

## We can Do it: Nursing Educational Intervention to Increase Delirium Documentation

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### Abstract

**Background/Objectives:** Delirium is a widely recognized complication during hospitalization, but poorly documented. We examined the effectiveness of a geriatrician-guided delirium training intervention to increase nurses' delirium documentation, knowledge, and self-confidence.

**Design:** Prospective cohort study

**Setting:** Orthopedic surgical inpatient unit

**Participants:** Twenty-six nursing staff

**Intervention:** Nurses participated in a geriatrician-guided delirium training intervention. Each nurse received two 45-minute didactic sessions on delirium causes, screening, and prevention using the Confusion Assessment Method (CAM).

**Measurements:** Nursing delirium documentation pre- and post-educational intervention was determined during the months of March and June 2013. Nurses also completed a pre- and 3-month post-interventional survey to assess confidence and knowledge of delirium detection.

**Results:** Nursing mean age was 46 years, with 17 years of experience. Patients with CAM documentation increased significantly post-intervention from 13 to 91% ( $p < 0.001$ ). On average, rate of nursing CAM documentation per shift increased from 5.5 to 70.8%, ( $p < 0.001$ ). Post-interventional nursing knowledge scores significantly improved from 44 to 73% correct ( $p < 0.001$ ). As compared to pre-intervention, nurses scored significantly higher on number of delirium risk factors from 32 to 71% ( $p < 0.001$ ), medications to avoid in the elderly from 20 to 70% ( $p < 0.001$ ), and correct management strategies for patients with delirium from 52 to 84% ( $p < 0.001$ ). Nurses' confidence in detecting delirium increased significantly post-intervention from 7.8 to 8.6 points out of a 10-point scale ( $p = 0.021$ ).

**Conclusion:** Nursing knowledge and documentation of delirium using the CAM, as well as nursing confidence in identifying delirium all significantly increased after formal geriatrician-guided educational intervention.

**Keywords:** Acute inpatient care and nursing; Delirium screening; Confusion assessment method

### Introduction

Delirium is widely recognized as a significant and possibly preventable complication during hospitalization, but is poorly documented in the electronic medical record [1]. Often under-recognized, if left untreated delirium is associated with serious health and quality-of-life consequences, including increased risk of morbidity and mortality, as well as greater functional dependence after discharge. Overall delirium incidence ranges widely, from 14-56% of hospitalized older patients, with a reported 9-65% incidence in those patients undergoing orthopedic fracture repair [2-6].

Complications of delirium include longer hospital stays, prolonged cognitive impairment and significant emotional distress to the patient and caregivers [7]. The financial burden of delirium is staggering, totalling more than \$16,303 to \$64,421 per patient, with direct 1-year health costs estimated to exceed \$143 to \$152 billion [8,9]. Unsurprisingly, the United States has seen rapid growth of multi-component interventional and educational programs aimed to prevent, screen, and reduce delirium occurrence and its complications [6,10].

Among the most commonly used delirium screening tools, the Confusion Assessment Method (CAM) boasts high sensitivity (0.94-1.0), specificity (0.90-0.95), and ease of use [11,12]. Initially created as a 4-item tool to facilitate clinical diagnosis by non-psychiatrists, the CAM was derived from delirium diagnosis criteria outlined in the third edition of the Diagnostic Statistical Manual [11]. A positive CAM screen for delirium is characterized by affirmative assessment

that a patient's mental status has both (1) acute onset and fluctuating course and (2) inattention, and either (3) disorganized thinking, or (4) altered level of consciousness [11]. When systematically compared among other bedside instruments, the CAM has demonstrated the best ease of use, supportive evidence-base, and time efficiency, requiring less than five minutes to administer [13]. Worldwide, the CAM has been validated in many clinical settings and has been translated into more than 20 different languages [12,14-16]. Subsequent adaptations of the CAM have included a longer version (Long CAM), CAM for the Intensive Care Unit (CAM-ICU), Family CAM (FAM-CAM), CAM severity score (CAM-S), and the 3-minute diagnostic assessment (3D-CAM) [17-22].

While studies agree that delirium education is a fundamental component of quality patient care in the hospital, formal geriatric educational programs such as the Nurses Improving Care for Health system Elders (NICHE) and the Hospital Elder Life Program (HELP) are not universally present in all hospitals [23-26]. Barriers to widespread

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adoption of delirium education include lack of hospital staff time and resources, and slowed response to cultural change in the medical field.

Aligned with recommendations from the American Geriatrics Society Expert Panel on Postoperative Delirium in Older Adults, an interdisciplinary approach to delirium education has been shown to improve knowledge and outcomes [27]. In our study of an orthopedic surgical inpatient unit, we examined the effectiveness of a geriatrician-guided delirium training intervention using the CAM to increase nurses' delirium documentation. As a secondary aim we also evaluated post-interventional improvement of nurses' delirium knowledge and self-confidence.

## Methods

### Study design and participants

Participants consisted of registered nurses working in a 30-bed orthopedic surgical unit at a tertiary care hospital. As part of a quality improvement collaborative for delirium education, nurses attended two 45-minute geriatrician-guided "orientation" and "refresher" didactic sessions on delirium knowledge and assessment about 3-months apart. A core committee (S.W.C., N.M., K.B., L.M.) of geriatricians and a biostatistician convened to evaluate and approve the lecture content. All sessions were taught by the same geriatrician (S.W.C.). In both sessions, nurses were instructed specifically on the fourth edition Diagnostic Statistical Manual criteria for delirium, types of delirium, pre-disposing and precipitating factors for delirium, and the implications and complications of delirium in the hospital setting. Participants were also taught the Mini-Cog screen for establishing baseline cognitive status as well as the CAM [11,28]. Following each didactic session, participants were provided case-based exercises for group practice and invited to share experiences and questions for discussion. Approximately three months following the orientation session, each nurse was required to attend a refresher session taught by the same geriatrician. A copy of the 45-minute didactic slides may be found on the Portal of Online Geriatrics Education [29].

### Measures

**Primary outcome:** To assess delirium documentation for a hospital stay, all patients admitted to the surgical unit aged 65 years or greater were included in the study. Chart review was completed to obtain patient demographics such as admission diagnosis, whether the surgery was elective or urgent, age, gender, dementia diagnosis, and length of stay. Nursing shifts were defined by 8-hour blocks (day, evening, and overnight). A patient's start of care was determined by the first nursing shift entry in the medical chart, and labeled as 0 (CAM not documented) or 1 (CAM documented). Use of CAM was further divided into positive and negative results based on criteria previously defined by Inouye and colleagues [11]. Nursing shift documentation was also reviewed for independent descriptive key words that might indicate delirium, such as "confusion" or "agitation." A patient's unit stay was considered complete if the patient was discharged from the hospital, or if the patient was transferred to another unit.

We evaluated CAM documentation in two ways. First, we compared the pre- versus post-intervention percent change in patients with any CAM documented divided by total number of patients for that time period. Second, we calculated rate of CAM documentation per patient shifts. Given that nursing shift documentation may be subject to unanticipated acute events resulting in irregular interval documentation, we calculated total number of nursing shifts available as the total number of documented nursing shifts, excluding multiple

assessments within the same 8-hour shift (7 am-3 pm, 3 pm-11 pm, 11 pm-7 am). If there was any positive CAM assessment within the multiple assessments, that episode was counted as the representative assessment for the shift. If there was more than one positive CAM per shift, the CAM with the more positive findings (i.e. all four features positive) was used. Rate of CAM documentation per patient was calculated as the total number of nursing shifts with any CAM assessment done divided by the total number of documented nursing shifts for each patient. Nursing delirium documentation was evaluated in either of two ways: (1) using the pre-existing CAM application built into the hospital electronic medical record, or (2) using the "free-type" portion of the nursing chart for writing additional notes that referenced clinical findings suggestive of delirium. Based on the limited results, free-typed words referencing delirium were subsequently categorized into "delirium," "confusion or confused," or "documented otherwise."

**Secondary outcome:** To assess change in knowledge, the nurses were asked to complete a delirium knowledge and self-confidence survey prior to receiving any aforementioned delirium training sessions, and again 3 months after receiving both 45-minute sessions. The same core committee of geriatricians and a biostatistician convened to approve the content of the pre- and post-intervention tests. Test questions were identical in content but ordered differently. Delirium knowledge questions pertained to features of the CAM, delirium pre-disposing and precipitating factors, medications to avoid in the elderly, and best non-pharmacological and pharmacological management strategies for delirium in an elderly person. Each correct response was awarded 10 points, for a maximum total score of 80 points.

Delirium confidence questions included a 10-point Likert rating scale (10 connoting strongest agreement) where participants indicated along a numbered line the relative strength of agreement or disagreement that "delirium is an important patient issue to learn about," and "I am confident in my ability to identify delirium in my patients." A copy of the pre- and post-test questionnaires are available on the Portal of Online Geriatrics Education [29].

### Statistical analysis

All analyses were conducted in SAS version 9.2.30 Patient and nursing characteristics were described with standard statistics. Paired sample t-tests were conducted to compare differences in pre- and post-intervention delirium documentation using CAM or free-type, as well as change in delirium knowledge and confidence scores across the three-month period. Patients observed in March 2013 (pre-intervention) served as historical controls for patients observed in June 2013 (post-intervention). Chi-square tests were conducted to determine the association between pre- and post-intervention scores and correct response for delirium knowledge and confidence. Statistical significance was evaluated at  $\alpha=0.05$ .

## Results

**Demographics:** Among the 26 nurses who participated in the pre- and post-intervention survey, average age was 46 years, with an average of 17 years of nursing experience. All but one nurse was female. Average time working on the unit was 14.2 years. Table 1 highlights that there was no difference in the patient sample, pre- and post-intervention periods. Nursing records for 53 patients pre-intervention and 75 patients post-intervention were reviewed. Overall patient average age was 71.6 years. In the post-intervention group, patients were 59.1% female, 24% with hip fracture, and 8.1% with dementia, with a 4.4 day length of stay as compared to the pre-intervention

group (75.0%, 15.1%, 5.7%, and 4.6 days, respectively). There was no statistically significant difference noted in these measures.

**Primary outcome:** As seen in Figure 1, the total percent of patients with any nursing CAM documentation increased 7-fold from 13.2 to 90.9% post-intervention ( $p < 0.001$ ). The average rate of CAM shift documentation per patient increased significantly from 5.5% pre-intervention to 70.8%. There were no delirium-positive CAM results for the pre-intervention phase, and there were 3 positive CAM cases (4.3%) identified in the post-intervention phase (Table 2). Additional “free-write” descriptive nursing documentation increased slightly from 9.4 to 15.9% but not statistically significantly post-intervention. In the post-intervention phase, nurses used a greater variety of words to describe possible delirious behavior, including “confusion” or

“confused” (a little more than 9 percent of the time in both groups), and “documented otherwise” – such as “has dementia” (5.3% in the post-intervention as compared to 0% pre-intervention). Notably, the actual word “delirium” was recorded only once via “free-write” in the post-intervention phase.

**Secondary outcome:** Nursing showed significant improvement in knowledge of delirium risk factors, presentation, and screening post-educational intervention, improving overall scores by 60 percent post-intervention ( $p < 0.001$ ) (Table 3). As compared to pre-intervention, nurses identified more than twice the percent of delirium risk factors (from 32% to 71%,  $p < 0.001$ ), more than 3.5 times the percent of medications to avoid in the elderly (from 20% to 70%,  $p < 0.001$ ), and 60 percent greater correct matches for appropriate non-pharmacological and pharmacological management strategies for patients with delirium (from 52% to 84%,  $p < 0.001$ ). Correctly identifying the CAM acronym (Confusion Assessment Method), “what features must be present for a CAM positive screen,” and “what features may be present for a CAM positive screen” improved post-intervention, however this difference was not statistically significant ( $p = 0.082$ ).

Nurses also reported a 70% increase in confidence for detecting delirium in their patients post-intervention ( $p = 0.021$ ). Overall importance rating for understanding and knowledge about delirium was high at baseline (9.4), and increased by one-tenth of a point post-intervention.

Demographics	Baseline (n, %)	Follow-up (n, %)	p
sex (female)	129, 63.2	110, 72.8	ns
age			
<30	1, 0.5	1, 0.7	ns
31-50	33, 16.2	28, 18.5	ns
51-70	102, 50	68, 45	ns
71+	62, 30.4	54, 35.8	ns
urban	108, 52.9	78, 51.7	ns
aware of cessation recommendation	112 (54.9)	70 (46.4)	ns
Aware of PSA		80 (53)	

Table 1: Survey demographics.

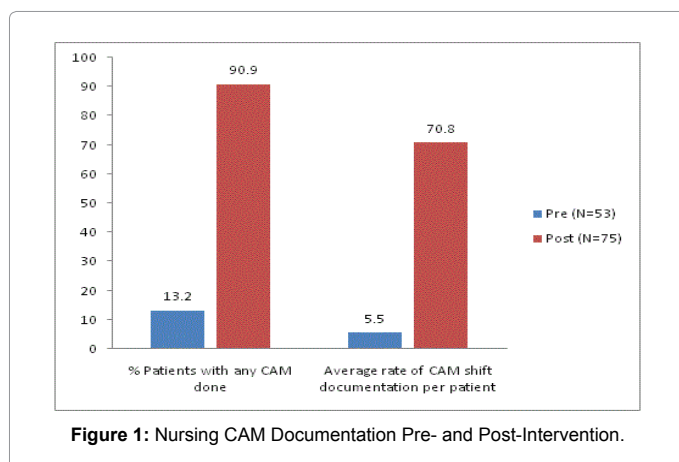


Figure 1: Nursing CAM Documentation Pre- and Post-Intervention.

## Discussion

Our results demonstrate that a formal, geriatrician-guided delirium training session using the Confusion Assessment Method is a feasible way to increase delirium documentation, knowledge, and confidence in detection among nurses caring for elderly hospitalized patients. Our findings coincide with prior studies advocating interdisciplinary delirium training sessions to improve quality of patient care in the hospital setting [27-31]. Our work additionally adds insight into behavioural and cognitive changes in nursing documentation, knowledge, and confidence in delirium assessment for their patients.

Nurses improved significantly in their rate of CAM documentation, which was our primary outcome measure. As a pre-existing application within the nursing electronic medical record, the CAM is a noninvasive screening tool easily incorporated into regular nursing clinical assessment. In this intervention, three months following the initial educational intervention, nurses continued to demonstrate consistent use of the CAM during routine patient assessment.

Delirium knowledge also increased significantly for the specific survey questions that pertained to identification of delirium risk factors, medications to avoid in the older patient population, and matching of non-pharmacological/pharmacological interventions to specific pre-disposing delirium conditions (i.e. Manage presbycusis with patient’s hearing aid or a voice amplifier). In contrast, nurses did not improve significantly on correct identification of the four cardinal CAM features (acute onset and fluctuating course, inattention, disorganized thinking, altered level of consciousness). This may be due to nurses recognizing that knowledge of delirium risk factors and non-pharmacological/pharmacological interventions align directly with quality patient care whereas memorization of the four cardinal features of the CAM is unnecessary when each feature is already pre-listed in the electronic medical record. Nurses therefore had no need to score their CAM assessments, and could check the boxes of any CAM features present during the clinical assessment.

Characteristic	Baseline (n,%) (n=204)	Follow-up (n, %) (n=151)	p
worried about driving ability	152 (74.5)	121 (80.1)	ns
sex (female)	101 (62.7)	96 (75)	ns
urban	91 (56.5)	66 (51.6)	ns
cessation recommended	112 (54.9)	70 (46.4)	ns
individual still driving		52 (40.6)	ns
action taken to prevent driving	161 (78.9)	128 (84.8)	ns
shared concerns with the driver	144 (70.6)	113 (74.8)	ns
shared concerns with a physician	119 (58.3)	99 (65.6)	ns
refused to be a passenger	25 (15.5)	19 (14.8)	ns
contacted registry of motor vehicles	21 (13)	15 (11.7)	ns
sold a vehicle	21 (13)	14 (10.9)	ns
hid car keys	44 (27.3)	29 (22.7)	ns
other	65 (40.4)	35 (27.3)	ns

Table 2: Subgroup analysis of caregivers with worries about driving ability.

Survey Questions	Pre (N=26)	Post (N=21)	p-value
Overall test score, mean (SD)*	35.0 (10.5)	58.0 (11.5)	<0.001
Nurses correctly identifying CAM acronym, n (%)	22 (84.6)	21 (100)	0.1174
Nurses correctly identifying CAM features 1 and 2, n (%)**	0 (0)	3 (14.3)	0.082
Nurses correctly identifying CAM features 3 and 4, n (%)**	0 (0)	3 (14.3)	0.082
Percent correctly identified delirium risk factors, mean (SD)	32.0 (29.3)	71.0 (25.5)	<0.001
Percent correctly identified medications to avoid in elderly, mean (SD)	20.0 (29.9)	70.0 (31.6)	<0.001
Nurses correctly responding that delirium less common in hospitalized elderly, n (%)	22 (84.6)	20 (95.2)	0.3623
Nurses correctly responding to attention assessment question, n (%)	20 (80.0)	21(100)	0.0536
Percent correctly matched nonpharmacological and pharmacological delirium interventions, mean (SD)	52.0 (36.9)	84.0 (23.9)	0.0008
Rating of importance in delirium knowledge, mean (SD)†	9.4 (0.88)	9.5 (0.76)	0.8336
Rating of delirium self-confidence score, mean (SD)†	7.8 (1.3)	8.6 (1.3)	0.021

**Abbreviations:** CAM=Confusion Assessment Method, SD=standard deviation

\* Test score is out of 80 points

\*\* CAM features=1(acute onset and fluctuating course), 2(inattention), 3(disorganized thinking), 4(altered consciousness)

† Rating scale is 1-10 (10 is highest importance or confidence)

**Table 3:** Nursing Survey Results Pre- and Post- Intervention.

Several studies examining clinical training environments of residents and attending physicians posit that resident self-confidence in new skills learned often coincides with competence and autonomy [32,33]. Our findings demonstrated a significant increase in nurses' self-confidence in delirium detection post-intervention. While not directly assessed, it may be that the supportive interdisciplinary environment of geriatricians and registered nurses validated the importance of nursing care efforts, increasing the desire to learn and apply the CAM to an at-risk elderly population.

In comparison to other studies, Andrews and colleagues implemented a similar CAM didactic in the intensive care unit and found that barriers to CAM use included nursing lack of confidence in performing the assessment, concerns about use of the tool for patients on mechanical ventilation, and lack of interdisciplinary response to findings obtained by the CAM [34]. In our study we were able to evaluate that post-intervention, nurses perceived significant improvement in overall delirium knowledge, specific improvement in identification of delirium risk factors, medications, and non-pharmacological and pharmacological interventions. As an interdisciplinary educational intervention, a geriatrician was made available daily to the nursing staff, and "refresher" sessions offered additional opportunity for skill and knowledge refinement.

These results should be interpreted in the context of several limitations. Due to our small sample size we were underpowered and unable to detect a difference in cases of delirium before and after the educational intervention. Our delirium prevalence was 4%, lower than the broad standard estimated average of 14-56%, and was done at a single site hospital [2]. In a prior study done at our hospital, Daniels and colleagues found post-operative hip fracture delirium rates in normal cognition patients to be consistent, at 4.3% [35]. Still, it is possible that our patient sample is not representative of the national population of elderly orthopedic surgery patients.

As our primary intent was to improve nursing delirium documentation, we did not evaluate the accuracy of the nursing delirium documentation. Such additional information would offer insight into the learning process of the nursing staff. Previously, Inouye et al. compared nurse CAM ratings against researcher ratings and found that nurses often under-recognized delirium when four independent patient risk factors were present: hypoactive delirium, age 80 years and

older, vision impairment, and dementia. Nursing delirium detection sensitivity in the study was low (15-31%), but with high specificity (91-99%) [36]. In our study, nursing staff did not document type of delirium detected (hypoactive, hyperactive, or mixed).

Our study has several strengths. First, because the registered nurse is often the medical staff member who spends the most time with the patient, we feel that a targeted educational intervention, tailored specifically for nursing staff is a key component to improving delirium detection among hospitalized patients. Second, prior studies have documented concerns of consistency in delirium diagnosis and interpretation between raters and between studies [37]. An advantage to our study design is that the same nurses served in both the pre- and post-intervention phases. Third, in order to assess the stability of the post-intervention change, we administered the post-intervention knowledge and confidence survey 3 months following completion of the second ("refresher") didactic lecture. This makes immediate-recall bias less likely for nurses who completed the post-intervention knowledge and self-confidence survey.

## Conclusion

In conclusion, nursing documentation of delirium screening using the CAM is significantly increased after formal geriatrician-guided educational intervention. Nursing knowledge of and confidence in delirium detection also improved significantly. Such improvements are important components to reducing hospital complications in older patients.

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## Conflict of Interest

The authors report no conflicts of interest.

## Author Contributions

Chow SW: Conception and design, recruitment, data acquisition, data analysis and interpretation, drafting of manuscript, revision of manuscript for all content, final approval. McNicoll L and Mujahid NM: Design, recruitment, data analysis and interpretation, revision of manuscript for key content, final approval. Butterfield K: Data analysis and interpretation, revision of manuscript for key analytical content, final approval.

## Sponsor's Role

The sponsor had no role in the design, methods, participant recruitment, data collection, analysis, or preparation of this manuscript.

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