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ORIGINAL RESEARCH

Improving Nurses Knowledge and Practices of Delirium Assessment at Mbarara Regional Referral Hospital: A Quasi Experimental Study

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Background: Despite the recommendations for delirium assessment in clinical settings, it stills remain a serious clinical problem associated with prolonged mechanical ventilation, stress on the patient and family, and mortality. There is paucity of data regarding delirium assessment and prevention in developing world. The Confusion Assessment Method for Intensive Care Unit (CAM-ICU) was developed to aid in the assessment of delirium. There is no documented assessment of delirium and prevention in Uganda. This study evaluated the effect of an educational intervention on nurses' knowledge and practices of delirium assessment using the CAM–ICU tool.

Methods: We used a quasi-experimental and recruited a convenience sample of 29 nurses from ICU and ER. The assessment before and after the interventions was conducted using a self-completed questionnaire from October 2020 to January 2021. The interventions were delivered through face-to-face presentations, demonstrations, watching videos, and hands on practice. Data were entered into excel, cleaned and exported to Stata version 14. Median and interquartile ranges were used for continuous variables, and frequencies and percentages for categorical variables. The mean knowledge score was calculated before and after the intervention. A paired *t*-test was used to compare Pre- and Post-test knowledge and practice scores at $P < 0.05$.

Results: Majority (62%) were female, 48% were Diploma holders, median age was 30 (IQR = 28–32) years and median years of experience 3.5 (IQR = 3–4). The Mean knowledge scores was 10.7 (SD = 2.36) pretest and 19 (0.94) posttest. The mean practice score was 2 (SD = 0.83) pretest and 6 (0.35) posttest. There were significant differences in mean knowledge and practice scores before and after intervention mean of ($t(28) = 17.32$, $p < 0.001$) and ($t(28) = 25.04$, $p < 0.001$), respectively.

Conclusion: Educational intervention Improved nurses' knowledge and practice of delirium assessment. Continuous nursing education could improve nurses' knowledge of delirium assessment and thus quality of patient care.

Keywords: nurse, delirium, assessment, knowledge, practice, CAM-ICU

Background

Delirium is a common condition faced by critically ill patients in intensive care units and is a top priority worldwide. Between 30% and 80% of patients admitted to ICUs develop delirium, leading to prolonged hospitalization, self-extubation, prolonged mechanical ventilation, and mortality.[1–5] Delirium is defined as an acute brain dysfunction characterized by an alteration in cognitive levels, with the patient exhibiting signs and symptoms of inattention, disorientation, memory impairment, decreased consciousness, emotional changes and perseveration.[6–9]

Delirium in the ICU presents with behavioral problems such as hallucinations, delusions, anxiety, agitation, restlessness and insomnia.[10] The ICU patients with hyperactive delirium show agitation, hallucination, and delusions, while those with hypoactive delirium appear calm and lethargic, and those who vacillate between are identified as mixed delirium.[11–13] Despite the severity of delirium in ICU and advances in practice guidelines to encourage ongoing delirium assessment, many health care professionals have low awareness of delirium.[14,15] As a result, 50% to 72% of the cases are overlooked, misdiagnosed or unrecognized by attending physician and nurses, further increasing morbidity and mortality rates.[16,17] Previous studies have

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demonstrated that delirium is often not recognized because of insufficient knowledge and minimal educational emphasis in medical and nursing schools.[18] In prior studies, 75% of the nurses interviewed stated that, even after they received formal education on the topic of delirium, they could not differentiate between delirium and dementia.[19] Although education might play an important role in boosting delirium recognition, the optimal strategies to improve recognition and their usefulness are currently unclear, and several authors have pointed out the limitations of standard delirium teaching methods[20]

Delirium assessment, prevention, and treatment should be performed in all critically ill patients in the ICU using standardized tools such as Confusion assessment method for Intensive care unit (CAM-ICU) and now widely used around the world and the management of ICU delirium includes use of antipsychotic drugs like haloperidol and other pharmacological drugs like dexmedetomidine, however non-pharmacological measures remain the cornerstone of delirium management.;[21–24] however, studies have pointed out that nurses need adequate knowledge and skills in delirium recognition to use the tools.[25,26] In a multicenter study in Kampala using the CAM-ICU tool, researchers found that 51% of ICU patients developed delirium which if not treated could result into increased morbidity and mortality. Regardless of this high incidence and known negative outcomes nurses in the study still did not perform regular delirium assessments resulting in missing even more cases.[27]

Early detection of delirium depends on the knowledge and the experience of the critical care team. Nurses have the closest contact with patients and are the most equipped personnel to detect changes in the patient's mental status or behavior at an early stage.[28] Nursing staff Knowledge and practices are key in identifying delirium in ICU. Education and training are necessary to improve the knowledge and skills of care givers in using delirium assessment tools effectively.

Methodology

Study Design

A descriptive quasi-experimental design with pre- and post-test was used on nurses working in the ICU and a highly dependent unit. Basic knowledge of delirium assessment was established using a self –administered questionnaire, followed by an educational intervention and a post-test to determine effect. The study was carried out from October 2020 – January 2021.

Study Area

The study was conducted at the Mbarara Regional Referral Hospital (MRRH) in southwestern Uganda. The place of study is a public university teaching hospital with a capacity of 1000 beds. The Intensive care unit has a capacity of 8 beds and the ward for highly dependent patients has a capacity of 7 beds with a 24-hour nursing service. These two units treat critically ill patients who are at risk of delirium. The hospital serves as the regional referral hospital for south-western Uganda and receives patients from districts in south-western Uganda. It offers inpatient and outpatient healthcare services.

Study Population

Nurses working in the intensive care unit and high care unit at MRRH participated in the study. Most of these nurses are not specialized but have gained some work experience. A total of 29 nurses worked in these units. Because MRRH is at the top in this region that region, most critically ill patients may be referred there and therefore these nurses will most likely treat these patients, therefore their level of delirium assessment can provide insight into nurses' knowledge of delirium and delirium assessment and prevention. The two service areas were chosen because they care for critically ill patients who are most prone to delirium.

Sample Size

The two units ICU and HDU has 29 nurses caring for critically ill patients. For a paired test analysis, a prior power analysis resulted in a total sample size of 22 participants to detect a large effect. (Cohen's d = 0.5) with = 0.05 and 1-β=0.95 (Faul et al, 2009). Expecting a 10% turnover, the researcher aimed to have all 29 nurses participate in the study.

Sampling Technique

Because the number of nurses working in the Intensive Care Unit and high care unit was small, the researcher used a population sampling approach, recruiting all eligible nurses working in the ICU and HDU for the study.

Inclusion

Nurses who were working in the ICU and HDU at the time of data collection and had at least 3 months of experience working directly with critically ill patients were eligible to participate in the study. This was done to ensure maximum patient care experience.

Exclusion

Nursing professionals who were on vacation and had other commitments and who had not yet spent at least 3 months at the time of data collection for basic knowledge were considered ineligible to participate.

Data Collection Instruments

Tools Were Used

Tool one was a self-administered questionnaire used pre and post intervention to measure knowledge. The pre-interventions tool included a demographic section including age, gender, level of education and years of experiences. It also had 15 items adopted from a tool developed by[29] with necessary modifications and some items on perceptions dropped because they were not relevant to the study. The tool was further reviewed by expert nurses in critical care one Senior ICU physician and one senior psychiatrist experienced in care of critically ill patients with delirium with a content validity index of 0.86. The knowledge questions related to delirium, its presentation, risk factors, and prevention and management. Knowledge questions on a Likert scale were dichotomized as "Yes" for strongly agree and agree and "No" for strongly disagree and disagree, 1 for "Yes" and 0 for "No". Knowledge questions that were not on a Likert scale were coded "Yes=1" for the correct response and "No=0" for an incorrect response.

Tool 2: This handout was used to help respondents assess delirium. It was developed by the researcher after reviewing the related literature.

Tool 3: The Confusion Assessment Method for Intensive Care Unit (CAM-ICU), the tool non-psychiatric nurses are expected to use to detect delirium, has been validated both in western world and has sensitivity of 93–100%, a specificity of 98%–100%, and high inter-rater reliability ($\kappa = 0.96$) in detecting delirium, and the tool takes about 3 to 5 minutes to assess delirium.[30] Another study by[31] it was found that the CAM-ICU inter-rater reliability Kappa (= 0.85) and Cronbach's alpha coefficient 0.69 (95% CI: 0.57–0.79).

Tool 4: The Richmond Agitation-Sedation Scale (RASS), is an arousal scale commonly used in intensive care units to assess for depth of sedation.[32] But has been incorporated into several delirium assessments to assess for level of consciousness.[33] RASS is a 10-point scale with four levels of anxiety or agitation (+1 to +4 [combative]), one level to denote a calm and alert state (0), and 5 levels of sedation (−1 to −5) culminating in unarousable (−5). The RASS has inter-rate reliability k = 0.80 (95% CI 0.69–0.90).

Data Collection Procedures

Ethical approval was obtained from Mbarara University of Science and Technology Ethics Committee (MUST-REC) #MUREC 1/7-20. We sought approval from the management of Mbarara Regional Referral Hospital. The researcher contacted the senior nurses of the two wards and arranged a meeting with the nurses, where the researcher explained the purpose of the study and the relevant details. Written consent was obtained from the study participants before they were given the pretest questionnaire. The data to measure intervention outcome were collected by the main researcher.

Pre-intervention phase: The Pre-intervention data using tool one was collected one week before the Intervention phase using a self –administered pretest questionnaire. The outcome of this data was used to measure previous knowledge and to modify teaching based on their knowledge. Respondents answered the questionnaire in an average of 30 minutes, were not allowed to cite any sources and gave it to the researcher immediately after completing it.

Intervention phase: A one and half hour face to face educational session was provided during the intervention phase. The sessions were provided twice a day for a period of three weeks to include nurses on the different shifts and this was done after the nurses eight hour shift to avoid disruptions with unit duties for both day and evening nurses.; both sessions were held on the same day and four nurses were attending the sessions two from each unit. The training session aimed to

increase nurses' knowledge of delirium in ICU, risk factors, and types of delirium, delirium assessment and delirium management. The validated CAM-ICU assessment tool was introduced. Participants were shown two five-minute videos, adapted by the Critical Illness, Brain Dysfunction, and Survivorship (CIBS) Center, showing how the CAM-ICU assessment tool is administered in clinical practice. This was followed by a case study scenario, adapted from CAM-ICU Training Manual, Revised edition to test the nurses' understanding of the use of the CAM-ICU tool.[34]

Respondents received a folder containing delirium informational pamphlets, a pocket card containing the Richmond Agitation–Sedation Scale (RASS) and CAM-ICU tool, a pen, assessment forms, and a set of case study scenarios. The RASS was provided because CAM-ICU is used concurrently with RASS for the patients who are sedated as this determines when assessment of delirium should start.

Post Intervention phase: The participants were asked to complete the Post intervention test one-month post-formal instruction and monitoring of the tool to assess the effects of the educational intervention on the nurses' knowledge on the use of the CAM –ICU in the management of delirium.

Data Management and Analysis

Data were analyzed using STATA version 14 for statistical analysis using descriptive statistics. For continuous variables, mean values and standard deviations (SD) or medians and interquartile ranges were used after fulfilling the assumption of normality using skewness and kurtosis. In addition to the overall assessment, each item was analyzed separately. A paired *t*-test was used to compare participants' knowledge and practice of delirium assessment before and after the intervention.

Results

The median age of nurses was 30 (IQR = 28 to 32) and 62% were females. Of the all participants 48% had diploma as the highest level of education with the median years of experience of 3.5 years on an interquartile range[1] of 3 to 4 years as shown in Table 1.

Nurses' Delirium Knowledge Assessment

For better interpretation of knowledge, the total mean sum score of nurses knowledge on delirium assessment before education intervention was 10.7 (SD = 12.36) and after the intervention it was 19 (SD = 0.94). A paired *t*-test was performed to compare total knowledge scores before and after the test to determine the significance of the difference in

Table 1 Descriptive Statistics of Characteristics of Respondents N=29

Characteristic	**N (%)**
Gender	
Male	11 (38)
Female	18 (62)
Level of education	
Certificate	8 (28)
Diploma	14 (48)
Bachelor's	5 (17)
Master	2 (7)
Years of experience (median(IQR))	3.5 (3–4)
Age (years) (Median (1QR))	30 (28–32)

nurses' knowledge in the delirium. There was a statistically significant mean increase in nurses' knowledge of delirium assessment ($t(28)=17.32$, $p < 0.001$) (Table 2). Table 3 shows the scores for each item for the pre- and post-intervention phases; similar to how there was an improvement in those respondents who answered the questions correctly in the post-intervention phase. Highly significant differences between pre- and post-intervention were found for six items, definition of delirium, cardinal signs of delirium, diagnosis of delirium treatment and prevention, and risk factors of delirium.

Nurses Practices for Delirium Assessment

Participants' total mean sum scores on delirium assessment before intervention were 2 (SD 0.83) and 6 (SD 0.35) after the intervention. A paired *t*- test compared pre-intervention assessment total score with post-intervention total score to

Table 2 Paired *t*-Test Results of Scores on the Nurses' Delirium Knowledge Assessment Before and After the Educational Intervention (N = 29)

	Mean	Standard Deviation	t-test	P-value
Pre-score	10.7	12.36	17.32	p<0.001
Post-score	19	0.94		

Table 3 Nurses' Knowledge Pre and Post Educational Intervention Questions (N = 29)

Knowledge Assessment	Pre Test	Post Test	
	Yes N (%)	Yes N (%)	P-value
Delirium is an acute change in mental status associated with physical or mental illness	12(41)	26(90)	0.025
Do you know the cardinal signs of delirium	2(7)	28(97)	0.031
There is no blood, electrophysiological or imaging test for ICU delirium	16(55)	26(90)	0.042
Do you know the outcomes of ICU delirium	6(21)	23(79)	0.160
Increasing sedation at night does not shorten duration of delirium	10(34)	26(90)	0.184
A patient who is comatose cannot be screened for delirium	16(55)	28(97)	0.259
A patient who meets criteria for delirium but does not score high enough for positive delirium screening is Subsyndromal delirium	7(24)	26(90)	0.302
Haloperidol(Haldol) is a pharmacological agent of choice for treatment of delirium	11(38)	28(97)	0.028
Dexmedetomidine hydrochloride(Precedex) is associated with decreased incidence of delirium	3(10)	28(97)	0.030
Patients with delirium are always physically and verbally aggressive	18(62)	4(14)	0.566
Delirious Patient faces difficulty in following conversation	22(76)	27(93)	0.067
Mechanical ventilation is a risk factor for delirium	19(66)	28(97)	0.460
Electrolyte imbalance is a risk factor for delirium	20(69)	27(93)	0.029
History of dementia is a risk factor for delirium	18(62)	27(93)	0.061
Age increases the risk of delirium	18(62)	27(93)	0.252
Drugs like benzodiazepine increases the risk of delirium	17(59)	26(90)	0.050

(*Continued*)

Table 3 (Continued).

Knowledge Assessment	Pre Test	Post Test	
	Yes N (%)	Yes N (%)	P-value
Neurological conditions are risk factors of delirium	25(86)	25(86)	0.484
History of smoking is a risk factor for delirium	15(52)	28(97)	0.326
Being post -operative is a risk factor for delirium	15(52)	28(97)	0.292
Alcoholism is a risk factor for delirium	23(79)	28(97)	0.046
Comatose state at any point during admission is a risk factor	16(55)	28(97)	0.129

ascertain the significance in the difference of participant knowledge. There was a statistically significant mean increase in nurses' practices (28) = 25.04, $p < 0.001$. There was a statistically significant mean increase in nurses; practices of delirium assessment ($t(28)=17.32$, $p < 0.001$) (Table 4). There was a statistically significant mean increase in nurses' practices (28) = 25.04, $p < 0.001$. There was a statistically significant mean increase in nurses' practices on delirium assessment ($t(28) = 17.32$, $p < 0.001$) (Table 4). Table 5 shows the scores for each item for the pre- and post-intervention phases; similar to how there was an improvement in those respondents who answered the questions correctly in the post-intervention phase. Significant differences between pre- and post-intervention were found for four items: presence of a sedation protocol, frequency of sedation assessment, presence of a delirium assessment tool, delirium assessment, and the usual and used delirium assessment methods that referred any abnormal behavior to a psychiatrist.

Three common methods were used to assess delirium prior to intervention. These included referring any abnormal behavior to psychiatry, asking patients to follow commands, and identifying agitated related events. After the intervention, the common assessment method was the use of the CAM-ICU tool (Figure 1).

Table 4 Nurses' Practice Questions Before and After Intervention (N = 29)

Practice	Pre-Test	Post-Test	
	Yes	Yes	P-value
	N (%)	N (%)	
ICU has a sedation protocol/guideline	20(69)	28(97)	0.029
Sedation protocol specify frequency for delirium assessment	6(21)	28(97)	0.003
Level of sedation is frequently assessed	13(45)	27(93)	0.641
ICU has delirium assessment tools	2(7)	28(97)	0.032
Presence of delirium is frequently assessed	2(7)	27(93)	0.690
Delirium assessment is done once every eight hour shift	2(7)	28(97)	0.027

Table 5 Paired *t*-Test Results of Scores on the Nurses' Practices on Delirium Assessment Before and After the Educational Intervention (N = 29)

	Mean	Standard Deviation	*t*-test	P-value
Pre-score	2	0.83	25.04	p<0.001
Post-score	4	0.35		

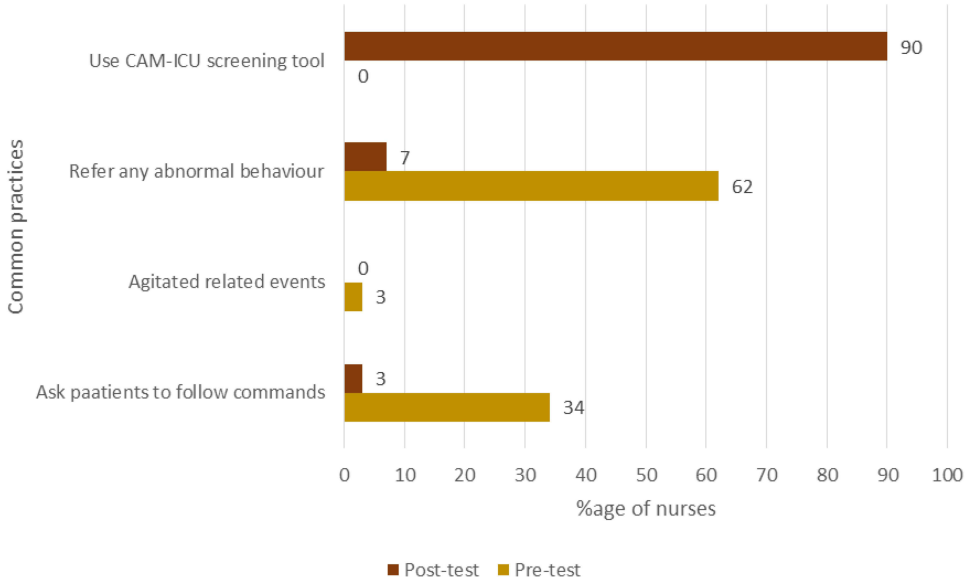

Figure 1 A graph showing common methods used to assess patients for delirium stratified by Pre and Post- test.

Discussion

Participants had not received any training in diagnosing delirium. This would also be attributed to the limited scope of practices for the participants, insufficient organizational support for their continuing education, as well as the lack of delirium assessment in their nursing curriculum at their training level. The mean total score of nurses' knowledge of delirium assessment prior to the training intervention (10.7, SD 12.36) is relatively low compared to baseline means reported in other studies.[35] A possible reason for the different results could be that nurses in this field of study were registered nurses who may not have this topic of delirium in their curriculum. However, at the post-intervention level, a significantly higher mean knowledge score was found (19, SD 0.94), showing that a brief educational intervention had a significant impact on nurses' knowledge of delirium assessment and intervention.

Inadequate knowledge of definitions, outcomes, signs of ICU delirium, and the preventive measures reflected a low level of education on this topic. This is in line with the results of several studies.[35–37] The greatest discrepancy was in knowledge of cardinal signs, definition of ICU delirium, and outcomes. This could be due to lack of awareness by the nurses of ICU delirium. The majority of participants were unaware that haloperidol is the pharmacological agent of choice for the treatment of delirium in the ICU, despite its broad recommendations in most of the literature. This is consistent with a study conducted in Jordan which found that nurses had insufficient knowledge of how delirium is managed in the ICU.[38,39] However, this is in contrary to a study by[40] in which nurses were aware of haloperidol as the pharmacological agent of choice for the treatment of delirium in the ICU. However, the nurses in that study had received some critical care training and continuous in service education prior to the study.

Although participants' knowledge in this study improved after the intervention, it was found that scores for some of the questions did not improve significantly, particularly those related to general risk factors for delirium. As reported in previous studies, nurses in general have some difficulties in identifying risk factors for delirium.[41]

In this study, the majority of nurses reported that they did not have delirium assessment tools in their departments and reported that they assessed delirium at most once in their eight-hour shift. These actions may reflect that the nurses do not recognize delirium as a serious problem, had little or no knowledge about delirium, and there were no delirium guideline in the unit. This is consistent with a study done by[42,43] where the nurses stated that they never did delirium assessment in their twelve hour shift, frequently of delirium assessment were not specified, and they had no delirium tools on their units. The findings are also consistent with a study done by[38] where the majority of the nurses had never assessed for ICU delirium.[44] These findings contrasts with[38] where the respondents had delirium assessment tools in their unit and assessed delirium every eight hour shift. In this study, the common methods used for assessing delirium were agitated related

events, the patient's ability to follow commands, and a psychiatry consult for any abnormal behavior (once or more per shift) 34% and 62% consequently. While agitated related events were rarely used to evaluate the presence of delirium (3%). ICDSC and CAM – ICU were never being used by all nurses. This could be due to the fact that the hospital and the unit management have not established a delirium guideline or does not have a formal policy that specifies the correct and easy method to use in the assessment of delirium. These findings are in line with[37] where nurses reported utilizing psychiatric consult as well as asking patients to follow commands and that CAM-ICU was never utilized by the majority of the participants despite its wide recommendation in the established literature.

Study Limitations

The main study limitation was the small sample size that limited generalizability. The hospital departments studied were representative of other general hospitals and the results may be of use to other clinicians. Due to the nature of the study design as applied to this study, there was no control group to compare the results to and this may have affected the internal validity of the study. Intervention studies generally recommend a minimum of 6 weeks to collect data post-intervention. In this study, however, we performed post-intervention data collection at 4 weeks, as adopted from some studies that considered a minimum of 4 weeks post-intervention to be sufficient. The argument is that the participants' memories of the training content may have been quite fresh, with seemingly very good results. Intervention studies generally recommend a minimum of 6 weeks to collect data post-intervention. However, in this study; we performed post-intervention data collection at 4 weeks, as adopted from some studies that assumed a minimum of 4 weeks.

Conclusion

Prior to the educational intervention, there was generally little basic knowledge of delirium assessment among nurses. On the other hand, the educational intervention significantly improved nurses' knowledge and practices on delirium assessment. Delirium assessment could be included in the hospital's continuing medical education plans so that information about delirium can be shared and well explained to all nurses to improve their knowledge of delirium. Also an appropriate assessment tool and training of nurses in delirium assessment contributes to the majority of nurses assessing delirium and therefore having an impact on delirium assessment in critically ill patients.

Recommendations

Based on the results of this study, there is a need to organize regular training for nurses on delirium assessment in critically ill patients. This equips staff with knowledge and skills to improve the quality of patient care. Delirium assessment, including delirium assessment of critically ill patients, should be included in the curricula of nurses at various levels of nursing education where those nurses are expected to work in critical care to provide quality care. There are reliable and valid tools that can be used to do this, and hospital unit policies should include the tools and necessary services for nurses to ensure the appropriate standard of care.

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Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Disclosure

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