What is the incidence of delirium in the Denver VA surgical intensive care unit?

a) 8%  
b) 23%  
c) 44%  
d) 65%
What is the incidence of delirium in the Denver VA surgical intensive care unit?

a) 8%
b) 23%
c) 44%
d) 65%
WHAT IS DELIRIUM?

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

DIAGNOSTIC CRITERIA FOR DELIRIUM

1. Disturbance of consciousness
2. Change in cognition
3. Acute onset
4. Coexisting physiologic disturbance

Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (1994).
THRESHOLD THEORY OF COGNITIVE DECLINE

• Older age → diminished brain reserve capacity

• Older patients are on a “functional cliff” for developing delirium when undergoing a major physiologic stress
POSTOPERATIVE DELIRIUM AND AGE

Incidence of delirium, %

Age, years

< 50  50-59  60-69  > 70

0  10  20  30  40  50
# RISK FACTORS FOR POSTOPERATIVE DELIRIUM (1 of 2)

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Absent</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>69 ± 9</td>
<td>61 ± 6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>82%</td>
<td>18%</td>
<td>.009</td>
</tr>
<tr>
<td>Albumin</td>
<td>3.3 ± 0.8</td>
<td>3.9 ± 0.4</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Dementia(^a)</td>
<td>3.3 ± 1.5</td>
<td>4.4 ± 1.0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Comorbidities(^b)</td>
<td>4.2 ± 0.5</td>
<td>1.9 ± 0.2</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Functional status(^c)</td>
<td>91 ± 11</td>
<td>99 ± 3</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

\(^a\) – Mini-Cog Test  \(^b\) – Charlson Index  \(^c\) – Barthel Index
RISK FACTORS FOR POSTOPERATIVE DELIRIUM (2 of 2)

- Age
- Male sex
- Cognitive impairment
- Depression
- Psychiatric diagnosis
- Psychotropic drug use
- Alcohol abuse
- History of prior delirium

- ASA score
- Smoking history
- Comorbidity
- Institutional residence
- Functional impairment
- Hearing impairment
- Visual impairment


Slide 9
What risk factor is the best for determining who will develop delirium in the Denver VA surgical intensive care unit?

a) Older age
b) Pre-existing dementia
c) Functional impairment
d) Hypoalbuminemia
What risk factor is the best for determining who will develop delirium in the Denver VA surgical intensive care unit?

a) Older age
b) Pre-existing dementia
c) Functional impairment
d) Hypoalbuminemia
Risk factors:
Age >65
Dementia
Functional impairment
Comorbidities
Low albumin
Risk factors:
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

Assess sedation
CAM-ICU evaluation
Motor subtypes:
- Hypoactive
- Hyperactive
- Mixed

Operation
MOTOR SUBTYPES OF DELIRIUM

- A spectrum of psychomotor behavior is found in delirium

- Delirium motor subtypes
  - Hypoactive — 40%
  - Hyperactive — 5%
  - Mixed type — 55%

DELIRIUM IS A DIAGNOSTIC CHALLENGE

- Fluctuating course
- Hypoactive motor subtype
- Delirium not recognized by clinical team in 32% of cases

**Risk Factors:**
- Age >65
- Dementia
- Functional Impairment
- Co-Morbidities
- Low Albumin

**Assess sedation**
CAM-ICU evaluation

**Motor Subtypes:**
- Hypoactive
- Hyperactive
- Mixed

**Operation**
**Risk factors:**
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

**Assess sedation**
CAM-ICU evaluation
Motor subtypes:
- Hypoactive
- Hyperactive
- Mixed

**POST-OP DELIRIUM**

**Operation**
Risk factors:
Age >65
Dementia
Functional impairment
Comorbidities
Low albumin

Assess sedation
CAM-ICU evaluation
Motor subtypes:
- Hypoactive
- Hyperactive
- Mixed

Operation

POST-OP DELIRIUM

Evaluation for an organic cause:
TREAT ORGANIC CAUSE

• Sepsis
• Hypoxemia
• Hypoglycemia
• Electrolyte abnormality
• Dehydration
• Stroke
• Medications
MEDICAL EVALUATION OF DELIRIUM

H&P Evaluation

• Mental status
• Neuro exam
• History of substance abuse
• Vital signs

Laboratory Tests

• CBC
• Glucose
• Electrolytes
• BUN / Cr
• UA
• $O_2$ saturation

**Risk factors:**
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

**Assess sedation**
- CAM-ICU evaluation
- Motor subtypes:
  - Hypoactive
  - Hyperactive
  - Mixed

**Operation**

**Evaluation for an organic cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance withdrawal
- Review medications

**POST-OP DELIRIUM**
**Risk factors:**
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

**Assess sedation**
- CAM-ICU evaluation
- Motor subtypes:
  - Hypoactive
  - Hyperactive
  - Mixed

**Operation**

**POST-OP DELIRIUM**

**Evaluation for an organic cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance withdrawal
- Review medications

**Organic cause:**
- Treat appropriately
Risk factors:
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

Assess sedation
CAM-ICU evaluation
Motor subtypes:
- Hypoactive
- Hyperactive
- Mixed

Operation

Evaluation for an organic cause:
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance withdrawal
- Review medications

Organic cause:
Treat appropriately

POST-OP DELIRIUM

Multi-component treatment plan
Risk factors:
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

Assess sedation
CAM-ICU evaluation
Motor subtypes:
- Hypoactive
- Hyperactive
- Mixed

POST-OP DELIRIUM

Operation

Evaluation for an organic cause:
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance withdrawal
- Review medications

Organic cause:
Treat appropriately

Multi-component treatment plan

Supportive measures:

Pharmacologic treatment:
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

### PREVENTING DELIRIUM IN THE HOSPITALIZED ELDERLY

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Usual Care</th>
<th>( P )</th>
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</thead>
<tbody>
<tr>
<td>Incidence of delirium</td>
<td>9.9%</td>
<td>15.0%</td>
<td>.02</td>
</tr>
<tr>
<td>Total days of delirium</td>
<td>105</td>
<td>161</td>
<td>.02</td>
</tr>
<tr>
<td>Episodes of delirium</td>
<td>62</td>
<td>90</td>
<td>.03</td>
</tr>
</tbody>
</table>

**Risk factors:**
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

**Assess sedation**
- CAM-ICU evaluation
- Motor subtypes:
  - Hypoactive
  - Hyperactive
  - Mixed

**Operation**

**POST-OP DELIRIUM**

**Evaluation for an organic cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance withdrawal
- Review medications

**Organic cause:**
- Treat appropriately

**Supportive measures:**
- Reorientation
- Sleep enhancement
- Vision/hearing protocol
- Remove Foley
- Medication choices

**Multi-component treatment plan**

**Pharmacologic treatment:**

*Slide 27*
**Risk factors:**
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

**Screen high-risk patients in preoperative clinic**

**Supportive measures:**
- Reorientation
- Sleep enhancement
- Vision/hearing protocol
- Remove Foley
- Medication choices

**Assess sedation**
- CAM-ICU evaluation
- Motor subtypes: - Hypoactive - Hyperactive - Mixed

**POST-OP DELIRIUM**

**Evaluation for an organic cause:**
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance withdrawal
- Review medications

**Organic cause:**
- Treat appropriately

**Multi-component treatment plan**

**Pharmacologic treatment:**

**Operation**

*Slide 28*
PHARMACOLOGIC TREATMENT: ICU

Haloperidol 2 mg q20 min
(while agitation persists)
OR

<table>
<thead>
<tr>
<th>Degree of agitation</th>
<th>Initial dose of haloperidol PO, IM or IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>0.25–2 mg</td>
</tr>
<tr>
<td>Moderate</td>
<td>2–4 mg</td>
</tr>
<tr>
<td>Severe</td>
<td>4–8 mg</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** maintenance dose by 20%–30% daily until off
<table>
<thead>
<tr>
<th>Control</th>
<th>Moderate agitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 AM – 2 mg IV</td>
<td></td>
</tr>
<tr>
<td>2:30 AM – 2 mg IV</td>
<td></td>
</tr>
<tr>
<td>3:00 AM – 2 mg IV</td>
<td></td>
</tr>
<tr>
<td>3:30 AM – Agitation controlled</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintain</th>
<th>1 mg TID IV or PO × 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Keep daily dose for 24–48 hours</td>
</tr>
</tbody>
</table>

| Taper                   | 0.5 mg PO BID for 24 hr, then DC       |
PHARMACOLOGIC TREATMENT: WARD

- General recommendation
  - Haloperidol 1–2 mg q2–4 hr PRN
  - May be administered PO, IM, or IV

- For elderly patients
  - Haloperidol 0.25–0.5 mg q4 hr PRN

Risk factors:
- Age >65
- Dementia
- Functional impairment
- Comorbidities
- Low albumin

Assess sedation
CAM-ICU evaluation
Motor subtypes:
- Hypoactive
- Hyperactive
- Mixed

Screen high-risk patients in preoperative clinic

POST-OP DELIRIUM

Evaluation for an organic cause:
- Electrolyte imbalance
- Hypoglycemia
- Hypoxemia
- Sepsis
- Substance withdrawal
- Review medications

Organic cause:
- Treat appropriately

Supportive measures:
- Reorientation
- Sleep enhancement
- Vision/hearing protocol
- Remove Foley
- Medication choices

Multi-component treatment plan

Pharmacologic treatment:
1. ICU
   - Haloperidol 1–2 mg IV
   - Repeat every 20 min until resolution of agitation
   - Taper over several days
2. Surgical ward
   - Haloperidol 1 mg PO/IM/IV
   - Maintenance dose 0.25–0.5 mg Q4h
   - Taper over several days
THANK YOU FOR YOUR TIME!

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