Preoperative Cognition Screening and Postoperative Delirium in Older Surgical Patients

by

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Abstract

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Objective: People 65 years or older are having surgery later in life and are at risk of developing a major postoperative complication, delirium., The Montreal Cognitive Assessment, is a preoperative cognitive screening tool which was used to screen thirty-three older orthopedic surgical patients to reduce the incidence of this serious postoperative complication.

Methods: Patients who scored below normal were identified as *at risk* and monitored to ascertain if identification and monitoring influenced their postoperative course. At the first postoperative visit each patient was evaluated for falls, confusion, and the ability to follow the required postoperative home exercise program to identify an undetected episode of delirium after discharge.

Results: Of the patients screened, 34.1% (n = 14) of patients fell below the cutoff for normal cognition. Subsequent monitoring and nursing interventions may have influenced their postoperative course as there were no reported episodes of delirium in the 90-day period.

Conclusion: Thus, preoperative screening with the Montreal Cognitive Assessment tool provides a baseline cognitive assessment and early identification of patients at higher risk for postoperative delirium, and therefore, identification of patients at risk for postoperative delirium may allow for early interventions and decrease postoperative delirium.

Cognition Screening and Postoperative Delirium in Older Surgical Patients

Patients 65 years or older are having surgery later in life and are at risk of developing delirium, a significant postoperative complication. Delirium is a postoperative complication that may disorient the patient, and which may have long-lasting effects. The main predisposing factor associated with postoperative delirium is preexisting cognitive impairment, yet many patients have never been assessed for cognitive functioning before surgery (Ansaloni et al., 2010). The National Clinical Guideline Center and the Hartford Institute for Geriatric Nursing support the use of delirium assessments that may yield early identification of risk factors associated with an increased incidence of delirium (Chow, Rosenthal, Merkow, Ko, & Esnaola, 2015). Delirium is defined as a change in mentation resulting in cognitive disturbances, which may be due to an unidentified medical issue (American Psychiatric Association, 2012). Major symptoms of delirium include disturbances in consciousness, inability to concentrate, and cognitive changes resulting in complication such as confusion, falls, memory problems, and sometimes even hallucinations (Bozic, Lau, Kurtz, Ong, & Berry, 2012).

Frequently, postoperative delirium (POD) is a complication in older patients after hospitalization and surgery. Known predictors of POD include cognitive impairment, a history of central nervous system disease, and joint arthroplasty surgery (Leung, Sands, Lim, Tsai, & Kinjo, 2013). Delirium is also associated with increased risk of medical complications including myocardial infarction, pulmonary edema, pneumonia, and respiratory failure (Flynn, Diehl, Seyfried & Malani, 2009). At least 20% of the 12.5 million of those 65 years and older who were hospitalized each year have delirium as a complication, causing a $9,000 to $15,000 surge in hospital costs per patient. Treatment of delirium in the United States is said to result in an estimated $38 to $152 billion annual cost (Akunne, Murthy, & Young, 2012). It is one of the

most common adverse outcomes of hospital admissions in patients 65 years and older (Ansaloni et al., 2010). The single most significant predisposing factor is preexisting cognitive impairment and dementia, yet many patients are not even aware they are experiencing cognitive decline as they prepare for surgery and have not had any testing or screening completed. The incidence of POD is associated with high mortality rates, multiple complications, and rates of long term care, greater costs and increased hospitalization taking significant resources, adding to increased length of stay, and poor functional outcomes (Ansaloni et al., 2010; Young, & Inouye, 2007). In one analysis, older age, identified cognitive impairment, depression, low educational attainment, and preoperative abnormal laboratory results were predictors of POD. However, these predictors are not routinely analyzed when evaluating a patient for surgery (Kim, Brooks, & Groban, 2015). In the 2014 clinical practice guidelines for postoperative care of delirium in older adults, prevention was identified as one way to improve patient outcomes (McCormick, 2015). Research has shown that 40% of delirium may be preventable in older hospitalized patients (McCormick, 2015). The preoperative use of a screening tool may help in identifying patients at risk, and when necessary, changes in nursing diagnosis and treatment plans are revised to reflect interventions put in place to decrease the onset and severity of delirium (Leung et al., 2013). Evidence indicates that identification of preoperative risk factors may influence the postoperative course and management of delirium (Cho, Song, Piao, Jin, & Lee, 2015).

In a busy orthopedic practice in northern California, over 700 surgeries are performed each year. In 2015, 200 (28.5%) of the practice's patients were over the age of 65, and 17 of these patients (8.5%) experienced less than optimal outcomes due to an episode of POD. Seven (41.1%) of these 17 patients experienced a longer length of stay in either the hospital or the ambulatory surgical center (ASC) because of confusion or disorientation. One patient was

transferred from the ASC to the hospital after surgery for medical management of delirium, one experienced a fall, and 8 (47.0%) were slow to return to their prior functional status of the affected surgical limb. In this orthopedic practice, patient safety and positive surgical outcomes were of primary importance.

The nursing staff and DNP student wanted to evaluate ways to decrease the incidence of POD by using cognitive screening results as an indicator to anticipate risk and different interventions in older surgical patients. These events may have been prevented, or the severity of delirium decreased, if the patients were screened and identified as at risk, monitored differently, and nurse sensitive interventions put in place early (De & Wand, 2016; Kratz, Heinrich, Schlaub, & Diefenbacher, 2015; Krogseth, Bruun-Wyller, Engedal, & Juliebø, 2011). Therefore, there is a benefit to utilizing nursing interventions to reduce duration and severity of delirium in older surgical patients.

Realizing that 30% of their patients were at risk for delirium, the DNP student, and the nursing staff set out to determine what the significant risk factors were, and if they might identify delirium prevention interventions to decrease the onset and severity of POD. Because cognitive changes may happen over many years before a diagnosis, a patient may be at risk of complications due to cognitive impairment without realizing cognitive changes have occurred. It is in this pre-clinical time when they are at risk for POD and makes screening before surgical interventions essential to the patient's wellbeing and health outcomes (Leung et al., 2013).

The goal of this evidence-based performance improvement project was to implement a change in nursing practice through the identification of patients at risk for delirium before surgery so that increased monitoring could be instituted to decrease the onset of delirium.

Additional benefits included enhanced knowledge gained by the nursing staff through the educational information, nurse adherence to using the screening tool, and decreasing the incidence of delirium in older patients who have orthopedic surgery.

Methodology

This performance improvement project sought to determine if the use of a preoperative screening tool to identify patients at risk for POD improved patient outcomes through increased postoperative monitoring. The Montreal Cognitive Assessment (MoCA) tool was selected for the preoperative screening because it is easy to learn the tool, (can administer in 10 minutes) and the high validity. The MoCA tool was developed as a screen for mild cognitive impairment and Alzheimer's disease (Hartford Institute for Geriatric Nursing, 2012). The MoCA tool assesses cognitive abilities including orientation, short-term memory, executive function, language skills, attention and visual capability (Nasreddine et al., 2005). The resultant score identifies the level of overall cognitive ability. The MoCA tool was found to have high test–retest reliability ($r = 0.92$, $p > 0.001$) and good internal consistency (Cronbach's alpha 0.83). The MoCA tool identified 100% of patients with Alzheimer's disease and had a specificity of 87% (Hartford Institute for Geriatric Nursing, 2012).

The project was divided into three phases: the education of the nursing staff, implementation of the screening process, and data collection and analysis. In phase one, clinic and hospital registered nurses and support staff attended an educational session that included delirium pathophysiology, risk factors, ramifications of unmanaged delirium, and rationale for early identification of patients who may be at risk. The session for the clinic nurses also included instruction on the administration and of the MoCA tool, interpretation of the results, and documentation and notification processes for high-risk patients. As part of the educational

process, the clinic nursing staff became familiar with the tool and even practiced administering it on each other. Additionally, the ASC nursing staff reviewed the tool, the scoring process and what interventions should be put in place if a patient experienced an episode of delirium. The surgical and postoperative nursing team were instructed on the notification process for patients at risk and how to document and implement appropriate delirium management interventions.

The second phase of the project included the orthopedic clinic nurse initiated screening of patients. The patients were identified using three criteria: age 65 years or older, surgery scheduled within the next 90 days, and had their final preoperative visit scheduled. Once selected, the nurse administered the screening tool at the end of the final preoperative visit. If the patient scored within the normal range (<26), their chart was flagged as screened and no action was taken. If the patient's score fell into the at-risk range (21-15), their medical record was flagged as at risk, and the surgeon and nurse liaison for the postoperative team were notified they were aware of the need to assess the patient for symptoms of delirium during the postoperative period. If the score fell below 20, the nursing staff notified the surgeon, and the patient was reassessed for appropriate intervention and follow-up. After surgery, patients who were identified as at risk received additional postoperative discharge instructions regarding the home exercise program and when to notify the triage nurse for other symptoms or falls.

The third phase took place at the first postoperative visit when the screened patients were evaluated for evidence of possible undetected delirium between their discharge and the first postoperative visit. Each patient was assessed for the length of surgical stay, compliance with discharge instructions, self-reported periods of confusion, disorientation, or falls. Scores and data were tabulated for analysis.

Results

The following section shows the aggregation of the results and a brief overview of the findings. The MoCA tool scores were evaluated to assess the relationship between MoCA scores and data collected. The quality improvement project used the Pearson Product Moment Correlation (PPMC) statistic to examine if the scores and the postoperative data were correlated.

Variables utilized in the data collection and analysis included:

- MoCA score
- Age
- Falls in the immediate postoperative period
- Reported episode of delirium
- Functional status measured by the degree of flexion at initial postoperative visit as compared to expected degrees of flexion or range of motion (ROM)
- Length of stay or delay in discharge

There were 33 patients who met the criteria (age, date of surgery and had not had their final peroperative visit.More men than women were tested [men (n = 18) and women (n = 13)] and the patients ranged in age from 65 - 87 years old. The MoCA tool scores ranged from 17-29. Means for each of these are reported in Table 1 below.

Table 1. *Descriptive Statistics*

	Mean	*Std. Deviation*	*N*
Age	72.70	6.612	33
MoCA Score	25.30	2.756	33

The MoCA tool identified 14 patients with a cognitive deficit and their medical records were flagged.The surgeon and nursing liaison from the ASC were notified of an at-risk patient was having surgery. The postoperative nurses assigned to recover patients implemented additional assessments in the immediate postoperative period including assessing mental status, symptoms of confusion and agitation.

The relationship between age and MoCA tool score was analyzed, the lowest three MoCA scores were in patients over the age of 75. The MoCA tool score was negatively correlated with age, $r = -0.355$, p (one-tailed) < 0.05 indicating that as a person ages, the MoCA score is more likely to decrease. The MoCA tool was successful in identifying impairment ($n = 14$), and patients who may be at higher risk for complications because of their cognitive decline (see Table 2.).

Table 2. *Correlations*

		MoCA Score
Age	Pearson Correlation	-.355*
	Sig. (1-tailed)	**.021**
	N	33

* Correlation is significant at the 0.05 level (1-tailed).

The relationship between the MoCA score and ROM, was examined, no statistically significant results were found, (Table 3).

The intent of this comparison was to look for a relationship between MoCA score and how well the patient has understood and complied with home exercise program (based on expected range of motion). This may provide insight as to where to focus discharge education and emphasize the home exercise program.

Table 3. *Range of motion in degrees*

Gender	Mean	*N*	Std. Deviation
Male	130.94	16	53.548
Female	141.36	11	47.754
Total	135.19	27	50.583

Using a *t* test correlation, the mean MoCA tool scores were calculated and compared to the mean scores for range of motion. It showed the range of motion scores were higher amoung those with higher MoCA scores (Table 3). However, there was not a definite conclusion because there are positive ROM degrees in patients who scored in the mid-range MoCA, as well and one person who scored 20 on the MoCA had 160 degrees ROM. There was no correlation between length of stay and MoCA score or age. The ROM variable was used because cognition may affect the patient's ability to follow instructions resulting in poor clinical outcomes of functional range of motion. Additional informationfrom the electronic medical record, family or caregiver interviews, helped to identify patients whose MoCA scores indicated the need for further evaluation. Patients whose scores were lower than 20 were referred to their primary physician for further discussion and follow up.

Discussion

The MoCA tool score combined with other data about a patient may help clinicians to confidently identify patients who are likely to be at risk for POD. Identification of risk allows for earlyinterventions that may decrease the potential for POD and poor postoperative outcomes. (Oh et al., 2015). The correlation between age and MoCA tool score may help identify preoperative patients who may be more predisposed to encounter POD. This information should be incorporated into the routine preoperative assessment, as low MoCA scores indicating cognitive impairment may be a key indicator of risk for delirium (Oh et al., 2015). An additional benefit of cognitive screening of older surgical patients is by determining the cognitive status of a patient before surgery, a documented baseline assessment of their cognitive status is recorded that may be usefulfor future comparisons (Oh et al., 2015). The nursing interventions were based on the patient's MoCA score. Once the nursesassessed the level of risk associated with the severity of the score, they changed the nursing care and treatment plan based on the culmination of data and the professional assessment. The interventions included administering the screen, documenting the results in the patient's medical record, notification of score results, and implication to the surgeon and the postoperative nursing staff.

Another area of significance was noted. The MoCA score was negatively correlated with age, *(r* = -0.355, *p (one-tailed)* < 0.05) supporting the assertion that as a person ages, the MoCA score is more likely to decrease. Based on these results, age explained 71% of the variation seen in MoCA scores. Although this was not the primary target of the project, identification of significance between age and scores further reinforced the MoCA may be a useful tool for cognitive assessment, and reinforces the idea that cognition declines with age (Lu, Law, Fung, & Lam, 2016).

Relevance and Implications for Nursing

This project holds relevance to nursing practice because the nurse-led interventions were designed to identify and potentially reduce the advent of delirium. Early intervention altered care and may have decreased the incidence of delirium. Registered nurses can easily incorporate the tool into the normal preoperative visit. Patients, 65 years or older, have higher postoperative complication rates, and they often require significant interventions when they are compromised.

A determination of risk factors through screening and assessments preoperatively can improve the postoperative course (Kim et al., 2015). Screening and management of patients at risk for postoperative complications including delirium, must include family education on delirium as part of the discharge process. Nurses in the preoperative setting should understand the rationale for and use how to use the screening tools that identify patients at risk for POD. Nurses in the postoperative setting must identify and manage POD and its associated risks.

The use of discharge teaching tools and a delirium care plan can help nurses to manage better and decrease the symptoms, as well as inform family members of symptoms of POD and what to do if there are changes in the patient's condition after discharge. Another clinical benefit of preoperative screening is it provides baseline documentation of cognitive status. Knowing a patient's cognitive status is important for providers, patients and family members alike to be aware of any decline in cognition as often it is progressive and detrimental, yet it can be identified and managed to influence the patient's health outcomes.

Additionally, decreasing delirium and improving patietn safety may provide a marker for health system-wide process advances. Future health priorities must include improvements in different coding and reimbursement, along with adequate research funding, and extensive education for clinicians and the public about the risks and prevention of delirium. Future

research is warranted to identify the association between preoperative screening and POD further, along with additional quality improvement projects which implement national guidelines for screening for cognitive impairment as a risk factor for delirium. Without knowing if delirium is a marker of vulnerability to dementia or if delirium leads to dementia, additional studies are needed to identify the relationship between these two diagnoses.

Limitations

There were limitations to this project, including the low number of patients 65 years or older scheduled for surgery during the project time frame. Another limitation was the number of surgeries canceled, due to an identified co-morbidity that required further testing to achieve medical clearance, scheduling, or personal reasons and the time constraints of the project. In future quality improvement projects, having a larger patient population who met the criteria may lessen those who were not able to complete the screening and their surgery. Because the MoCA tool is used to assess symptoms, it can be useful in identifying patients who need further evaluation and management that may require additional interventions and the follow-up status was unknown. The use of a screening tool is just the beginning of a diagnostic process, and the use of MoCA screening in patients undergoing surgical interventions is beneficial to the patient, their family, and the community of healthcare professionals who are caring for the patient.

Conclusion

In summary, cognitive impairment is a signifiant risk factors associated with POD (Oh et al., 2015). The use of a preoperative cognitive assessment is important in identifying those at the highest risk of POD. Cognitive screening as an early intervention may have contributed to no reported episodes of delirium or falls. Employing this easy to use nurse-sensitive delirium prevention assessment and implementation of subsequent interventions to address risk factors

known to contribute to the delirium can lead to early management and reduce delirium's severity and duration. Research involving at-risk individuals has shown brain changes begins decades before the onset of recognizable symptoms, and strategies focus on identification of risk factors and triggers of delirium before and after surgical interventions (Mitchell & Black, 2016). Early detection of patients with cognitive impairment and initiation of strategies that may prevent delirium may successful in reducing the incidence and impact of postoperative delirium for patients, providers, and families.

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