentation on the chart so the nurse who is caring for a patient for the first time can determine if the delirium is new, or if the patient has been previously been diagnosed with delirium.

Improving Effectiveness of CAM-ICU and Detection of Delirium

All experts agreed that there are numerous ways to improve effectiveness of the CAM-ICU as well as improve the detection of delirium in MSICU patients. Experts 1, 2, and 3 all emphasized the importance of continuing education when attempting to improve the effectiveness of the CAM-ICU and detecting delirium in MSICU patients. Experts 2 and 4 added to this by highlighting the importance of the role of the patient care coordinator in improving the effectiveness of the CAM-ICU. It was discussed that the patient care coordinator could improve the discussion in rounds by ensuring that each patient's neurological status is reviewed every shift. As well, Expert 2 stressed the importance of the patient care coordinator in getting patients out of the ICU and up to an acute care ward bed, thus decreasing the potentiality of patients acquiring delirium. Expert 2 also emphasized the position of management in ensuring there is an adequate number of staff working to allow early mobilization of patients, which in turn decreases the risk of acquiring delirium. In addition, Expert 5 expressed the need to link nursing practice to patient outcomes by performing quality care audits and measuring nurse attitudes, to better understand why nurses do not utilize the CAM-ICU in assessing delirium in MSICU patients.

Conclusion

Consultation with invested key knowledge experts, within the MSICU, is essential in order to obtain valuable details from those employing the CAM-ICU delirium assessment tool on a daily basis. The consultation course is essential in the effective development of an Evaluation Report.

Invested key knowledge experts generally deemed the CAM-ICU as an effective delirium assessment tool, especially in the detection of hypoactive delirium. However, despite agreed upon effectiveness of the CAM-ICU, the invested key knowledge experts identified a number of key barriers to the utilization of the CAM-ICU, as well as significant improvements needed concerning utilization and effectiveness of CAM-ICU, which they thought needed to be addressed. Discussed barriers included: nurses' attitudes and beliefs, sedation level, physicians' value of nurses' assessment findings, and lack of a coordinated structured approach to the management of patients with delirium. All experts in consultations, agreed that 'nurse champions' and the clinical educator was the major facilitators for the utilization of the CAM-ICU.

Findings concerning the discussed improvements of the utilization and effectiveness of CAM-ICU has many implications for the practicum project, including better discussion in rounds between physicians and nurses regarding the neurological status of a patient. This could be done with the use of a checklist, as discussed by the invested key knowledge experts, to ensure that all aspects of the neurological assessment are discussed. A second improvement, reviewed by the experts, which could be an implication for the practicum project is the idea of strengthening educational strategies to "frontline" staff regarding the importance of the CAM-ICU as a delirium assessment tool, and how to properly apply it to nursing practice. A final improvement examined by the experts as an implication for the practicum project, is linking nursing practice to patient outcomes by performing quality care audits and measuring nurse attitudes to understand why nurses do not utilize the CAM-ICU in assessing delirium in MSICU patients; thus possibly eliminating the nurses' attitudes as one of the major barriers to the

utilization of the CAM-ICU. All views and knowledge expressed by the invested key knowledge experts needs to be considered in order to improve and optimize the utilization of the CAM-ICU in early detection of delirium.

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Appendix

Interview Questions

Please answer questions listed below. Feel free to utilize more space for answers if necessary.

- 1) What is your role within the Medical Surgical Intensive Care Unit (MSICU)?

- 2) Are you familiar with delirium and the Confusion Assessment Method for Intensive Care Unit (CAM-ICU) delirium assessment tool?

- 3) Do you use this tool in the screening of delirium within the MSICU? If yes, what are your past experiences with utilization of the CAM-ICU?

- 4) Do you believe that barriers exist concerning the utilization of the CAM-ICU within the MSICU setting? If yes, what are they?

- 5) Do facilitators exist concerning the utilization of the CAM-ICU within the MSICU setting? If yes, what are they?

- 6) Do you believe that the CAM-ICU is effective in the detection and treatment of delirium? If yes, what do you feel are indicators of success of the CAM-ICU?

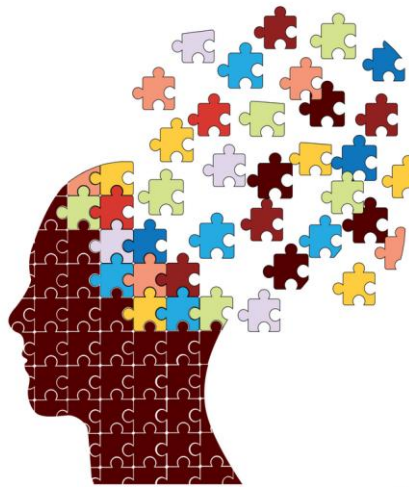
- 7) Do you feel that there are ways to improve the utilization of the CAM-ICU?

- 8) Is there anything that management, the intensivist, the nurse or the educator of the MSICU can do to improve effectiveness of the CAM-ICU and the detection of delirium in ICU patients?

- 9) Do you feel all data to complete an evaluation of this tool is currently being collected? If no, what data should be collected?

Appendix C- Evaluation Report

**Evaluation Report on the Usability and Knowledge Testing of the Delirium
Assessment Tool, Confusion Assessment Method for Intensive Care Unit,
for Nurses in the Medical Surgical Intensive Care Unit**



ditkemisan.net

Ashlee Leonard, RN, BN

Memorial University of Newfoundland

N6660/6661: MN Practicum 1 and 2

Completed January – August 2016

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Appendix A: CAM-ICU Flow Sheet

Appendix B: The Knowledge to Action (KTA) Framework

Appendix C: Letter of Introduction for Nurses in MSICU

Appendix D: Questionnaire for MSICU Nurses

Preface

This report has been developed as a practicum project for the completion of the Masters of Nursing program at Memorial University. The Medical Surgical Intensive Care Unit [MSICU] within the Health Science Centre hospital recognized the need to evaluate the usability and knowledge testing of the delirium assessment tool, Confusion Assessment Method for the Intensive Care Unit [CAM-ICU], for staff nurses, in the MSICU. Presently, there are approximately 70 permanent full-time staff nurses employed within the MSICU; 60 % of which are senior nursing staff and 40% of which are junior nursing staff.

A comprehensive literature review was conducted concerning delirium, delirium assessment tools, and barriers preventing nurses from utilizing the CAM-ICU in clinical practice. Several gaps were identified in the literature concerning how nurses in the ICU setting can appropriately initiate this assessment to provide early diagnosis and treatment of delirium in ICU patients. These included a medical-nursing communication gap, the lack of specialized education and training, time- management, and lack of generalizability among available research. Consultations with invested key knowledge experts such as the medical intensivist, manager, clinical educator, and two clinical staff nurses of the MSICU were conducted.

Within this report, a summary of the background of delirium and CAM-ICU is discussed. The evaluation strategy of collaborating with staff nurses was conducted using self-reporting questionnaires. The questionnaires were developed using components from the Knowledge to Action Framework (Graham et al., 2014) including barriers to knowledge use, evaluating outcomes, and sustaining knowledge use. Data synthesis and

interpretation of the results will be examined, in addition to the need of a communication plan to ensure appropriate dissemination of the evaluation findings.

Additionally, this report delivers recommendations for the invested key stakeholders of the MSICU when evaluating the CAM-ICU within the MSICU.

Background

Delirium is a disturbance of consciousness illustrated by acute onset and fluctuating course of inattention complemented by either an alteration in cognition, or a perceptual disturbance, causing an individual's ability to receive, process, store, and recall information to be compromised (ICU Delirium and Cognitive Impairment Group of Vanderbilt University Medical Center (VUMC), 2002; Inouye, 2006; Raju & Coombe-Jones, 2015; Young & Inouye, 2007).

Delirium progresses over a short period of time from hours to days, is commonly reversible, and can be a direct result of a medical condition, substance intoxication or withdrawal, use of a medication, toxin exposure, or a combination of these factors (ICU Delirium and Cognitive Impairment Group of VUMC, 2002). Delirium is present within the general population, as well as in hospital environments, and is most prevalent in individuals with pre-existing cognitive impairments and the elderly (Raju & Coombe-Jones, 2015). The prevalence of delirium in the general population is 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% (Raju & Coombe-Jones, 2015; Sharma, Malhotra, Grover, & Jindal, 2012; Young & Inouye, 2007). Delirium in ICU settings is a predictor of several adverse outcomes, including reported increases in: mortality, length of stay in the ICU,

time kept on a ventilator, long-term cognitive impairment, and, number of discharges to long-term care facilities instead of home; resulting in predicted increased costs to the health care system (Limpawattana et al., 2016)

There have been numerous tools developed to assist with the diagnosis of delirium within hospital settings. The MSICU within the Health Science Centre utilizes the Confusion Assessment Method for Intensive Care Unit (CAM-ICU). The Confusion Assessment Method (CAM) was developed in 1990 by Dr. Sharon Inouye and was designed to be a bedside assessment tool operational by non-psychiatrists to assess delirium (Inouye, van Dyck, Alessi, Balkin, Siegal, & Horwitz, 1990). The CAM-ICU is a revision of this tool for use on ICU patients both on and off a ventilator. Based on this tool, delirium is described in terms of four indicative features and is considered positive when feature one plus feature two, and either features three or four are present (ICU Delirium and Cognitive Impairment Group of VUMC, 2002).

In order for the CAM-ICU to be an indicator for the presence of delirium, a patient's level of consciousness must be moderately sedate (able to move or open eyes to voice) to alert. Feature one of the CAM-ICU assesses whether or not there is an acute change or fluctuating course of mental status. Specifically, this feature is present if the patients presents differently 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 your hand 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. The third feature is present if the patient is any state of consciousness besides alert and calm. Feature four measures 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?” The last feature is present if the patient incorrectly answers one of the questions. In summary, 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 (ICU Delirium and Cognitive Impairment Group of VUMC, 2002). Please refer to Appendix A for a complete description of the CAM-ICU flowsheet.

Purpose and Rationale for Evaluation

The purpose of this evaluation was to assess the usability and knowledge testing of the Confusion Assessment Method for Intensive Care Unit [CAM-ICU] for nurses employed in the Medical Surgical Intensive Care Unit [MSICU]. The validity of the CAM-ICU delirium assessment tool is not in question, however, ensuring the CAM-ICU is being appropriately utilized in clinical practice by MSICU nurses required evaluation due to the potential need of quality improvement of the tool so that nurses are able to promptly detect and diagnose delirium within the clinical ICU setting. Consultations with key invested knowledge experts provided valuable information, such as nurses contain adequate understanding of the CAM-ICU, yet it was revealed that the nurses have often felt “intimidated” while using the CAM-ICU to assess delirium because they do not completely understand all aspects of the assessment tool, and how to use it in daily practice in the ICU. It was identified that nurses were declaring that a patient was CAM-ICU negative (absence of delirium) when they were actually CAM-ICU positive (presence of delirium). This evaluation was done by identifying areas where

staff nurses would need more education on how to adequately employ the CAM-ICU within their practice; in efforts to enhance detection of undiagnosed delirium in MSICU.

With this understanding, it is important to evaluate the usability and knowledge testing of the CAM-ICU tool for nurses in MSICU and identify areas where nurses need further education on how to appropriately and properly initiate this assessment to provide early diagnosis and treatment of delirium. These areas of knowledge gaps are specific to timely action and responsive care demonstrated by staff nurses of the MSICU.

Knowledge to Action (KTA) Framework

Conceptual frameworks are suggested as a way of using theory to improve application efforts. Professor Graham and colleagues at the University of Ottawa developed the KTA framework in Canada in the 2000's, resulting from a systematic review of 31 Planned Action Theories (Field, Booth, Ilott, & Gerrish, 2014). The framework is comprised of two components; including Knowledge Creation and an Action Cycle, where each of which contains multiple phases. Please refer to Appendix B for the complete Knowledge to Action Framework. In particular, the Action Cycle portion of the KTA framework was deployed in the data collection portion of this evaluation to implement the knowledge obtained in the early stages of the literature review and consultations with the key invested knowledge informants.

The Action Cycle details a course, representing the actions required for knowledge to be utilized in practice, and the knowledge is tailored to the local context; and, barriers and facilitators to its utilization are clearly assessed. Contribution of key invested knowledge informants and modifying knowledge to the needs of the individuals, who will use it, is essential (Field, Booth, Ilott, & Gerrish, 2014). As shown in Appendix

B, the Action Cycle is comprised of seven phases, in which, three phases were incorporated into the development of the second questionnaire distributed to nurses of the MSICU. The phases included were assessing barriers around knowledge use, sustaining knowledge use, and evaluating outcomes.

Methods

In order to further evaluate the usability and knowledge testing of the CAM-ICU for nurses in the MSICU, it was essential to collaborate with staff nurses who are involved in the utilization of the CAM-ICU tool on a daily basis. Collaboration with staff nurses is necessary in the effective development of an evaluation plan. A questionnaire was developed incorporating three phases of the KTA framework including: barriers to knowledge use; sustaining knowledge use; and, evaluating outcomes.

Recruitment and Data Collection

A convenience sample was recruited from nurses working within the MSICU of the Health Science Centre. Inclusion criteria included (a) employment as a nurse within the MSICU, and (b) ability to complete the questionnaire in English language. Exclusion criteria included nurses who did not work within the MSICU. An invitation to participate in the self-reporting questionnaire was given via a cover letter that detailed the practicum project, as well as how data was to be collected and kept confidential. Four staff nurses completed the questionnaire See Appendix C for a copy cover letter and Appendix D for a copy of the questionnaire.

Data Management and Data Analysis

Data obtained from collaboration with staff MSICU nurses was the result of the self-reported questionnaire. As stated above, four staff nurses completed the

questionnaire. The staff nurses will be described as Participant 1, 2, 3 and 4 in the results section of this report. The analysis of the data included a qualitative analysis of the information obtained from the interview with all four participants to highlight common themes. Data obtained from the questionnaire was analyzed at one time.

Results

The findings from this collaboration with these nurses are presented using the focus of each question posed in the questionnaire. The questionnaire was developed and guided by the KTA framework as per Appendix B.

Barriers to Knowledge Use

Both the previously conducted literature review and consultation with key invested knowledge experts identified existing barriers and facilitators concerning the utilization of the CAM-ICU within the MSICU. There were five barriers and 2 facilitators identified (See Table 1). The first question posed on the questionnaire referred to addressing barriers that existed concerning the utilization of the CAM-ICU in clinical practice. All participants agreed that the CAM-ICU should be completed at the beginning of the shift along with the remainder of the neurological assessment to ensure it would not be missed or overlooked. Also, Participant 3 and 4 addressed the issue of sedation, suggesting that CAM-ICU be addressed in patients who are heavily sedated during ‘sedation vacations.’ Participant 2 addressed the issue of lack of protocols emphasizing that the care of patients with delirium needs to be standardized, as many physicians have different views and handle situations differently. This can add stressors thus making it difficult for a protocol to be developed and followed. It was emphasized by all of the participants nurses that physicians within the MSICU environment need to come to an

agreement in terms of a standard of care. For example, the use of antipsychotic medications in the patient with delirium versus avoiding the use of antipsychotic medications in patients with delirium.

Table 1: Identified Barriers and Facilitators to Utilization of the CAM-ICU within the MSICU as presented by Participants

BARRIERS	FACILITATORS
<ul style="list-style-type: none"> i.) Nursing attitudes and beliefs ii.) Time consuming (especially when short staffed) iii.) High sedation levels iv.) Hesitant to change from status quo v.) Lack of coordinated structured approach (no protocols to direct care of patients with delirium) 	<ul style="list-style-type: none"> i.) Nurse champions ii.) Clinical Educator

Evaluating Outcomes

The second question posed to the staff nurses encompassed assessing the effectiveness of quality care audits and the measurement of nurses’ attitudes in improving the utilization of the CAM-ICU. Participating nurses 1, 2, and 3 agreed that audits and

surveys measuring nurses' attitudes would be an effective way to improve the utilization of the CAM-ICU. However, Participant 4 did not believe this would always be an effective solution due to the fact that results are not always circulated throughout the staff of the MSICU, and this may lead to negative feelings among nurses in the unit. As well, Participant 3 suggested that results of audits be released via email and in person during rounds, and at staff meetings at least once a week to the staff of the MSICU.

In addition to audits, Participant 3 and 4 identified further ways to improve utilization of CAM-ICU including the completion of case studies in which the CAM-ICU was effective in the early diagnosis and treatment of delirium. Participant 4 stressed the importance and need for senior staff to demonstrate strong leadership skills when working with newer staff nurses. Additionally, senior nurses should reinforce the use of the CAM-ICU and answer any questions that the junior nursing staff may have. This will help to lead to growth and development of the junior nurses when assessing patients that may or may not have delirium.

Sustaining Knowledge Use

The third question of the self-reported questionnaire covered sustaining knowledge use, which entailed how to ensure the utilization and continued utilization of the CAM-ICU. Participant 3 emphasized the importance of reinforcement and communication. Communication of results, especially long-term results, would be beneficial to the staff of MSICU as they are not involved in patient care once the patient is discharged from the MSICU. Participant 1 and 2 stressed the significance of education in sustaining knowledge use and how all staff, including nurses and physicians should be

aware of current evidence based practice on the diagnosis and treatment of patients with delirium.

Data Synthesis and Interpretation

Evaluation data obtained from the self-reported questionnaire completed by the staff nurses illustrated three common themes to improve the usability of the CAM-ICU among MSICU nurses. These included, the importance of leadership shown by senior nursing staff, the importance of evidence-based practice within the clinical area, and the importance of informed decision-making within clinical practice.

Leadership shown by senior nursing staff, especially to new nursing staff provides the opportunity for the reinforcement of appropriately utilizing the CAM-ICU can offer the chance to grow and develop in professional practice, allowing them to become more experienced at identifying and diagnosing delirium early. Furthermore, the importance of evidence-based practice and informed decision making was a common theme throughout the literature review, consultation with key invested knowledge informants, and presently the collaboration with staff nurses. The role of the clinical educator is essential in providing the MSICU nurses with the most recent research on delirium and CAM-ICU, ensuring that delirium is appropriately being screened and treated, in turn improving the quality of care of all patients within the MSICU.

Further evaluation of the usability and knowledge testing of the CAM-ICU among nurses in MSICU should be conducted. It would be ideal for the manager of the MSICU, as well as a MSICU nurse, to be involved in further data synthesis and interpretation of the CAM-ICU. A meeting involving all key invested knowledge informants is advised to obtain multiple diverse perspectives (McKenzie, Neiger, & Thackeray, 2013).

Additionally, a communication plan is also imperative, in helping to incorporate multiple key invested knowledge informants in the interpreting and knowledge dissemination of results. A step-by-step outline is provided below as recommendations for the unit as a working template (Table 2). If desired, managers and other key invested knowledge informants of the unit can implement this working template.

Table 2: Step-by-step Outline as Recommendations for the Unit as a Working Template

Step One: Data Collection	Step 2: Data Synthesis and Interpretation	Step 3: Recommendations
<p>-Post evaluation questionnaire results</p> <p>-Quality care audits concerning the use of the CAM-ICU delirium assessment tool in diagnosing delirium.</p> <p>-A larger scale measure of nurses' attitudes concerning the CAM-ICU</p> <p>Timeline: Continuous</p>	<p>-Management must decide on how evaluation results will be disseminated to MSICU staff (email, rounds, staff meetings, etc.)</p> <p>-One nurse from the MSICU staff should participate in data synthesis and interpretation concerning their work environment</p> <p>-Team meetings comprised of key invested knowledge experts should take place or continue to take place to obtain various viewpoints from different professions.</p> <p>Timeline: ~ 6 months</p>	<p>-Using the results obtained from the evaluation process, a plan to make any necessary changes to the utilization of the CAM-ICU can be made in addition to any further education and training that staff may require concerning the CAM-ICU</p> <p>Timeline: ~ 6 months to 1 year</p>

Conclusion

This report has been developed to contain recommendations based on the Evaluation of the Usability and Knowledge Testing of the CAM-ICU for nurses in MSICU. Additionally, it provides suggestions on how to further evaluate the CAM-ICU delirium assessment tool. The Knowledge to Action Framework was used as a guide in the development of the questions posed to staff nurses. Evaluation has only started, as many details will need to be considered including who will be completing the audits and how data from these audits will be distributed throughout the staff of the MSICU, as well as any alterations need to be made to the current practice of delirium screening or if further education on the CAM-ICU is required by staff nurses. Perhaps, a larger scale questionnaire should be distributed to the nurses of the ICU to obtain a wider range of data. This would require engagement by the nursing staff, medical team, and management in order to effectively implement evidence based practice which in turn will lead to prompt and appropriate care for patients with delirium in the MSICU.

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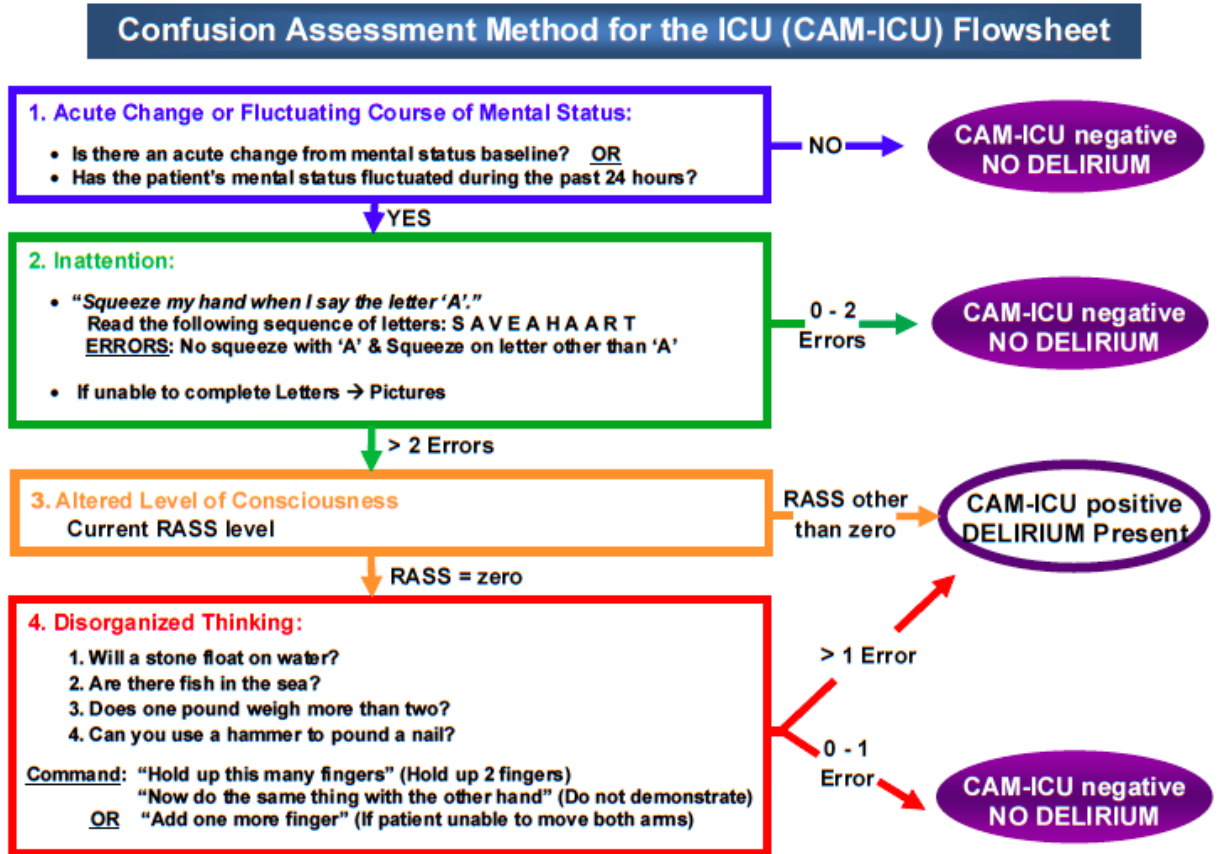
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Appendix A

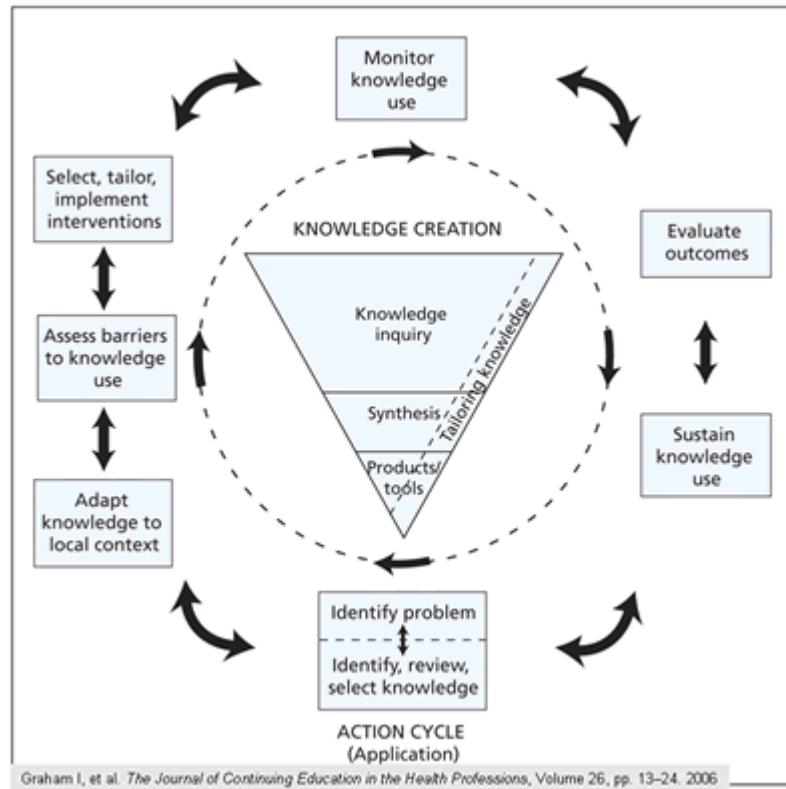
CAM-ICU Flowsheet



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Appendix B

The Knowledge to Action Framework



From Graham, I., Logan, J., Harrison, M., Strauss, S., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *The Journal of Continuing Education in the Health Professions*, 26, 19.

Appendix C

Letter of Introduction for Staff Nurses in MSICU

I am currently enrolled in the Master's of Nursing program and as a part of the practicum course I have decided to conduct an evaluation report on the delirium assessment tool, Confusion Assessment Method for Intensive Care Unit (CAM-ICU) in an Intensive Care Unit (ICU) setting. There is currently no evaluation plan concerning this assessment tool available to utilize within Eastern Health.

In March 2016, a questionnaire was distributed to five key invested knowledge experts. Valuable details were obtained from this questionnaire. In order to add to the valuable details obtained through the first questionnaire, it is essential to collaborate with staff nurses who are involved in the utilization of the CAM-ICU tool daily. Collaboration with staff nurses is essential in the effective development of an evaluation plan. Your expertise and experience with the CAM-ICU delirium assessment tool in an ICU setting is data that cannot be acquired elsewhere. Please note, your participation in this process is voluntary.

Please complete the interview questions at your earliest convenience. The completion of these interview questions will be deemed your agreement to participate in the consultation course. You will receive the questions via email and I will contact you via telephone to ensure that you have received the interview questions and to answer any additional questions you may have. The information obtained from this interview will be stored in a secure place and confidentiality will be maintained. Please feel free to contact me regarding any questions you may have about the interview questions at (709) 690-9273.

Thank you in advance for your time and support in this consultation process.

Ashlee Leonard, BNRN
Memorial University of Newfoundland
June 1, 2016

Appendix D

Questionnaire for Medical-Surgical Intensive Care Unit (MSICU) Nurses

Please answer questions listed below. Feel free to utilize more space for answers if necessary.

1.) From your clinical experience, what do you believe is the best way to address barriers, within your shift in utilizing the CAM-ICU? (i.e., time constraints, staffing issues, patient sedation level, and lack of delirium protocols)

2.) Do you believe the performance of quality care audits and measurement of nurse's attitudes is an effective solution in improving utilization of the CAM-ICU?

If yes, how (and how often) would you like to receive the data obtained from these audits and measurements?

If no, why not? Are there other effective solutions to improving utilization?

3.) In your opinion what might help you to be effective in utilizing and continuing to use the CAM-ICU tool in practice?

4.) How can you help to ensure that you will utilize the tool CAM-ICU in delirium assessment of ICU patients?

Appendix D- Executive Summary

Executive Summary

Ashlee Leonard

Memorial University

Executive Summary

This report details the phases of the practicum project completed, from January to August 2016, to evaluate the usability and knowledge testing of the delirium assessment tool, Confusion Assessment Method for Intensive Care Unit (CAM-ICU), for nurses in Medical Surgical Intensive Care Unit within the Health Science Centre hospital in St. John's, Newfoundland. The practicum project was comprised of three phases (1) a literature review, (2) expert consultations, (3) staff nurse consultations resulting in the development of an Evaluation Report. Based on the findings from the literature review, and consultations with key knowledge experts and staff nurses of the MSICU, recommendations are made on how to further evaluate the usability and knowledge testing of the CAM-ICU to ensure prompt detection and appropriate treatment of delirium in MSICU patients.

Phase 1. The literature indicated that delirium is a real concern for patients in the MSICU as well as the health care system as a whole thus demonstrating importance of delirium screening tools in the prompt diagnosis and treatment of delirium. Delirium screening tools, specifically the CAM-ICU was found to be an effective delirium assessment tool in detecting patients with or without delirium. Despite documented effectiveness of the CAM-ICU, there are still multiple barriers that exist regarding the utilization of the CAM-ICU, particularly by nurses, in clinical practice. Barriers include: nursing attitudes and beliefs, time, high sedation level, hesitancy to change from status quo, and lack of coordinated structured approach. Several literature gaps pertaining to the appropriate diagnosis and treatment were identified including medical- nursing

communication gap, lack of specialized education and training, time management, and lack of generalizability among available research.

Phase 2. Consultation with five invested key knowledge experts was conducted. All experts were employed within the MSICU and have experience with delirium and the CAM-ICU delirium screening tool. Consultants included: management, clinical educator, intensivist, senior ICU nurse, and a junior ICU nurse. All experts deemed the CAM-ICU as effective, especially in the detection of hypoactive delirium. However, despite agreed upon effectiveness of the tool, a number of barriers were identified pertaining to the utilization of the CAM-ICU. These included: nurses' attitudes and beliefs, sedation level, physicians' value of nurses' assessment findings, and lack of a coordinated structured approach to the management of delirium. Experts discussed a number of ways to improve the utilization of the CAM-ICU including: better discussion in rounds; strengthening of educational strategies offered to staff nurses regarding delirium and delirium screening tools; and, linking nursing practice to patient outcomes through the performance of quality care audit and measurement of nurses' attitudes.

Phase 3. An Evaluation Report was developed based on results obtained from self-reporting questionnaires completed by staff nurses of the MSICU. Self-reporting questionnaires, incorporating components from the Knowledge to Action (KTA) Framework (Graham et al., 2006), were distributed to ten staff nurses with four nurses completing the survey. Components included: barriers to knowledge use, evaluating outcomes, and sustaining knowledge use. Three thematic suggestions emerged from the discussion on how to address barriers to the utilization of the CAM-ICU. They were: performing assessment at the beginning of the shift, performing assessment during

sedation vacation, and most significantly, the development of a standard of care concerning the treatment of a patient with delirium to ensure that every patient with delirium is provided the same appropriate treatment based on evidence-based practice.

Reinforcement and communication were identified as possible solutions in sustaining the knowledge use and ensuring the use and continued use of the CAM-ICU in delirium screening. Communicating the results, especially long-term results, would be beneficial to the staff of MSICU as they are not involved in patient care once the patient is discharged from the MSICU. Participants also stressed the significance of education in sustaining knowledge use and how all staff, including nurses and physicians, should be aware of current evidence based practice on the diagnosis and treatment of patients with delirium.

Recommendations. All recommendations are made based on the results of the evaluation report. Step one consists of data collection including: post evaluation questionnaire results; the implementation of quality care audits concerning the use of the CAM-ICU delirium assessment tool in diagnosing delirium; and the conduction of a larger scale study to measure of nurses' attitudes concerning the CAM-ICU. Data collection should be continuous throughout the evaluation process. Step two consists of data synthesis and interpretation including: the decision on how results of quality care audits and measurement of nursing attitudes will be disseminated to the staff of the MSICU; the conduction of team meetings including individuals from all disciplines; and the collaboration with agencies such as the Canadian Patient Safety Institute to assist with the development of a standard of care for patients with delirium in MSICU. This step should take approximately six months to complete. Step three consists of applying the results

obtained from the audits and measurement of nursing attitudes to provide: additional clarification and education relating to delirium and treatment of delirium as well as a direction for the development of standards of care for patients experiencing delirium. The timeline for the initiation of these recommendations is six months to one year.