Surgical Care of the Geriatric Patient – What Every Surgeon Should Know

Tom Robinson MD
Extremes of age:
Surprising similarities of pediatric and geriatric surgery
Is geriatric surgery a specialty?
Proposed Competencies in Geriatric Patient Care

Pre-Operative  Operation  Hospital Course  After Discharge Care
Proposed Competencies in Geriatric Patient Care

Atypical presentations
Assess risk - frailty
Medication management
Complex/chronic illness
Cognitive disorders
Informed consent
Proposed Competencies in Geriatric Patient Care for Use in Assessment for Initial and Continued Board Certification of Surgical Specialists

Pre-Operative

Atypical presentations
Assess risk - frailty
Medication management
Complex/chronic illness
Cognitive disorders
Informed consent

Operation

Hospital Course

Medication management
Advance directives
Complex chronic illness

After Discharge Care
Proposed Competencies in Geriatric Patient Care

- Pre-Operative: Atypical presentations, Assess risk - frailty, Medication management, Complex/chronic illness, Cognitive disorders, Informed consent
- Operation: Medication management, Advance directives, Complex chronic illness
- Hospital Course: Medication management, Delirium management, Treat chronic illness, Patient safety, Palliative care / end-of-life, Transitions of care
- After Discharge Care:
Proposed Competencies in Geriatric Patient Care for Use in Assessment for Initial and Continued Board Certification of Surgical Specialists

Atypical presentations
Assess risk - frailty
Medication management
Complex/chronic illness
Cognitive disorders
Informed consent

Medication management
Advance directives
Complex chronic illness

Medication management
Delirium management
Treat chronic illness
Patient safety
Palliative care / end-of-life
Transitions of care
Geriatric Surgery – Matrix Management Structure

Diagram courtesy of Dr. Ben Eiseman MD.
Geriatric Surgery – Matrix Management Structure

Diagram courtesy of Dr. Ben Eiseman MD.
A Model of Multi-Disciplinary Surgical Care

Complementary Courses

- Advanced Trauma Care for Nurses (ATCN) for Registered Nurses
- Pre-Hospital Trauma Life Support (PHTLS) for Pre-hospital Care Providers
- Trauma Evaluation and Management (TEAM) for Medical Students
Geriatric Surgery – Matrix Management Structure

Diagram courtesy of Dr. Ben Eiseman MD.
Co-Managed Geriatric Hip Fracture Center

• Clinical outcomes
  – Decreased length of stay
  – Decreased readmission rate
  – Decreased complications
  – Decreased mortality

Co-Managed Geriatric Hip Fracture Center

- Clinical outcomes
  - Decreased length of stay
  - Decreased readmission rate
  - Decreased complications
  - Decreased mortality

- Cost of caring for hip fractures was 66.7% of expected cost.

## Age Demographic by Surgical Specialty

<table>
<thead>
<tr>
<th>Surgical Specialty</th>
<th>Age &gt; 65 years</th>
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<tbody>
<tr>
<td>Cardiovascular</td>
<td>51%</td>
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<tr>
<td>Thoracic</td>
<td>48%</td>
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<tr>
<td>Urologic</td>
<td>45%</td>
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<tr>
<td>Gastrointestinal</td>
<td>43%</td>
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<td>Orthopedic</td>
<td>39%</td>
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<tr>
<td>Ophthalmologic</td>
<td>34%</td>
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<tr>
<td><strong>All</strong></td>
<td><strong>35%</strong></td>
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</table>
U.S. Population Aged 65 and Over

Population (Millions)

Percent Total Population

Calendar Year
Geriatric Surgery – Matrix Management Structure

Diagram courtesy of Dr. Ben Eiseman MD.
Proposed Competencies in Geriatric Patient Care for Use in Assessment for Initial and Continued Board Certification of Surgical Specialists

- **Pre-Operative**
  - Atypical presentations
  - Assess risk - frailty
  - Medication management
  - Complex/chronic illness
  - Cognitive disorders
  - Informed consent

- **Operation**
  - Medication management
  - Advance directives
  - Complex chronic illness

- **Hospital Course**
  - Delirium management
  - Treat chronic illness
  - Patient safety
  - Palliative care / end-of-life
  - Transitions of care

- **After Discharge Care**
Proposed Competencies in Geriatric Patient Care for Use in Assessment for Initial and Continued Board Certification of Surgical Specialists

Atypical presentations
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Medication management
Delirium management
Treat chronic illness
Patient safety
Palliative care / end-of-life
Transitions of care

To operate or not to operate, 
that is the question.
Traditional pre-operative risk assessment strategy does not distinguish risk in these two individuals.
Risk stratifying the geriatric patient requires assessment of vulnerability unique to older adults.
Geriatric Assessment

Functional Impairment

Geriatric Syndromes

Impaired Cognition

Walking Speed

Chronic Disease Burden

Nutrition
Geriatric Assessment

Functional Impairment

Geriatric Syndromes

Impaired Cognition

Walking Speed

Chronic Disease Burden

Nutrition
Geriatric Assessment - Function

Activities of Daily Living (ADLs)

- Bathing
- Dressing
- Transferring
- Toileting
- Grooming
- Feeding
Geriatric Assessment - Function

Instrumental Activities of Daily Living (IADLs)

- Using the telephone
- Shopping
- Food preparation
- Housekeeping
- Doing laundry
- Utilization of transportation
- Ability to medicate
- Ability to handle finances
Geriatric Assessment

- Functional Impairment
- Geriatric Syndromes
- Walking Speed
- Nutrition
- Chronic Disease Burden

Impaired Cognition
Geriatric Assessment - Cognition

Mini-Cog

- Three item recall - apple, table, penny
- Clock Draw - draw clock face, hands at 11:10

Geriatric Assessment

- Functional Impairment
- Geriatric Syndromes
- Walking Speed
- Impaired Cognition
- Nutrition
- Chronic Disease Burden
Geriatric Assessment – Chronic Disease Burden

- Charlson Index
- Cumulative Illness Rating Scale
- Polypharmacy
- ASA Score
- Anemia of chronic disease (< 35%)

Geriatric Assessment

- Functional Impairment
- Impaired Cognition
- Chronic Disease Burden
- Nutrition
- Walking Speed
- Geriatric Syndromes
Risk stratifying the geriatric patient requires assessment of vulnerability unique to older adults.
Geriatric Assessment

- Functional Impairment
- Impaired Cognition
- Chronic Disease Burden
- Walking Speed
- Geriatric Syndromes
- Nutrition

Nutrition is highlighted.
Geriatric Assessment – Nutrition

• 10 lbs. weight loss in past year
• 10% weight loss in past year
• Albumin level
• Mini-Nutritional Assessment
Geriatric Assessment

- Functional Impairment
- Impaired Cognition
- Chronic Disease Burden
- Nutrition
- Geriatric Syndromes
- Walking Speed

[Diagram with arrows connecting the topics to the central theme of Geriatric Assessment]
Geriatric Assessment – Walking Speed

Timed ambulation over 15 feet
Timed ambulation over 6 meters
Timed Up-and-Go
A geriatric syndrome represents accumulated impairments in multiple organ systems that results in a clinical event.

- Falls
- Continence

Geriatric Assessment

- Functional Impairment
- Geriatric Syndromes
- Impaired Cognition
- Walking Speed
- Nutrition
- Chronic Disease Burden
### CHARLSON INDEX (retrospective)

<table>
<thead>
<tr>
<th>Condition</th>
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<td>Myocardial Infarction</td>
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<tr>
<td>Congestive Heart Failure</td>
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<tr>
<td>Peripheral Vascular Disease</td>
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<tr>
<td>Cardiovascular Disease</td>
<td>1</td>
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<tr>
<td>Dementia</td>
<td>1</td>
</tr>
<tr>
<td>COPD</td>
<td>1</td>
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<tr>
<td>Connective Tissue Disease</td>
<td>1</td>
</tr>
<tr>
<td>Ulcer Disease</td>
<td>1</td>
</tr>
<tr>
<td>Wound or chronic diseased liver</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
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<tr>
<td>Renal disease</td>
<td>1</td>
</tr>
<tr>
<td>Moderate to severe renal disease</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes with end organ damage</td>
<td>2</td>
</tr>
<tr>
<td>Any Tumor</td>
<td>2</td>
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<tr>
<td>Leukemia</td>
<td>2</td>
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<td>Lymphoma</td>
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<tr>
<td>Metastatic solid tumor</td>
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<td>AIDS</td>
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### BARTHEL INDEX

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<tr>
<td>Feeding</td>
<td>0 = unable, 10 = independent</td>
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<tr>
<td>Dressing</td>
<td>0 = dependent, S = independent (or in shower)</td>
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<tr>
<td>Grooming</td>
<td>0 = needs help, S = independent</td>
</tr>
<tr>
<td>Dressing</td>
<td>0 = dependent, S = independent</td>
</tr>
<tr>
<td>Bowels</td>
<td>0 = incontinent, S = occasional accident, 10 = continent</td>
</tr>
<tr>
<td>Bladder</td>
<td>0 = incontinent, S = occasional accident, 10 = continent</td>
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<tr>
<td>Toilet</td>
<td>0 = dependent, S = needs some help, 10 = independent</td>
</tr>
<tr>
<td>Transfer</td>
<td>0 = unable, S = minor help (physical), 10 = independent</td>
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<tr>
<td>Mobility</td>
<td>0 = immobile or &lt; 50 yards, S = wheelchair independent, 10 = independent</td>
</tr>
<tr>
<td>Stairs</td>
<td>0 = unable, S = needs help, 10 = independent</td>
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</table>

### DEPRESSION SCREEN

Ask following question:

1. During the past month, have you been bothered by feeling down, depressed or hopeless?
2. During the past month, have you been bothered by little interest or lack of pleasure in doing things?

Score 1 point is answer "YES" to question (0=no depression, 2=depression)

**DEPRESSION SCORE TOTAL**

0 1 2
Accumulation of Geriatric “Deficits”
Accumulation of Geriatric “Deficits”

Risk Scale

Normal Gait Speed

Functional Impairment

AVERAGE OUTCOMES

POOR OUTCOMES
Accumulation of Geriatric “Deficits”

- No Geriatric Syndromes
- Normal Gait Speed
- Impaired Cognition
- Functional Impairment

Risk Scale

AVERAGE OUTCOMES

POOR OUTCOMES
Accumulation of Geriatric “Deficits”

Risk Scale

- Normal Albumin
- Low Burden Chronic Disease
- No Geriatric Syndromes
- Normal Gait Speed

- Impaired Cognition
- Functional Impairment

AVERAGE OUTCOMES

POOR OUTCOMES
Accumulation of Geriatric “Deficits”

Risk Scale

- No Geriatric Syndromes
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AVERAGE OUTCOMES

POOR OUTCOMES
Functional Impairment
Walking Speed
Impaired Cognition
Nutrition
Chronic Disease Burden
Geriatric Syndromes
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<tr>
<td>Non-Frail</td>
<td>0 or 1</td>
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<tr>
<td>Pre-Frail</td>
<td>2 or 3</td>
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<tr>
<td>Frail</td>
<td>4 or more</td>
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Post-Operative Complications

One or More Complications (%)

Non-Frail | Pre-Frail | Frail
---|---|---
0 | 40 | 60

Hospital Length of Stay

Hospital Length of Stay (days)

Cost of Hospitalization

Hospital Cost ($10K)

Non-Frail
Pre-Frail
Frail

0 10 20 30 40 50 60 70 80

1 2 3

Post-Discharge to Six-Month Healthcare Costs

Post-Hospital 6-Month Costs ($10K)

Non-Frail | Pre-Frail | Frail
0 | 5 | 35

Geriatric Assessment

Geriatric Syndromes
Walking Speed
Functional Impairment
Impaired Cognition
Nutrition
Chronic Disease Burden
Mood
Extrinsic Markers
Exhaustion
Low activity
# Geriatric Assessment and Post-Op Outcomes

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<tr>
<td>Saxton et al (2011)</td>
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</tr>
</tbody>
</table>
Preoperative Assessment:
What Really Matters
Walking Speed

Functional Impairment

Impaired Cognition

Nutrition

Chronic Disease Burden

Geriatric Syndromes
Proposed Competencies in Geriatric Patient Care for Use in Assessment for Initial and Continued Board Certification of Surgical Specialists

- Pre-Operative
  - Atypical presentations
  - Assess risk - frailty
  - Medication management
  - Complex/chronic illness
  - Cognitive disorders
  - Informed consent

- Operation
  - Medication management
  - Advance directives
  - Complex chronic illness

- Hospital Course
  - Delirium management
  - Treat chronic illness
  - Patient safety
  - Palliative care / end-of-life
  - Transitions of care

- After Discharge Care

Why is delirium important?

- Most common post-operative complication in the elderly.
- Closely related to adverse outcomes.
- Potentially preventable, and there is room to improve treatment.
What is Delirium?

Delirium is an acute, fluctuating change in mental status, with inattention and altered levels of consciousness.

Diagnostic Criteria for Delirium

1. Coexisting Physiologic Disturbance
2. Acute Onset
3. Disturbance of Consciousness
4. Change in Cognition

Diagnostic and Statistical Manual of Mental Disorders DSM IV - Fourth Edition (1994)
## Incidence of Delirium

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract Surgery(^5)</td>
<td>&lt; 5%</td>
</tr>
<tr>
<td>Medical Ward(^1)</td>
<td>15%</td>
</tr>
<tr>
<td>Vascular Operation(^4)</td>
<td>36%</td>
</tr>
<tr>
<td>Hip Fracture(^3)</td>
<td>40%</td>
</tr>
<tr>
<td>DVAMC SICU(^6)</td>
<td>44%</td>
</tr>
<tr>
<td>DHMC Trauma ICU(^7)</td>
<td>59%</td>
</tr>
<tr>
<td>Medical ICU(^2)</td>
<td>72%</td>
</tr>
</tbody>
</table>

\(^1\)NEJM (1999) 340(9):669.  
\(^3\)JAGS (2002) 50:850  
Age and Post-Operative Delirium

Incidence of Delirium (\%)

Age by Decade (years)

Pre-Operative Risk Factors

✓ Impaired cognition
✓ Functional impairment
✓ High chronic disease burden
✓ Older age
✓ Low albumin

Multifactorial Model of Delirium

Predisposing Factors/ Vulnerability

Precipitating Factors/ Insults
Multifactorial Model of Delirium

Predisposing Factors/Vulnerability

Precipitating Factors/Insults

High Risk

DELIRIUM

Low Risk

Multifactorial Model of Delirium

Predisposing Factors/ Vulnerability

Precipitating Factors/ Insults

High Risk  ↓  High Vulnerability  ↑  Noxious Insult  ↓  Low Vulnerability  ↑  Less Noxious Insult

Low Risk  ↓  DELIRIUM  ↑  Low Risk
Multifactorial Model of Delirium

Predisposing Factors/Vulnerability

Precipitating Factors/Insults

High Risk

High Vulnerability

Noxious Insult

Low Risk

Low Vulnerability

Less Noxious Insult

DELIRIUM

Risk Factors:
- Older age
- Dementia
- Functional Impairment
- Co-Morbidities
- Malnutrition

OPERATION → POST-OP DELIRIUM
Evaluation for an Identifiable Cause:

**OPERATION** → **POST-OP DELIRIUM**

**Risk Factors:**
- Older age
- Dementia
- Functional Impairment
- Co-Morbidities
- Malnutrition
Treat Identifiable Cause

- Sepsis
- Hypoxemia
- Hypoglycemia
- Electrolyte Abnormality
- Dehydration
- Stroke
- Medications
Medical Evaluation of Delirium

H&P Evaluation
✓ Mental Status
✓ Neuro Exam
✓ Substance Abuse
✓ Medications
✓ Vital Signs

Laboratory Tests
✓ CBC
✓ Glucose
✓ Electrolytes
✓ BUN / Cr
✓ UA
✓ $O_2$ Saturation
Risk Factors:
- Older age
- Dementia
- Functional Impairment
- Co-Morbidities
- Malnutrition

OPERATION → POST-OP DELIRIUM →

Evaluation for an Identifiable Cause:
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance Withdrawal
- Review Medications
**Risk Factors:**
- Older age
- Dementia
- Functional Impairment
- Co-Morbidities
- Malnutrition

**OPERATION** → **POST-OP DELIRIUM** →

**Evaluation for an Identifiable Cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance Withdrawal
- Review Medications

**Identifiable Cause:**
- Treat Appropriately
**Risk Factors:**
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**OPERATION** → **POST-OP DELIRIUM** → **Evaluation for an Identifiable Cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance Withdrawal
- Review Medications

**Multi-Component Treatment Plan**

**Identifiable Cause:**
- Treat Appropriately
Risk Factors:
Older age
Dementia
Functional Impairment
Co-Morbidities
Malnutrition

Evaluation for an Identifiable Cause:
Electrolyte imbalance
Hypoglycemia
Hypoxemia
Sepsis
Substance Withdrawal
Review Medications

Identifiable Cause:
Treat Appropriately

Supportive Measures:

Multi-Component Treatment Plan
Preventing Delirium in the Hospitalized Elderly

• Hypothesis
  Reducing the number of risk factors for delirium will prevent delirium in hospitalized elderly patients.

• Methods
  - 852 hospitalized medical patients
  - Older than 70 years
  - Compare effectiveness of reducing the risk factors for delirium to standard of care

### Multi-Component Interventions To Prevent Delirium

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Impairment</td>
<td>Orientation protocol</td>
</tr>
<tr>
<td>Sleep Deprivation</td>
<td>Sleep enhancement</td>
</tr>
<tr>
<td>Immobility</td>
<td>Early mobilization</td>
</tr>
<tr>
<td>Visual Impairment</td>
<td>Early vision correction</td>
</tr>
<tr>
<td>Hearing Impairment</td>
<td>Hearing protocol</td>
</tr>
<tr>
<td>Dehydration</td>
<td>Change BUN/Cr ratio</td>
</tr>
</tbody>
</table>

## Preventing Delirium in the Hospitalized Elderly

<table>
<thead>
<tr>
<th></th>
<th>STUDY GROUP</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention</td>
<td>Usual Care</td>
<td></td>
<td>p value</td>
</tr>
<tr>
<td>Incidence Delirium</td>
<td>9.9%</td>
<td>15.0%</td>
<td></td>
<td>p=0.02</td>
</tr>
<tr>
<td>Total Days Delirium</td>
<td>105</td>
<td>161</td>
<td></td>
<td>p=0.02</td>
</tr>
<tr>
<td>Episodes of Delirium</td>
<td>62</td>
<td>90</td>
<td></td>
<td>p=0.03</td>
</tr>
</tbody>
</table>

**Risk Factors:**
- Older age
- Dementia
- Functional Impairment
- Co-Morbidities
- Malnutrition

**OPERATION** \rightarrow **POST-OP DELIRIUM**

**Evaluation for an Identifiable Cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance Withdrawal
- Review Medications

**Identifiable Cause:**
- Treat Appropriately

**Supportive Measures:**
- Re-Orientation
- Sleep Enhancement
- Vision/Hearing Protocol
- Remove Foley
- Medication Choices

**Multi-Component Treatment Plan**
**Risk Factors:**
- Older age
- Dementia
- Functional Impairment
- Co-Morbidities
- Malnutrition

**Screen High Risk Patients in Pre-Operative Clinic**

**Operation** ➔ **Post-Op Delirium** ➔ **Evaluation for an Identifiable Cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance Withdrawal
- Review Medications

**Identifiable Cause:**
- Treat Appropriately

**Supportive Measures:**
- Re-Orientation
- Sleep Enhancement
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- Remove Foley
- Medication Choices

**Multi-Component Treatment Plan**
Screen High Risk Patients in Pre-Operative Clinic

Evaluation for an Identifiable Cause:
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
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Review Medications

Risk Factors:
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Supportive Measures:
- Re-Orientation
- Sleep Enhancement
- Vision/Hearing Protocol
- Remove Foley
- Medication Choices

Multi-Component Treatment Plan

Pharmacologic Treatment:

Identifiable Cause:
- Treat Appropriately

OPERATION

POST-OP DELIRIUM
# Pharmacologic Treatment - ICU

Haldoperidol 2 mg q20 min
(while agitation persists)

OR

<table>
<thead>
<tr>
<th>Degree of Agitation</th>
<th>Initial Dose Haldoperidol PO, IM or IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>0.25-2mg</td>
</tr>
<tr>
<td>Moderate</td>
<td>2-4mg</td>
</tr>
<tr>
<td>Severe</td>
<td>4-8mg</td>
</tr>
</tbody>
</table>

Pharmacologic Treatment - ICU

Maintenance Dose:

✓ 50% of total loading dose is the maintenance dose divided every 6-8 hours daily

✓ Continue maintenance dose for 24-48 hours before tapering

Taper:

✓ Taper maintenance dose by 20-30% daily until off.
## Pharmacologic Treatment - ICU

### Haldoperidol Administration

<table>
<thead>
<tr>
<th>Control</th>
<th>Moderate Agitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00AM</td>
<td>2mg IV</td>
</tr>
<tr>
<td>2:30AM</td>
<td>2mg IV</td>
</tr>
<tr>
<td>3:00AM</td>
<td>2mg IV</td>
</tr>
<tr>
<td>3:30AM</td>
<td>Agitation controlled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintain</th>
<th>Order 1mg TID IV or PO x 24 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Keep daily dose for 24 – 48 hrs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Taper</th>
<th>0.5mg PO BID for 24 hrs. then DC</th>
</tr>
</thead>
</table>
General Recommendation:
Haldoperidol 1-2 mg q2-4 hrs PRN
May be administered PO/IM/IV

For Elderly Patients:
Haldoperidol 0.25-0.5mg q4hrs PRN

**Screen High Risk Patients in Pre-Operative Clinic**

**Multi-Component Treatment Plan**

**Supportive Measures:**
- Re-Orientation
- Sleep Enhancement
- Vision/Hearing Protocol
- Remove Foley
- Medication Choices

**Risk Factors:**
- Older age
- Dementia
- Functional Impairment
- Co-Morbidities
- Malnutrition

**Pharmacologic Treatment:**
1. ICU
   - Haldoperidol 1-2mg IV
   - Repeat every 20 min until resolution of agitation
   - Taper over several days
2. Surgical Ward
   - Haldoperidol 1mg PO/IM/IV
   - Maintenance dose 0.25-0.5mg Q4hrs
   - Taper over several days

**POST-OP DELIRIUM**

**OPERATION**

**Evaluation for an Identifiable Cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
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**Medication Choices**

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