

Geriatrics

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Preface

Draft materials. Not to be cited.

Corrections, suggestions for additions, or general comment can be sent to [Mark Grant](#).

1 Protocol

2 Geriatric Anesthesia Draft Systematic Review Protocol

2.1 Background

Between 2019 and 2060, the number of US adults aged 65 years or older will likely increase from 54 to 95 million; the oldest-old (85+ years) will grow from 6.6 to 19 million over the same period.^{1,2} These demographic shifts carry significant implications for the practice of anesthesiology. In 2007, the elderly (15% of the US population) underwent 35% of inpatient surgeries.³ In 2006, 32% of outpatient surgeries were performed in the elderly.⁴ Moreover, the risk of postoperative complications increases with age.^{5,6} Improving the quality of perioperative care for older adults is a major priority for patients, providers, and policy makers.

2.2 Systematic Review Questions

2.2.1 Preoperative care

1. Among geriatric patients anticipating surgery and anesthesia, does expanded preoperative evaluation (e.g., for frailty, cognitive impairment, functional status, or psychosocial issues) lead to improved postoperative outcomes?
2. Among geriatric patients anticipating surgery and anesthesia, do interventions targeted at improving physical function, cognition, and nutritional status before surgery (“prehabilitation”) improve postoperative outcomes?

2.2.2 Intraoperative care

3. Among geriatric patients undergoing surgery, does regional anesthesia as the primary anesthetic technique improve postoperative outcomes compared with general anesthesia?
4. Among geriatric patients undergoing surgery with general anesthesia, does the use of intravenous agents for maintenance of anesthesia improve postoperative outcomes compared with inhaled agents?

5. Among geriatric patients undergoing surgery and anesthesia, do commonly used potentially inappropriate medications administered during the perioperative period increase the risk of postoperative delirium or other adverse outcomes?
6. Among geriatric patients undergoing surgery and anesthesia, do dexmedetomidine, ketamine, ramelteon, or melatonin administered during the perioperative period decrease the risk of postoperative delirium or other adverse cognitive outcomes?

2.2.3 Postoperative care

7. Among geriatric patients undergoing surgery, do postoperative lower limb regional anesthetic techniques, such as continuous epidural anesthesia improve postoperative outcomes?
8. Does screening geriatric patients for postoperative delirium in the post anesthesia care unit improve postoperative outcomes?

2.3 PICOTS

2.3.1 Population

- Patients 65 years or older undergoing general anesthesia, sedation, or regional anesthesia for surgical procedures.
- Subgroups
 - Age
 - * 65-74
 - * 75-84
 - * 85+
 - Sex
 - Race
 - Ethnicity
 - Frailty
 - Mild neurocognitive disorder (mild cognitive impairment)
 - Major neurocognitive disorder (dementia)
 - Elective surgery

- Emergency surgery
- Type of procedure
- ASA classification
 - * ASA I-II
 - * ASA III or higher

2.3.2 Interventions

2.3.2.1 Preoperative

- Expanded preoperative evaluation (frailty, cognitive, functional, or psychosocial)
 - Primary frailty tools to include (but not limited to)
 - * Fried Frailty Index
 - * Frailty Index
 - * Clinical Frailty Scale
 - * Edmonton Frail Scale
 - * Risk Analysis Index
- Prehabilitation (functional, cognitive, nutritional)

2.3.2.2 Intraoperative

- Regional anesthesia as the primary anesthetic
- TIVA
- Inhalation agents
- Potentially inappropriate medications
 - Anticholinergics
 - Antipsychotics
 - Corticosteroids
 - Ketorolac and NSAIDs
 - H2-receptor antagonists

- Benzodiazepines
- Nonbenzodiazepine benzodiazepine receptor agonist hypnotics: eszopiclone, zaleplon, zolpidem
- Drugs to prevent delirium (dexmedetomidine, ketamine, ramelteon, or melatonin)

2.3.2.3 Postoperative

- Postoperative regional anesthetics for lower limb pain (continuous epidural, nerve block with catheter)
- PACU screening for delirium

2.3.3 Comparators

2.3.3.1 Preoperative

- Standard preoperative evaluation
- No prehabilitation

2.3.3.2 Intraoperative

- Regional anesthesia as the primary anesthetic
- TIVA
- Avoidance of potentially inappropriate medications
- No drugs to prevent delirium

2.3.3.3 Postoperative

- No postoperative regional anesthetics for lower limb pain (continuous epidural, lower limb nerve block with catheter)
- No PACU screening for delirium

Table: Interventions and corresponding comparators.

	Intervention(s)	Comparator(s)
<i>Preoperative</i>	Expanded preoperative evaluation (frailty, cognitive, functional, psychosocial)	Standard preoperative evaluation
	Prehabilitation (functional, cognitive, nutritional)	No prehabilitation
<i>Intraoperative</i>	Regional anesthesia as the primary anesthetic	General anesthesia
	Total intravenous anesthesia	Volatile anesthetics
	Anticholinergics	None
	Antipsychotics	
	Corticosteroids	
	H2-receptor antagonists	
	Benzodiazepines	
	Nonbenzodiazepine benzodiazepine receptor agonist hypnotics: eszopiclone, zaleplon, zolpidem	
	Drugs to prevent delirium (dexmedetomidine, ketamine, ramelteon, or melatonin)	None
<i>Postoperative</i>	Postoperative regional anesthetics for lower limb pain (continuous epidural, lower extremity nerve block with catheter)	Opioids, multimodal analgesia not including nerve block, or conventional pain management
	Screening for postoperative delirium	No screening for postoperative delirium

2.3.4 Outcomes

- Postoperative delirium
- Delayed neurocognitive recovery (< 30 days after procedure)
- Postoperative neurocognitive disorder (mild, major)
- Major neurocognitive disorder (dementia)
- Mild neurocognitive disorder (mild cognitive impairment)
- Stroke
- Intraoperative awareness
- Recovery (e.g., Aldrete and Quality of Recovery scores)
- Depression
- Patient/caregiver/family satisfaction
- Valued life activities

- Physical functional status (independence/disability)
- Health-related quality of life
- Pain
- Opioid use
- Complications
 - Surgical site infection (superficial, deep)
 - Respiratory (pneumonia, unplanned intubation, pulmonary embolism, on ventilator > 48 hours)
 - Urinary tract infection
 - Acute kidney injury
 - Central nervous system (stroke, nerve injury)
 - Cardiac (MI, arrest)
 - Deep venous thrombosis
 - Sepsis
- Length of stay
- Discharge location
 - Home
 - Rehab/skilled/short-term, long-term care, or other than primary residence
- Readmission
- Mortality

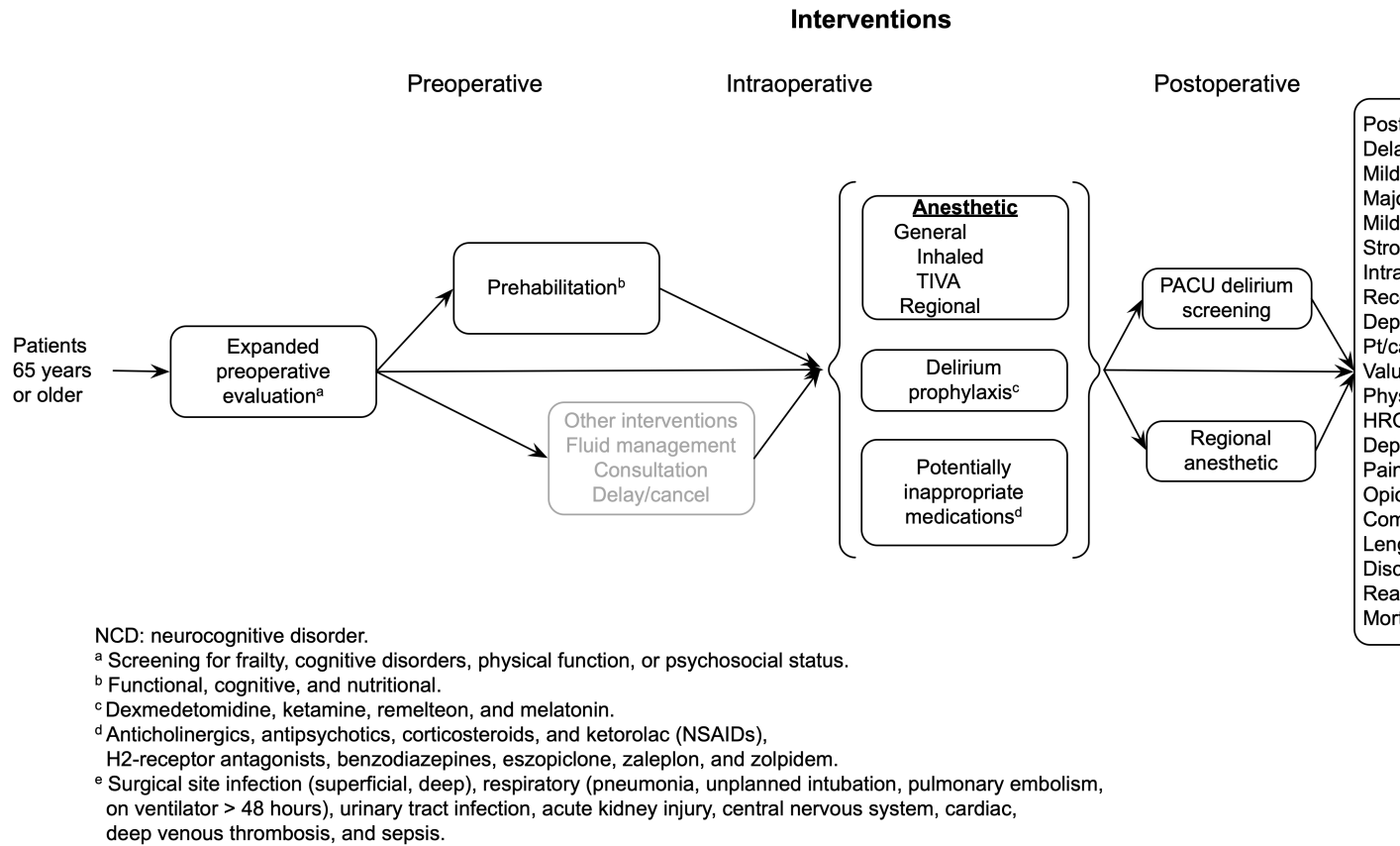
2.3.5 Timing

- Perioperative period through 1 year

2.3.6 Settings

- Any surgical

2.4 Analytic Framework



2.5 Methods

2.5.1 Search

The literature search will include publications from 2000 to present (PubMed, Embase, Scopus, and Cochrane Central).

2.5.2 Study inclusion/exclusion criteria

1. Studies of geriatric patients. (Studies including younger patients will be considered if a result is judged transportable to the target population).
2. Publication Types

- Published journal articles, reports
- Language restrictions: English language only
- Limited to humans
- Grey literature

3. Study Designs

- Include
 - Randomized clinical trials
 - Non-randomized trials
 - Quasi-randomized designs (e.g., before-after studies, interrupted time series)
 - Cohort studies (prospective, retrospective)
 - Case-control studies
 - Other observational studies (e.g., diagnostic accuracy)
- Exclude
 - Case reports and case series
 - Surveys, questionnaires
 - Letters
 - Editorials
 - Conference abstracts
 - Systematic reviews and meta-analyses (for reference checking)

2.5.3 Search Strategies

(Separate document)

2.5.4 Data Abstraction and Management

Title/abstract and full-text screening together with data extraction will be performed on the DistillerSR platform.⁷ All screening will be conducted in duplicate, with disagreements resolved by consensus or a third reviewer as needed.

Anticipated data extraction includes study characteristics (e.g., design, dates, setting, centers, country, funding, registration, subgroups, surgery, and anesthetic), study arms (e.g., intervention, participant characteristics, intervention, and outcomes reported), and outcome detail according to type (e.g., patient-reported or clinical; continuous, dichotomous [includes relative effects], rating scales [Likert, visual analog, numeric]). As required, figures will be digitized. A single reviewer will extract study data followed by verification.⁸

2.5.5 Risk of Bias of Individual Studies

Risk of bias assessment for randomized trials will be conducted using the Cochrane risk of bias tool.⁹ Risk of bias assessment of non-randomized studies of interventions (e.g., observational studies of interventions including cohort, case-control, and quasi-randomized designs) will utilize the Risk Of Bias In Non-randomised Studies of Interventions tool (ROBINS-I).¹⁰ Risk of bias will be assessed independently by two reviewers with discrepancies resolved by discussion, or a third reviewer as needed.

2.5.6 Evidence Synthesis

As appropriate, based on clinical and methodological heterogeneity, study results will be pooled in either pairwise or network meta-analyses in random effects models (given the goal of estimating unconditional effects not relevant only to the pooled studies).¹¹ Statistical heterogeneity is evaluated using between study variance and I^2 .¹² When there is meaningful heterogeneity and the number of studies sufficient (e.g., 10 or more) meta-regression is considered to explain the variability.¹³ With 10 or more pooled studies, small study effects and the potential for publication bias will be examined in funnel plots, regression-based tests, adjustment methods, and p-curves.^{14,15}

Relative effects will be pooled as risk ratios for clinical interpretability except when adjusted measures reported as odds are pooled. Continuous measures are pooled as mean differences or standardized mean differences when studies use differing scales. When practicably, standardized mean differences will be re-expressed on the most meaningful scale.¹⁶ R (R Foundation for Statistical Computing, Vienna, Austria) will be used for analyses and data made publicly available when the guideline is completed.

2.5.7 Grading the Strength of Evidence

The strength (certainty) of evidence for important outcomes will be appraised using either GRADE¹⁷ and ACCF/AHA¹⁸ frameworks.

2.5.8 Registration

TBD

Table. Protocol Development

Date	Section	Modification
July 2021		First draft
June 2022	Key questions	Key questions removed: EEG monitoring and cognitive function; sedation titration with EEG monitoring; and maintaining intraoperative high blood pressure

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3 Potentially Inappropriate Medications (KQ5)

Among geriatric patients undergoing surgery and anesthesia, do commonly used potentially inappropriate medications administered during the perioperative period increase the risk of postoperative delirium or other adverse outcomes?

3.0.1 Interventions of Interest

- Anticholinergics
- Antipsychotics
- Benzodiazepines
- Corticosteroids
- Ketorolac and other NSAIDs
- H2-receptor antagonists
- Nonbenzodiazepine benzodiazepine receptor agonist hypnotics: eszopiclone, zaleplon, zolpidem

4 Summary

In summary, this book has no content whatsoever.

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