

Delirium Screening: From Research to Point of Care

Beth Ann Swan, PhD, CRNP, FAAN¹; Sheen Ahlawat, MPH¹; Christopher N. Sciamanna, MD, PhD²

¹Jefferson School of Nursing, Thomas Jefferson University; ²Penn State Milton S. Hershey Medical Center, Penn State College of Medicine

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BACKGROUND & SIGNIFICANCE

Postoperative Delirium Among Older Adults is Significant and Under-Recognized

Delirium is a serious public health problem among older adults and is one of the most common cognitive disorders affecting postoperative older adults. Delirium is a treatable illness that disproportionately places postoperative older adults at increased risk for functional and cognitive decline, as well as increased morbidity and mortality^{1-3, 5-7}. More than 50 percent of postoperative patients develop delirium during hospitalization¹⁻³. Epidemiologic and clinical studies over the past two decades have provided ample evidence that delirium in hospitalized older adults is under-recognized by nurses and physicians, often leading to untoward events that the safety and well-being of hospitalized older adults^{8, 9, 10, 20}. For example, Milisen (2002) studied the documentation of delirium in nursing records of older hip fracture patients and found no documentation of delirium in 87.5% of the delirious patients on the first postoperative day; and 50% on the 12th postoperative day¹¹. In addition, due to negative stereotypes about aging among Americans and the belief by many health care providers that delirium is a consequence of aging, it is largely neglected and can have devastating human and economic consequences. Foreman (1993) found that because nurses had insufficient knowledge of cognitive deficits, many patients suffering from delirium are not recognized¹². As delirium has identifiable causes and is reversible, efforts should be made to recognize and manage delirium in hospitalized older adults^{13, 14}.

Quality of Care for Older Adults who Develop Postoperative Delirium

Postoperative delirium is associated with poor short-term and long-term quality of life. Studies examining the quality of care of postoperative older adults found increased rates of adverse events in delirious patients compared to patients without delirium. For example, falls, restraint use, pressure ulcers, urinary tract infections, new nursing home placement, and length of stay, were significantly higher in patients with delirium¹⁵⁻¹⁸. In addition, delirium is known to persist beyond an older adults discharge from the hospital. For example, in 40% to 95% of older adults with hospital-acquired delirium, symptoms of delirium persist at the time of discharge and in some instances continue for up to 6 months¹⁹⁻²¹. This contributes to the poor functional recovery of older adults up to 1 year post hospitalization²². Thus, delirium screening and management are critical to providing quality care to postoperative older adults. The proposed study is consistent with AHRQ's broad based goal "enhancing quality and safety by reducing risk of harm from health care services through promoting the delivery of appropriate care that achieves the best quality outcomes"²³ and addresses one of AHRQ's current priority areas "translating research into practice by testing strategies for adoption, implementation, and routinization of evidence-based clinical and organization intervention". The expected results of this study can be used to improve recognition of delirium at the point of care and subsequently implement evidence-based interventions to minimize adverse event in hospitalized older adults.

Screening Interventions for Postoperative Delirium Among Older Adults

The literature supports the efficacy of screening for delirium by geriatricians. None of the studies explored the impact of delirium screening with the CAM by bedside nurses at the point of care. This study will incorporate the CAM, screening tool for delirium, with score alert system into a hospital-based electronic medical record use by bedside nurses at the point of care. Screening interventions have consisted of a single targeted approach, geriatric consultation on admission, either by a geriatrician or an anesthesiologist²⁴⁻²⁶. Two studies explored recognition of delirium by nurses during routine clinical care. In the first study, bedside nurses did not use a standardized cognitive testing tool²⁷; and in the second study, nurses used the CAM (paper and pencil) at the end of the work shift on days 1, 3, and 5²⁸. In both studies, nurses had difficulty recognizing delirium. Overall, the timing of the screening intervention differed across studies from only preoperatively²⁷ or postoperatively²⁸, to both preoperatively and postoperatively²⁹. All the studies screened for delirium with at least one standardized instrument, for example, the Confusion Assessment Method (CAM). Postoperative delirium was likely to occur 2 to 5 days postoperatively. Studies were small to moderately effective in identifying risk for delirium and reducing the occurrence of incident delirium, and one study did significantly reduce the length of stay in the intervention group²⁸. However, associated adverse events were not significantly reduced.

Evidence-Based Management of Delirium by Nurses

Screening is not desirable for all conditions, only when effective strategies exist to manage the condition. Point of care screening for delirium is not only good if management strategies can be implemented for a positive screen. Once detected, care strategies known to be effective in reducing morbidity from postoperative delirium are: 1) providing supportive measures and continuous assurances to alleviate anxiety, and 2) managing symptoms associated with delirium³⁰. Supportive nursing care interventions may include providing a safe environment including orientation to hospital room, surroundings, appropriate stimulation, and environmental modifications as needed³¹⁻³³; psychological stability³⁴; support of sensory function³⁵; physical activity³⁶; pain management strategies³⁷. Nurses are strategically positioned to positively affect the quality of care of older adults with postoperative delirium. Nurses spend more time at the bedside caring for patients than physicians and therefore, occupy a key position in recognizing delirium. The observations made by nurses are critical for the early detection of delirium symptoms and for the continuous monitoring of these symptoms. Nurses have frequent contacts with patients and their families and are ideally positioned to observe subtle changes at an early stage preoperatively and continuously postoperatively³⁸.

SIGNIFICANCE

Delirium has been associated with negative postoperative outcomes in older adults. These patients often do not receive adequate management of their delirium, increasing the likelihood of physical restraint use and subsequent harmful physical (falls, pressure ulcers, urinary tract infections) and psychological effects (use of psychotropic medications, longer hospital stays and likely discharge to long term care). Older adults have special post-operative needs and challenges due to age-related changes, including needs for early mobilization, effective pain management, avoiding restraints, promoting normal sleep pattern, maintaining hydration, managing risk for falls, and preventing risk for infection. Thus, screening for and managing postoperative delirium is an important component of patient safety and quality health services for these patients. Successful management of delirium depends on screening and correct identification. None of the studies explored an intervention directed at delirium screening at the point of care with a score alert system and subsequent evidence-based delirium management by nurses as part of nurses' routine clinical practice. A screening intervention providing nurses with standardized and comprehensive tools as part of routine clinical practice to assess, recognize, and manage delirium is one innovative intervention worth studying.

Aim 1

In order to establish the feasibility of incorporating the Confusion Assessment Method (CAM), screening tool for delirium, with score alert system into a hospital-based electronic medical record, focus group discussions were conducted during phase I. Bedside nurses who will interact with the system at the point of care were recruited to participate in focus group discussions to understand the barriers and opportunities to incorporating a screening intervention to assist nurses in screening for delirium at the point of care. Feasibility was further established by examining the satisfaction of nurses with using the CAM in the EMR at the point of care. The total number of technical support hours needed for the implementation was tracked and the time needed to input and save a patient's CAM data in the system was tracked and summarized. These activities were completed during phase I.

Aim 2

A pre-post design was employed to examine the effect of screening with the Confusion Assessment Method (CAM) on nurses' ability to recognize and identify delirium. The patient population in the pre-intervention phase (phase II) with respect to socio-demographic characteristics (e.g., age, sex, race), clinical variables (e.g., knee vs. hip surgery), and CAM delirium score were assessed by the research assistant. In the post-intervention phase (Phase III), each enrolled patient was assessed by a nurse using the CAM embedded in the EMR) and the research assistant (using the paper and pencil CAM) every day.

Aim 3

To determine the effect of screening with the Confusion Assessment Method (CAM) on the management of delirium by nurses, we compared the use of management strategies by the nurses for patients with delirium during phase II and phase III.

Aim 4

To determine the effect of screening with the Confusion Assessment Method on clinically recognized adverse events including falls, pressure ulcers, urinary tract infections, restraint use in postoperative older adults undergoing hip and knee surgery, we compared the phase II and phase III clinically recognized rates of falls, pressure ulcers, restraints, and urinary tract infections.

PHASE I: FOCUS GROUPS

Using qualitative research methods, phase I examined the feasibility of incorporating the CAM into a hospital-based electronic medical record and evaluated the facilitators and barriers to full integration of this computer screening tool into the care provided by bedside nurses on three orthopedic wards. A convenience sample was conducted with two focus groups of bedside nurses in November 2007 (November 1 (n=5); November 29 (n=10)), representing a 30 percent participation rate of all nurses in three patient care units. Participants were recruited from multiple shifts and three units where patients are admitted following elective and emergency orthopedic surgery. The units were selected because the majority of the patients are 65 years or older and the potential for reducing negative events related to delirium by computerized screening may have significant impact on clinically important outcomes. The focus groups were conducted for up to 1.5 hours, included dinner and participants were given a merchandise card from a food vendor as a token of appreciation for their time and input.

Focus Groups

All participants were encouraged to share information and voice their opinions. The questions incorporated three broad areas: familiarity with using screening tools; knowledge and attitude towards the patient population; and impressions of the CAM tool. The facilitators and the co-investigators developed a discussion guide (including questions and prompts), which was revised several times to assure that the questions were value-neutral. The focus groups were recorded using audiotapes, augmented by notes taken by another researcher. Since the focus groups used a semi-structured interview format, the facilitators asked questions and then followed up with specific probes for additional information or clarity.

Analysis

Using techniques of qualitative research, the focus groups were audio-taped, transcribed, and analyzed using congruence and memoing. In addition, the facilitators' initial comments from a short debriefing conducted at the end of each focus group, as well as their notes from the focus groups were used. A-priori themes were identified through the development of the focus group questions. Additional sub-themes were established as part of the analysis.

RESULTS

Job satisfaction and challenges

Participants discussed their job satisfaction from two perspectives: personal satisfaction and the job environment. They described their personal satisfaction as "helping patients feel better" and "feeling like they make a difference." Participants described positive aspects of their work environment as the following (1) flexibility in their schedule; (2) a sense of independence as it relates to decision-making; (3) the remuneration; (4) valuing their co-workers; and (5) the opportunity to work as a team. But the participants identified several challenges in their jobs as well, including organizational issues like (1) the physical layout of the unit, (2) an excessive patient load, and (3) a high level of stress. Communication issues between staff, patients, family members and external professionals also were mentioned, as was a mismatch of expectations between staff, patients, and family members.

Familiarity with using screening tools

Participants discussed the use of three routine screening tools: the Braden Scale for Predicting Pressure Sore Risk, the Morse Fall Scale and the Universal Pain Scales. These scales are part of LastWord! (a database that nurses use to chart patient information) and were taught to the nurses during nursing school and in orientation on the unit. Almost all of them were comfortable in using the scales and recording them electronically. These scales require qualitative assessments and do not have an inter-rater reliability component. Some participants felt the questions in the scales were too vague and resulting in a "we know it" when we see it" type of assessment.

Knowledge and attitude towards patient population

The average patient profile is a 63 year old female who elects to have surgery, but the perception of the participants was that average age is increasing because more patients are electing to have surgery especially knee repair. When asked to characterize their patients, the participants described them as being independent or desiring independence, "being set in their ways," and being "resistant to change." The participants described their older patients as less fearful of hospital routines or medical procedures than younger adults, but that they needed to talk slower and louder to their older patients. The participants felt they needed to "watch" and monitor the older patients more carefully. Most participants felt comfortable with older adults, and felt that their assistance was both needed and appreciated by older patients. But most participants also felt that working with confused or delirious older adults presented significant challenges such as more precautions to insure safety and avoid falls, dealing with screaming and combative patients could be disconcerting, and overall increased staff anxiety. When one had a confused or delirious patient, it made for "not a good day" or a "long day."

Impressions of the CAM tool

Participants were asked to look at the CAM and provide on-the-spot feedback. The first focus group responded by saying that the tool was similar in format to other tools and would not be difficult to implement. In fact, the participants from Focus Group 1 felt it was pretty self-explanatory and did not even require an in-service training for implementation. Focus Group 2 did not agree with these responses. The second focus group raised a number of issues including: the lack of a defined baseline; intake procedures to assess mental status; and concerns about labeling a patient and its effect upon being admitted to a rehabilitation facility. It was clear that Focus Group 2 felt that the barriers to implementation such as nurses' knowledge of delirium, the tool's redundancy, patient labeling, and a general resistance to additional work responsibilities (particularly among the younger participants) were important to address through an in-service training conducted by a nurse (preferably a nurse practitioner) and not a doctor or other health professional.

Proficiency with computers

None of the participants expressed concerns about proficiency with computers. The second focus group cited problems with computer availability, the lack of charting facilities, and that not every computer runs all the software necessary to chart patients' progress.

Experience with research

Of the 15 participants, only four mentioned having had direct experience(s) with participating in research. One participant designed a research study as part of a graduate school class and did not enjoy the experience. One had participated as both a research subject and as someone who collected the data for the principle investigator. Two had participated in the role of data collection. None of the participants expressed concern about being both part of data collection and a study subject.

Although workload and training issues may influence implementation of the CAM delirium screening tool into everyday practice, no barriers were identified that would prevent/preclude implementation of this screening tool into the practices of bedside nurses. Addressing issues related to equipment problems and sufficient computer resources would help to alleviate some of these issues, as would training by a nurse practitioner. The physical layout of the floors (lack of a nursing station on some floors) may also be an impediment. Overall, the nurses appeared receptive to the screening tool provided appropriate measures and training are instituted to facilitate the new process.

INTERVENTION

Dr. Sharon Inouye gave permission to use the Confusion Assessment Method and provided the researchers with *The Confusion Assessment Method (CAM) Training Manual and Coding Guide* (personal communication October 2, 2006)³⁹. The CAM, a 9-item questionnaire (referred to as the long CAM), was developed to assist clinicians with no formal psychiatric training to identify quickly and accurately patients with delirium in both clinical and research settings⁴⁰. The CAM takes 5 to 10 minutes to complete. There is also a short CAM comprised of 4 items, which has been fully validated, this shortened version will be used for this study⁴⁰. The short CAM has four features that are determined by information that the nurse will obtain during routine clinical care. These features are: 1) an acute onset of mental status change or a fluctuating course; 2) inattention; 3) disorganized thinking; and 4) an altered level of consciousness. Delirium is diagnosed if the patient has both features 1 and 2 and either feature 3 or 4. The CAM has been used extensively in the delirium research literature, has been compared with other instruments by external reviewers and found to have the best combination of ease of use, speed of use, data acquisition, reliability and validity. The CAM is suitable for use by nurses at the bedside to identify patients with delirium⁴⁰ for nurses, the specificity is 90% to 95% and sensitivity 94% to 100%⁴⁰.

We worked with TJUH's Hospital Applications/Information Systems department to incorporate the short CAM with a score alert system into TJUH's hospital-based electronic medical record. This included embedding the CAM into the nurses' work flow screens with functionality to score the tool when the nurses completed it and created prompts for positive screens to alert the nurses to intervene with evidence-based delirium management strategies as depicted in **Figures 1, 2, and 3**.

Figure 1: Confusion Assessment Method (CAM) 4-Item Short Form

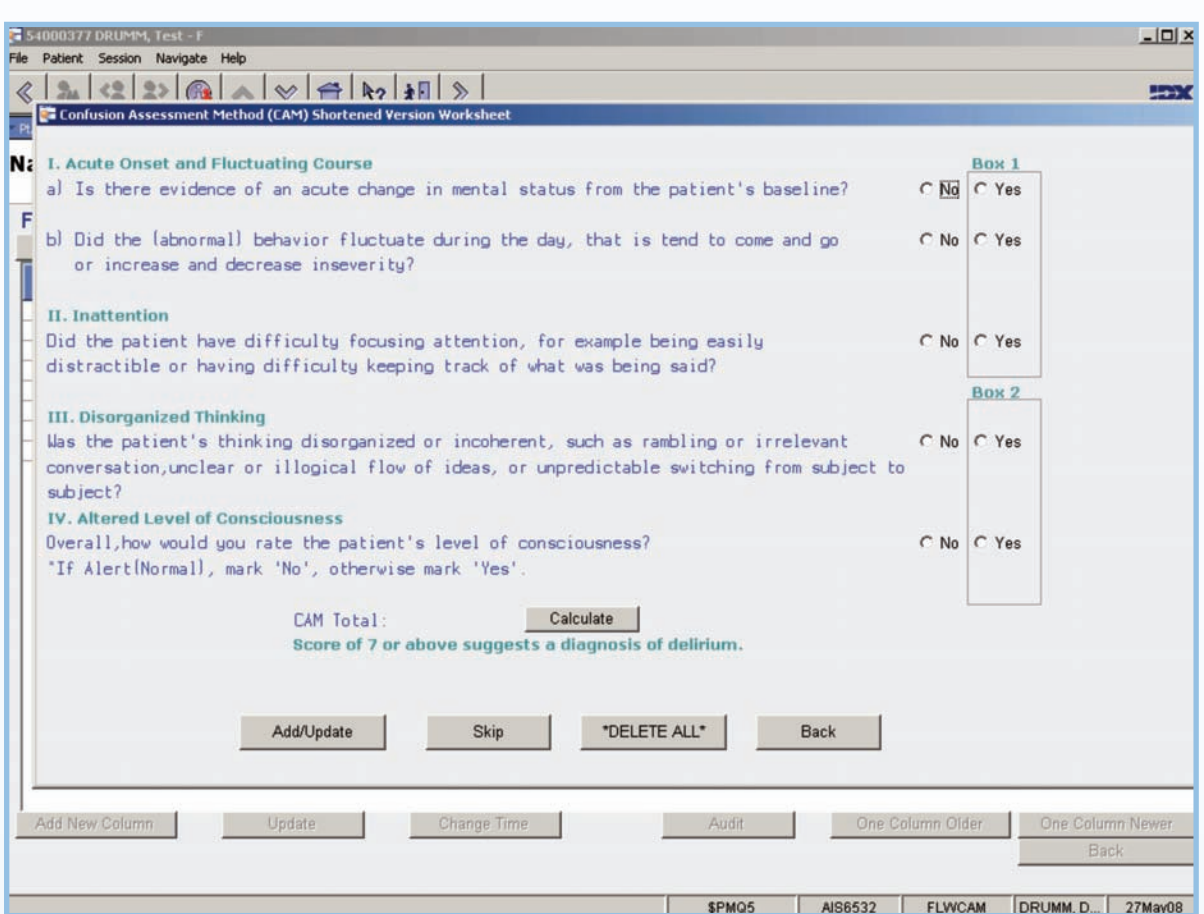


Figure 2: Confusion Assessment Method (CAM) Flowsheet

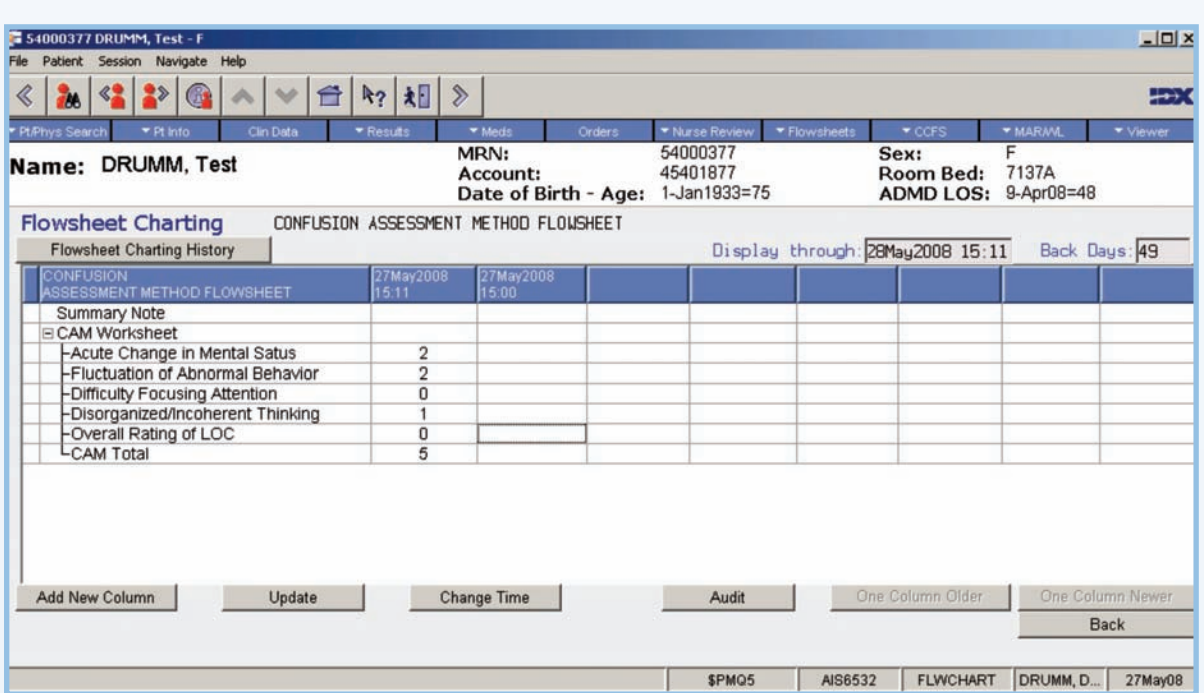
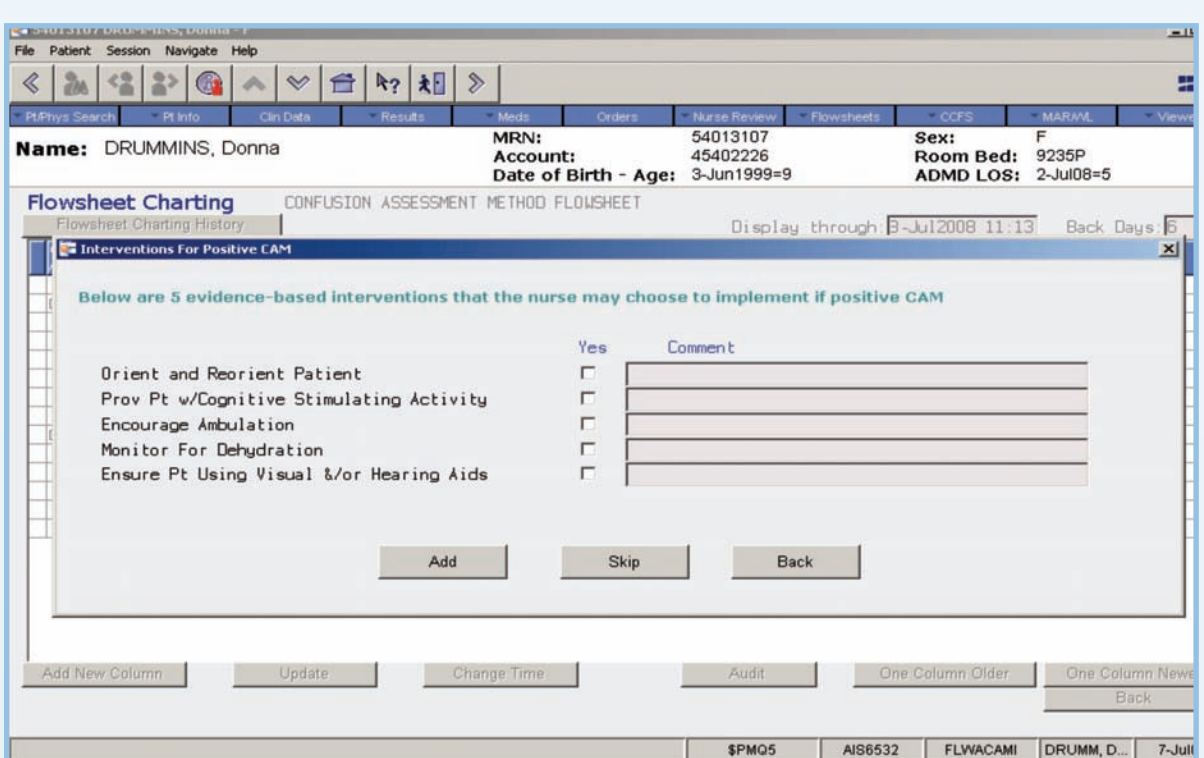


Figure 3: Evidence-Based Nursing Interventions



PHASE II: PRE-INTERVENTION PHASE

During the phase II, a trained research assistant approached all patients, who signed informed consents prior to their surgeries, on postoperative day #1 and daily including the day of discharge. Clinical data including demographic data and co-morbidities were recorded. The patient population in phase II was described with respect to socio-demographic characteristics (e.g., age, sex, race), clinical variables (e.g., knee vs. hip surgery), and CAM delirium score as assessed by the research assistant. At the conclusion of the pre-intervention phase, patient data was extracted for nursing documentation related to care strategies for delirium management, as well as clinically recognized adverse events including falls, pressure ulcers, urinary tract infections, and restraint use in postoperative older adults undergoing hip and knee surgery.

PHASE III: POST-INTERVENTION (CAM) PHASE

In Phase III, each enrolled patient was assessed by a nurse and the research assistant on postoperative day #1 and daily including the day of discharge. Clinical data including demographic data and co-morbidities was recorded. The patient population in the post intervention (CAM) phase was described with respect to socio-demographic characteristics (e.g., age, sex, race), clinical variables (e.g., knee vs. hip surgery), and with CAM delirium scores as assessed by the research assistant and the nurses. The post-intervention (CAM) phase concluded July 15, 2009. At the conclusion of the post-intervention phase, patient data was extracted related to nurse CAM scores, evidence-based interventions for delirium management, as well as clinically recognized adverse events including falls, pressure ulcers, urinary tract infections, and restraint use in postoperative older adults undergoing hip and knee surgery. Data analysis is pending.

MAIN POWERED OUTCOMES:

Clinically Recognized Delirium

Clinically recognized delirium is delirium that is identified by the bedside nurse (and research assistant) using the CAM consisting of the 11 presence or absence of acute onset and a fluctuating course of symptoms, 2) inattention, 3) disorganized thinking and 4) altered level of consciousness. Inattention is defined as difficulty focusing attention and being easily distracted; disorganized thinking is defined as disorganized or incoherent speech; and altered level of consciousness is defined as consciousness other than alert, either hypoalet or hyperalet⁴⁰.

SECONDARY OUTCOME MEASURES:

Clinically Recognized Adverse Events

Falls

Falls are adverse events in which "an individual inappropriately comes to rest on a lower-than-usual level in the absence of an overwhelming force, syncope, or stroke"⁴¹. 80 Falls have been associated with altered cognitive functioning in hospitalized older adults. In one study, falls for delirious patients were significantly higher than in patients without delirium (12% versus 2%)⁴².

Physical Restraint Use

Physical restraint use is defined as any manual method or physical or mechanical device, material or equipment attached or adjacent to a patient's body that the individual cannot remove easily which restricts freedom of movement or normal access to one's body⁴³. Restraint use is a modifiable risk factor⁴⁴ and highly associated with developing delirium, dehydration, new-onset bladder and bowel incontinence, new pressure ulcers, and increased rate of nosocomial infections⁴⁵. In one study, physical restraint use for delirious patients was significantly higher than in patients without delirium, 48% versus 1%⁴⁶.

Pressure Ulcers

Pressure ulcers are breakdowns in the skin. Altered mental state is a known risk factor for the formation of pressure ulcers. None of the studies on delirium reported rates of developing pressure ulcers.

Urinary Tract Infections

Urinary tract infection is defined as significant bacteriuria in the presence or absence of symptoms. Delirium is often attributed to urinary tract infections. In one study, urinary tract infections in delirious patients were significantly higher than in patients without delirium (19% versus 7%)⁴⁷.

ANALYSIS

Power and Sample Size

We have powered the study for the main evaluation aim (Aim 2). We proposed to enroll a total of 420 patients, 210 patients in each phase. Phase 2, the pre-intervention phase, we enrolled 161 subjects and 178 subjects were enrolled in Phase 3, the post-intervention phase. Preliminary results for Phase II: Pre-Intervention Phase are listed in **Table 1**. Phase III results are pending.

Table 1: Pre-Intervention Phase Preliminary Descriptive Results (N=161)

Age	Mean = 73 (SD = 7)
Gender	Male = 46%
Race	African American = 15% White = 84% Asian = 1%
Education	High School/GED diploma or less = 54%
Marital Status	Married = 63%
Time Outside Home (hours)	Mean = 4 Hours (SD = 3)
ASA Physical Class Status	I = 1% II = 25% III = 73% IV = 1%
Procedure	Hip = 56% (88 single hip + 2 bilateral) Knee = 44% (58 single knee + 13 bilateral)
Positive CAM Score	11
Falls	1 *
Pressure Ulcers	2 *
Restraints	0
Urinary Tract Infection	Data pending

* All 3 patients w/ falls or ulcers had 3 CAM assessments, all positive.

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