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# The Future of Cognitive Dysfunction in Elderly Patients: A Clinical Perspective with Recommendations

Laura Taylor
*University of San Diego*, lmtaylor@sandiego.edu

# The Future of Cognitive Dysfunction in Elderly Patients: A Clinical Perspective with Recommendations

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Laura Marie Taylor

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# Documentation of Mastery of DNP Program Outcomes

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University of San Diego Doctor of Nursing Practice Program

## Author Note

This project would not have been possible without the support of Dr. Joseph Burkard and Dr. Alyssa Brzenski, as well as the entire team and support staff in the peri-operative services department.

## Abstract

**Background:** The U.S. Census Bureau projects the number of Americans age 65 years and older will more than double between 2010 and 2050. The geriatric patient population will likely require the use of surgical services at a higher rate than ever before. To best care for the elderly undergoing procedures with anesthesia, it is imperative to follow the most up to date evidence to avoid post-operative complications, and more specifically post-operative cognitive dysfunction.

**Purpose:** The purpose of this DNP evidence-based practice project is to identify patients that are at high risk for post-operative cognitive dysfunction prior to undergoing anesthesia. Post-operative cognitive dysfunction can lead to increased lengths of stay in the hospital, discharge of patients to places other than home, and leads to unnecessary spending of the healthcare system. By identifying these patients in their pre-op visit, an "anesthesia bundle for the elderly" can be implemented intra-operatively to decrease risk for cognitive dysfunction post-operatively.

**EBP Model:** The "8 A's Model' will be used to guide this Evidence Based Practice project.

**Evidence Based Interventions:** Elderly patients that are over the age of 70 should be administered a Mini-Cog exam in their pre-op visit. If the Mini-Cog is failed, and key patient factors that increase the risk for post-operative cognitive dysfunction are identified, this information should be disseminated to the surgical team so the patients can be treated more appropriately intra-operatively. The evidence demonstrates that Benzodiazepines and Anticholinergic drugs specifically should be avoided in patients who are at high risk for post-operative cognitive dysfunction.

**Evaluation and Results:** The initial stages of this project will gather information through a chart review on current practices at a local university hospital. Charts were reviewed of elderly patients aged 70 and older that underwent anesthesia at this hospital in the past month. Per the evidence, patients with a history of alcohol abuse, depression, renal insufficiency, anemia, coronary artery disease, hypertension, and poor functional capacity should be administered a Mini-Cog exam. We will note if a Mini-Cog was done or not and note which medications the patients were on prior to undergoing anesthesia. Additionally, it will be important to know which medications were administered to patients during anesthesia, as well as how the patient did post-operatively. CAM scores conducted in the PACU will be taken from the chart. All information gathered will have no patient identifiers present.

**Implications for Practice:** The goal of this project is to make a practice change in this local hospital's anesthesia department to improve cognitive outcomes for the elderly post-operatively. Best practices for our growing elderly population are critical for anesthesia administration. Continuity of care between pre-op, intra-op, and post-op is imperative and can help decrease cognitive dysfunction after anesthesia for some of our most fragile patients.

*Keywords:* post-op cognitive dysfunction, peri-op, anesthesia, mini-cog, CAM score, benzodiazepines, anticholinergics

*Abbreviations:* Confusion Assessment Method (CAM), Post-Anesthesia Care Unit (PACU), Doctor of Nursing Practice (DNP)

# The Future of Cognitive Dysfunction in Elderly Patients: A Clinical Perspective with Recommendations

## Introduction

The U.S. Census Bureau projects that between 2012 and 2050, the older population will grow at a rapid rate. The number of Americans aged 65 years and older will almost double in size, increasing from 43.1 million elderly adults in 2012, to over 83.7 million elderly adults by 2050 (U.S. Census Bureau, 2014). These changes will impact many facets of life in this country, including families, businesses, health policies like Social Security and Medicare, as well as the U.S. healthcare system in general (U.S. Census Bureau, 2014). The geriatric patient population will likely require the use of surgical services at a higher rate than ever before. To best care for the elderly undergoing procedures with anesthesia, it is imperative to follow the most up to date evidence to avoid post-operative complications, and more specifically post-operative cognitive dysfunction.

One of the most common post-operative complications in our elderly patients is delirium, which occurs in up to 65% of patients who undergo anesthesia and surgical operations (Decker & Peden, 2020). However, about 40% of cases of post-operative cognitive changes could have been avoided with simple steps conducted by the peri-operative services team before, during, and after undergoing anesthesia (Decker & Peden, 2020). One of the steps that healthcare teams can take to mitigate post-operative cognitive impairment is to screen patients for preexisting cognitive impairment in the days prior to procedure, and then disseminate the patient's screening results to the peri-operative team to reduce risk for cognitive dysfunction in the post-op period (Decker &

Peden, 2020). One of the biggest predictors of postoperative cognitive dysfunction is preexisting cognitive impairment, which makes it critical to identify these patients early and manage them appropriately during and after their procedures. Post-operative cognitive dysfunction is associated with poor surgical outcomes, longer stays in the hospital, mortality, postoperative functional decline, and being discharged to places other than home, like a long-term care facility or a skilled nursing facility (Chow, Esnaola, Ko, & Rosenthal, 2012). Ideally, healthcare systems should implement a 'peri-operative anesthesia bundle', which includes screening in the pre-operative period, specific medication selection intra-operatively, and a care bundle in the recovery room to decrease post-operative cognitive dysfunction.

The purpose of this evidence-based practice project was to partner with the peri-operative services department at a local hospital and review their current practices by sifting through the electronic health records of elderly patients who had recently undergone anesthesia to trend their pre-operative status, their intra-operative status, and their post-operative status. By collecting actual data from the patients that receive surgical services at this prestigious hospital system, the true numbers would be able to be compared to the national benchmark data, and recommendations and changes can be implemented to improve outcomes for our most fragile patients.

## Methods

### Evidence Based Practice Model

The 8 A's Evidence Based Practice (EBP) Model, which was initially created by Dr. Laurie Ecoff and Dr. Caroline Brown in 2011, was selected to guide this project. The

model has most recently been updated in 2020 and provides a sequential, concise model to effortlessly implement an evidence-based change project (Ecoff & Brown, 2020).

This model was chosen as the framework for this project because it is clear and easy to implement at almost any stage of a practice change project. The eight steps of the model include assessing, asking, acquiring, appraising, applying, analyzing, adopting, and advancing (Ecoff & Brown, 2020). The seventh and eighth steps are all about "advancing and adopting" the EBP project and include the dissemination of the project results (Ecoff & Brown, 2020). This step is where one should consider taking the new practice and implementing it beyond the initial population (Ecoff & Brown, 2020).

The 8 A's model has many strengths that help bring evidence-based changes to fruition. First, the 8 A's model is easy for its users to understand and remember. This model uses simple alliteration to engage its users and to ensure no steps are forgotten. The current model further appeals to its users as it is color coded, versus the older version which is black and white, which makes it easier for users to stay on track and note which stage of a process change they are taking part in (Brown & Ecoff, 2011). Overall, the model is organized, clear cut, and concise.

While the 8 A's model is a newer model developed here in San Diego, it was developed utilizing the core fundamentals from older and more widely known change models like that of Rosswurm and Larrabee, and that of Haywood. This model can be used both in a hospital setting, as well as outside a hospital setting, which gives users the opportunity to expand their change project and to many locations.

What is most intriguing about the 8 A's model is the fact that once you hit the eighth step, the change project does not end there. It encourages the user to go one step

further and disperse the results to more than just the target organization. The outcome should go beyond the initial problem that inspired the change project (Ecoff, et al., 2020). Often, change projects start small, but if they are successful, it is important to implement the results beyond the scope of the initial change project and the 8 A's model lets users do just that in the last step. The plan for this DNP project was to initially start small with the implementation of my practice change (just one department in a local hospital), but eventually, if the project returns positive results and outcomes, the goal is to disseminate this information via a reputable medical journal in hopes of creating a practice change at a state or national level.

**Literature Review and PICO Question**

An extensive review of the literature was conducted prior to beginning this evidence-based practice project. The CINAHL and PubMed databases were utilized, and key words including cognitive dysfunction, post-op cognitive dysfunction, delirium, elderly, peri-op, and anesthesia were entered into the search engine to bring up relevant articles. Filters and parameters were added to fine tune the articles presented and were only to include articles in the English language and those from the year 2010 and on. Additionally, three articles were pulled from www.anesthesiologynews.com, which is a subscription-based platform. It is highly respected and the most widely read publication for the anesthesia specialty over the last 25 years.

Over 20 articles were read and reviewed for relevancy and accuracy. These journal articles were evaluated for high quality evidence using the Johns Hopkins Nursing Evidence Based Practice Model research appraisal tool. In total, 10 articles were chosen based on the quality of the content and application to this project. Ultimately,

each of the articles selected were, in part, able to answer the PICO question: In the geriatric population, (adults age 70+) who are undergoing anesthesia, does establishing and implementing a perioperative anesthesia bundle for brain health, compared to current practices, decrease amount of postoperative cognitive dysfunction and improve patient outcomes?

As a whole, the 10 articles selected all supported the fact that elderly patients are at high risk for post-operative cognitive dysfunction. The cause of post-operative cognitive dysfunction is unclear, but is likely to include age, pre-existing mild cognitive impairment, and lower education (Nathan, 2018). Additionally, risk factors such as depression, alcohol abuse, anemia, renal insufficiency, heart disease and hypertension, poor functional capacity and the use of polypharmacy or psychotropic medications can affect the likelihood of cognitive impairment as well (Chow, et al., (2012). Of all the potential causes of post-operative cognitive dysfunction, the strongest predictor is pre-existing cognitive impairment (Chow, et al., (2012). However, small changes can be implemented during the pre-op visit, intra-op procedure, and post-op recovery can greatly improve these elderly patients' outcomes.

The articles pinpoint that the use of benzodiazepine and longer-acting opioids while under anesthesia increases the risk of postoperative delirium, and those should be avoided when possible (Arora, 2014). Additionally, use of medications on the BEERS list (see Appendix K) as well as anticholinergic medication should be avoided as they are high risk medications in the elderly (Decker & Peden, 2020). Specifically, pharmaceuticals like Diphenhydramine, all Benzodiazepines, Scopalamine, Ketamine, Meperidine, Morphine, Zolpidem, and Histamine-receptor antagonists are mentioned and

should be avoided when possible (Hughes, 2020). Instead, administering lower risk medications like Acetaminophen and NSAIDs would be appropriate to minimize post-operative cognitive dysfunction (Decker & Peden, 2020).

Because preexisting cognitive impairment is the strongest predictor of post-operative cognitive dysfunction, cognitive screening using the Mini-Cog should be administered to all elderly patients age 70 and older. Documentation of Mini-Cog results in the electronic health record, as well as disseminating this information to the peri-operative team is critical in preventing post-operative cognitive dysfunction (Decker & Culley, 2021). "Documentation of cognitive status led to a decrease in the administration of high-risk medications with anticholinergic properties, such as scopolamine, meperidine and diphenhydramine, from 9.6% to 3.2%. Conversely, low-risk medications such as acetaminophen were much more commonly used in patients with documentation (68.8%) than in those with no documentation" (Decker, 2021). Additionally, patients with a documented Mini-Cog score received significantly fewer benzodiazepines and were more likely to have a cognitive impairment prevention plan in place for the post-op period than those without a Mini-Cog in their chart (Decker & Culley, 2021).

While implementing a Mini-Cog in the pre-op phase and withholding the use of high-risk medications in the intra-op phase can improve outcomes in our elderly who are undergoing anesthesia, even more can be done in the post-op phase to protect our most fragile patients. Regular screening using the Confusion Assessment Method (CAM) tool should be conducted in the recovery unit (Decker & Peden, 2020). Nursing actions become extremely essential in the post-op period. Returning the patients' most important belongings to them as soon as it is safe, like hearing aids, dentures, and glasses, can help

patients get their bearings more quickly (Decker & Peden, 2020). Nurses should encourage family, friends, and visitors to be present with the patient and do everything possible to adjust lighting and tune out background noise to protect the sleep and wake cycle (Decker & Peden, 2020). Additionally, using pharmacy alerts for high-risk medications and providing suggested alternatives can be beneficial (Decker & Peden, 2020). If impairment occurs in the post-operative phase, trying non-pharmacologic options first is preferred, only resorting to pharmacologic options if they are absolutely necessary, starting at the lowest dose and advancing slowly (Decker & Peden, 2020).

**Selected Screening Tool**

As mentioned previously, the consensus is that a Mini-Cog and identifying key patient factors should be utilized for patients aged 70 and older during their pre-op visit. The Mini-Cog is a screening tool that is used to increase the detection of cognitive impairment in elderly adults. It consists of two components: a three-item recall test to test memory, as well as completing a simple drawing of a clock. A score of zero to two indicates probable cognitive dysfunction, and a score of three to five suggests a lower likelihood of cognitive impairment (Wanderer, 2017).

In the post-operative period, the suggested screening tool to utilize is the CAM tool. “The CAM instrument assesses the presence, severity, and fluctuation of 9 delirium features: acute onset, inattention, disorganized thinking, altered level of consciousness, disorientation, memory impairment, perceptual disturbances, psychomotor agitation or retardation, and altered sleep-wake cycle. The CAM diagnostic algorithm is based on four cardinal features of delirium: 1) acute onset and fluctuating course, 2) inattention, 3) disorganized thinking, and 4) altered level of consciousness. A diagnosis of delirium

according to the CAM requires the presence of features 1, 2, and either 3 or 4. The CAM demonstrated sensitivities from 94–100%, specificities from 90–95%, positive predictive accuracy of 91– 94%, negative predictive accuracy of 90–100%, interrater reliability ranging from .81–1.00; and convergent agreement with other mental status tests including the Mini-Mental State Examination (MMSE)" (Wei, et al., 2008).

**Project Plan and Implementation Process**

The development of this evidence-based practice project ultimately began with the development of a PICO question, which was followed by a thorough review of the literature. The DNP student collaborated with her campus faculty advisor to come up with an implementation process and plan. As with any change implementation project, it was important to get initial buy-in from key stakeholders at the local hospital that was identified to be where the project would take place. Because this project involves implementing changes in three different departments, it was important to identify individuals that would support this project in each area. After pitching the idea of this project to anesthesiologists, nurses, and leadership in peri-op and receiving positive feedback, the decision was made to submit for IRB approval. On December 20, 2021, the project was approved by the ACQUIRE committee at the local hospital and data collection could begin.

An excel spreadsheet was utilized to collect and store data from the chart review and 250 charts were examined on the EPIC platform from January 1, 2022 to February 20, 2022. Demographics were assessed initially, collecting data on the age, gender, and primary language spoken by the patient undergoing anesthesia. Only patients over the age of 70 were included. From there, health records were opened, and health history of these

elderly patients were obtained. It was noted in the excel spreadsheet when these elderly patients had any one of the following diagnoses added to their medical record: depression, alcohol abuse, renal insufficiency, anemia, coronary artery disease, hypertension, poor functional capacity, or taking any medications on the BEERS list. Having just one of these prior medical conditions is grounds for a Mini-Cog and avoidance of high-risk medications intra-operatively. Then, the pre-operative history and physical note from the provider was opened and skimmed to see if a Mini-Cog was administered. The medication administration record from the procedure was opened and reviewed, and administration of a benzodiazepine or an anticholinergic was documented in the excel spreadsheet. Lastly, the post-op notes from both the anesthesia team and the nursing staff in the PACU were reviewed, and the post-op course was documented in the excel spreadsheet. This included the use of a CAM score, any signs of delirium or post-op cognitive dysfunction, and the patient's length of stay.

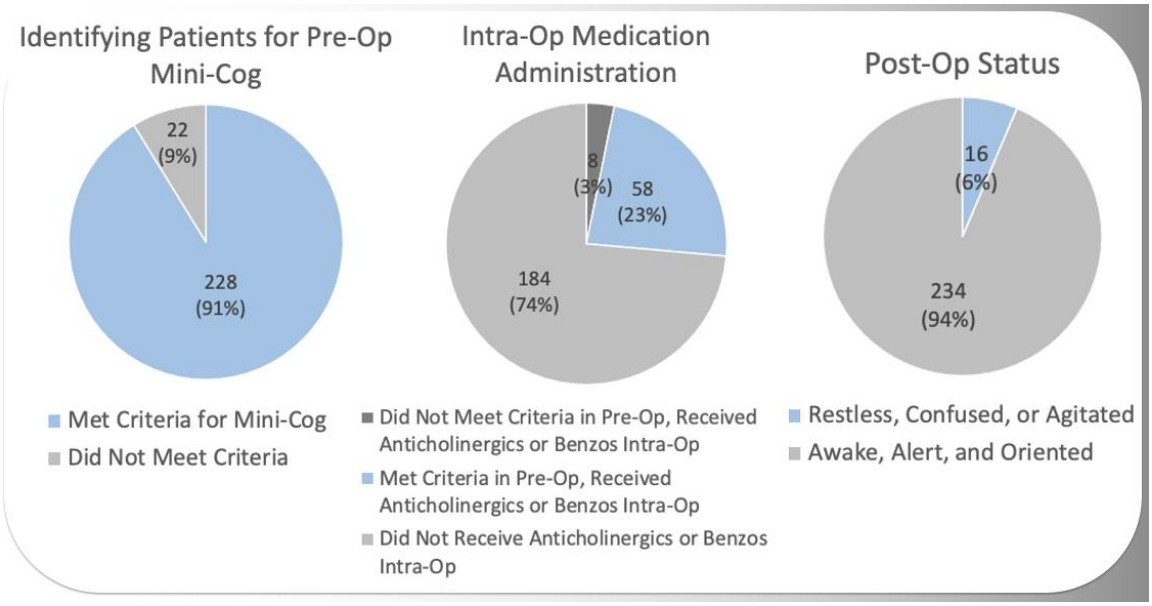
It is important to note that patients who were undergoing electroconvulsive therapy were excluded from the data set, as they come in for treatment so frequently that the data would have been skewed.

## Results

After the retrospective chart review, the data was analyzed, and conclusions were drawn that were presented to the peri-operative team. Of the 250 charts reviewed, 228 of them met criteria to have a Mini-Cog prior to undergoing anesthesia (91.2%). However, zero charts actually had a Mini-Cog documented. Intraoperatively, 66 patients received medications recommended against per the literature, like a benzodiazepine or an anticholinergic. The most frequently used benzodiazepine was Midazolam. Of the 66

patients that received these drugs intra-operatively, 58 of them met criteria where they should have been avoided based on their health history. That means that 88% of elderly patients who received a benzodiazepine or an anticholinergic intra-operatively should not have. Post-operatively, there were zero documented CAM scores to assess for delirium, which is the tool recommended by the literature. Instead, there was documentation of a RASS score in most of the charts, or the Richmond Agitation and Sedation Scale. Based on RASS assessments, 16 patients were either restless, confused or agitated when they woke up from anesthesia. Ultimately, length of stay did not seem to be affected by which drugs were used intraoperatively.

Figure 1.




## Discussion

### Strengths and Limitations

Looking back upon the completion of this evidence-based practice project, it is important to evaluate the strengths, limitations and possible areas for improvement. One of the main strengths of this project is the amount of literature that suggests the

implementation of a Mini-Cog, identifiable patient factors, and the avoidance of benzodiazepines and anticholinergics, among other medications, intra-op. The evidence gathered was very high level and each article was in congruence with the suggestions of the next article. Another one of the strengths that can be appreciated is that the use of the suggested screening tools are easy to understand, easy to interpret, and quick to implement in practice. Each screening tool should take less than 3 minutes to conduct, which should not disrupt current workflow. Lastly, it is beneficial that this evidence-based practice project is being conducted with the staff of the hospital versus trying to get patients themselves to make a change. Healthcare workers know through and through that change and quality improvement projects are a significant part of medicine. Because of this, healthcare workers are usually more open and welcoming to the idea of process improvement, which was noticed during this project and can be considered a strength of this project.

Limitations of this project included a small sample of charts and a short time frame where chart review was conducted. Due to the COVID-19 pandemic, it was difficult to get this project started at the anticipated time. The IRB committees did not meet as frequently because of the global pandemic, and approval took longer than anticipated. This ultimately led to reviewing a much smaller number of charts than what was hoped for. Additionally, while there was a surplus of information and journal articles on how to screen for post-operative cognitive dysfunction and which medications to avoid intra-op, there seemed to be a limited amount of information available that discussed recommended post-op interventions and which medications should be used instead intra-operatively.

## Cost Benefit Analysis

Ultimately the potential benefit of this project greatly outweighs any of the associated costs. As stated previously, the Mini-Cog only takes three minutes to conduct and can be added as a requirement during the pre-operative history and physical that must completed within 30 days of the scheduled procedure. Adding one small step to the patient's visit would not cost anything to the hospital. Disseminating this information to the anesthesia team on the day of the procedure will also not cost anything, but can significantly benefit the patient. Intraoperatively, the anesthesia team has the freedom to make clinical judgments based on their critical thinking to determine which combination of pharmaceuticals would be best for each patient's individual case. By having the documented Mini-Cog and patient factors, the anesthesia team has the knowledge to avoid administering benzodiazepines and anticholinergics when possible. Per the literature, this can lead to less post-op cognitive dysfunction and, in turn, shorter hospital stays, increased discharge to home instead of skilled nursing or long-term care facilities, and decreases in morbidity and mortality. If a day in the hospital in California typically costs an average of $3726.00, it is in the best interest of each hospital system to follow best practice and safely discharge patients as soon as possible (Fay, 2021). By preventing post-operative cognitive dysfunction in our elderly, we can do just that.

## Conclusion

As clinicians, we are constantly changing and evolving our practice to keep up with the latest literature. Simply documenting a Mini-Cog and identifiable patient factors in the electronic health record and verbally disseminating this information to the anesthesia team prior to putting a patient under can decrease the use of high-risk

medications like benzos and anticholinergics intra operatively. In the PACU, documentation of a CAM score can help identify delirium early, and in these patients, we can best assist them by bringing in familiarities to help them adjust post-op.

All of these tools, which can be referred to as “the peri-op anesthesia bundle” are easy changes that can be implemented at this local hospital to improve our peri-op care for our elderly patients and improve their outcomes. It is clear that while this hospital system is looked upon highly and with favor by the community, has won many awards and is a MAGNET designated facility, which only 8.9% of hospitals in the United States are, the data coming from their peri-op department demonstrate there is still room for improvement.

The goal of this project is to be continued by a first-year or second-year DNP student, to implement the changes suggested in the literature. While the completion of this stage of the project was extremely important because gaps in care were identified, it is important to take this information and implement the necessary changes to improve outcomes. Our elderly patients deserve the best, and with the continued implementation of this quality improvement project, one should see increased discharges to home, decreased mortality, and decreased overall cost to the hospital.

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