“DELIRIUM”

J. Sukanya

Introduction

- Delirium
  - An acute decline in attention and cognition
  - The most frequent neuropsychiatric syndrome
  - A common, life-threatening, potentially preventable
  - Acutely admitted elderly patients
Introduction

- Disadvantages of Delirium
  - Increased risk of morbidity and mortality
  - Increased health care costs
  - New data link this syndrome to poor long-term outcome

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Why?
Epidemiology

- **Delirium**: hypoactive form
  - More common
  - Often unrecognized

Epidemiology

- Vary depending on
  - The patients’ characteristics
  - Setting of care
  - Sensitivity of the detection method

- Among general hospital populations
  - The prevalence: 14 - 24 percent
  - The incidence: 6 - 56 percent
Epidemiology

- The overall prevalence in the community
  - 1 - 2 percent
  - Up to 14 percent - if more than 85 years old

- At the emergency departments
  - 10 - 30 percent of older patients presenting with delirium
  - Often heralds the presence of life-threatening conditions

Epidemiology

- Postoperative: 15 - 53 percent
- In intensive care setting: 70 - 87 percent
- In nursing homes or post–acute care settings: Up to 60 percent
- At the end of life: Up to 83 percent

Epidemiology

- Incidence of post-stroke delirium and 1-year outcome
  - N = 314
  - Acute stroke unit
  - 72.9 years
  - Incidence: 27.4%
  - Higher functional impairment/nursing home placement/mortality
Epidemiology

- The mortality rates
  - Range from 22 - 76 percent
  - As high as the rates with acute myocardial infarction or sepsis

- The one-year mortality rate
  - 30 - 40 percent

Prevalence and incidence of delirium in Thai older patients: a study at general medical wards in Siriraj Hospital.


OBJECTIVE

- To determine prevalence and incidence of delirium
- In older patients
- Admitted to general medical wards
- In a university hospital in Thailand
MATERIAL AND METHOD

- A prospective observational study
- Age 70 years or older
  - In general medical wards during study period
- Delirium assessments
  - Initially within the first 24 hours of admission
  - And serially every 48 hours
  - Until developed delirium or were discharged

MATERIAL AND METHOD

- Delirium was diagnosed by experienced geriatricians
- Based on the DSM-IV criteria

Prevalence
- Based on delirium identified at the first assessment

Incidence
- Based on cases developed during hospitalization
RESULTS

- **N = 225**

- The prevalence of delirium
  - 40.4%

- The incidence of delirium
  - 8.4%

- The total occurrence rate of delirium
  - 48.9%
RESULTS

- Occurrence rate of delirium significantly increased with
  - Age (p = 0.003)
  - Illness severity (p < 0.001)
  - Number of impaired activities of daily living
Figure 2 | Outcomes of delirium.
A review and meta-analysis of published studies

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Hazard ratio</th>
<th>Odds ratio [OR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>2 years</td>
<td>1.95, 1.51–2.52</td>
<td>2.41, 1.77–3.29</td>
</tr>
<tr>
<td>Institutionalisation</td>
<td>15 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing dementia</td>
<td>4 years</td>
<td></td>
<td>12.52, 1.86–84.21</td>
</tr>
</tbody>
</table>
A review and meta-analysis of published studies

- Poor outcome independent of important confounders
  - Age
  - Sex
  - Comorbid illness or illness severity
  - Baseline dementia
Incidence of post-stroke delirium and 1-year outcome

- Nursing home placement: 62% vs 11.2%
- Mortality
  - Inpatient mortality: 18% vs 2.2%
  - 1-year mortality: 30% vs 7.4%
- Longer hospital stay: 45 vs 22 days
Adverse Outcomes After Hospitalization and Delirium in Persons With Alzheimer Disease

- Death: 1/16
- Institutionalization: 1/7
- Cognitive decline: 1/5
- Any adverse outcome: 1/8
What?
<table>
<thead>
<tr>
<th>Clinical Features of Delirium.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute onset</td>
</tr>
<tr>
<td>Occurs abruptly, usually over a period of hours or days</td>
</tr>
<tr>
<td>Reliable informant often needed to ascertain the time course of onset</td>
</tr>
<tr>
<td>Fluctuating course</td>
</tr>
<tr>
<td>Symptoms tend to come and go or increase and decrease in severity over a 24-hour period</td>
</tr>
<tr>
<td>Characteristic lucid intervals</td>
</tr>
<tr>
<td>Inattention</td>
</tr>
<tr>
<td>Difficulty focusing, sustaining, and shifting attention</td>
</tr>
<tr>
<td>Difficulty maintaining conversation or following commands</td>
</tr>
<tr>
<td>Disorganized thinking</td>
</tr>
<tr>
<td>Manifested by disorganized or incoherent speech</td>
</tr>
<tr>
<td>Rambling or irrelevant conversation or an unclear or illogical flow of ideas</td>
</tr>
<tr>
<td>Altered level of consciousness</td>
</tr>
<tr>
<td>Clouding of consciousness, with reduced clarity of awareness of the environment</td>
</tr>
<tr>
<td>Cognitive deficits</td>
</tr>
<tr>
<td>Typically global or multiple deficits in cognition, including disorientation, memory deficits, and language impairment</td>
</tr>
<tr>
<td>Table 1. Clinical Features of Delirium.*</td>
</tr>
<tr>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Perceptual disturbances</td>
</tr>
<tr>
<td>Illusions or hallucinations in about 30 percent of patients</td>
</tr>
<tr>
<td>Psychomotor disturbances</td>
</tr>
<tr>
<td>Psychomotor variants of delirium</td>
</tr>
<tr>
<td>Hyperactive</td>
</tr>
<tr>
<td>Marked by agitation and vigilance</td>
</tr>
<tr>
<td>Hypoactive</td>
</tr>
<tr>
<td>Marked by lethargy, with a markedly decreased level of motor activity</td>
</tr>
<tr>
<td>Mixed</td>
</tr>
<tr>
<td>Altered sleep–wake cycle</td>
</tr>
<tr>
<td>Characteristic sleep-cycle disturbances</td>
</tr>
<tr>
<td>Typically daytime drowsiness, nighttime insomnia, fragmented sleep, or complete sleep-cycle reversal</td>
</tr>
<tr>
<td>Emotional disturbances</td>
</tr>
<tr>
<td>Common</td>
</tr>
<tr>
<td>Manifested by intermittent and labile symptoms of fear, paranoia, anxiety, depression, irritability, apathy, anger, or euphoria</td>
</tr>
</tbody>
</table>
Clinical features

- Symptom profile of delirium
  - In northern India
  - Assessed 100 consecutive cases of DSM-IV delirium
  - Mean age: 44.4 [standard deviation: 19.4] years

- Most frequent symptoms
  - Attention, Orientation, Visuospatial ability, Sleep disturbance

- Less frequent
  - Language, Thought-process abnormality, Motor agitation
### Table 2. Predisposing Factors for Delirium.

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of 65 years or older</td>
</tr>
<tr>
<td>Male sex</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognitive status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dementia</td>
</tr>
<tr>
<td>Cognitive impairment</td>
</tr>
<tr>
<td>History of delirium</td>
</tr>
<tr>
<td>Depression</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functional status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional dependence</td>
</tr>
<tr>
<td>Immobility</td>
</tr>
<tr>
<td>Low level of activity</td>
</tr>
<tr>
<td>History of falls</td>
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</table>

<table>
<thead>
<tr>
<th>Sensory impairment</th>
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<tbody>
<tr>
<td>Visual impairment</td>
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<tr>
<td>Hearing impairment</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Decreased oral intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dehydration</td>
</tr>
<tr>
<td>Malnutrition</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment with multiple psychoactive drugs</td>
</tr>
<tr>
<td>Treatment with many drugs</td>
</tr>
<tr>
<td>Alcohol abuse</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coexisting medical conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe illness</td>
</tr>
<tr>
<td>Multiple coexisting conditions</td>
</tr>
<tr>
<td>Chronic renal or hepatic disease</td>
</tr>
<tr>
<td>History of stroke</td>
</tr>
<tr>
<td>Neurologic disease</td>
</tr>
<tr>
<td>Metabolic derangements</td>
</tr>
<tr>
<td>Fracture or trauma</td>
</tr>
<tr>
<td>Terminal illness</td>
</tr>
<tr>
<td>Infection with human immunodeficiency virus</td>
</tr>
</tbody>
</table>
### Table 3. Precipitating Factors or Insults That Can Contribute to Delirium.

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Surgery</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedative hypnotics</td>
<td>Orthopedic surgery</td>
<td>Admission to an intensive care unit</td>
</tr>
<tr>
<td>Narcotics</td>
<td>Cardiac surgery</td>
<td>Use of physical restraints</td>
</tr>
<tr>
<td>Anticholinergic drugs</td>
<td>Prolonged cardiopulmonary bypass</td>
<td>Use of bladder catheter</td>
</tr>
<tr>
<td>Treatment with multiple drugs</td>
<td>Noncardiac surgery</td>
<td>Use of multiple procedures</td>
</tr>
<tr>
<td>Alcohol or drug withdrawal</td>
<td></td>
<td>Pain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emotional stress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prolonged sleep deprivation</td>
</tr>
<tr>
<td>Primary neurologic diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke, particularly nondominant hemispheric</td>
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<tr>
<td>Intracranial bleeding</td>
<td></td>
<td></td>
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<tr>
<td>Meningitis or encephalitis</td>
<td></td>
<td></td>
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<tr>
<td>Intercurrent illnesses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infections</td>
<td></td>
<td></td>
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<tr>
<td>Iatrogenic complications</td>
<td></td>
<td></td>
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<tr>
<td>Severe acute illness</td>
<td></td>
<td></td>
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<tr>
<td>Hypoxia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td></td>
<td></td>
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<tr>
<td>Fever or hypothermia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dehydration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor nutritional status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low serum albumin level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metabolic derangements (e.g., electrolyte, glucose, acid–base)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Incidence of post-stroke delirium and 1-year outcome

- **Independent risk factors of post-stroke delirium**
  - **Chest infection**  \( OR = 22.0 \)
  - **Total anterior circulation infarct**  \( OR = 18.8 \)
  - Presence of acute urinary retention  \( OR = 7.67 \)
  - **posterior circulation infarct**  \( OR = 3.52 \)
  - **pre-existing cognitive impairment**  \( OR = 2.51 \)
  - **National Institutes of Health Stroke Scale**  \( OR = 1.13 \)
  - **Age**  \( OR = 1.05 \)
Risk Factors for Developing Delirium in Older Patients
Admitted to General Medical Wards

Table 2. Results from logistic regression for factors associated with delirium

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate analysis (OR)</th>
<th>Multivariate analysis (Adjusted OR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>2.01 (1.18-3.42)</td>
<td>1.59 (0.74-3.45)</td>
</tr>
<tr>
<td>Age more than 80</td>
<td>2.31 (1.29-4.15)</td>
<td>2.15 (0.93-4.96)</td>
</tr>
<tr>
<td>Four or more co-morbid</td>
<td>1.87 (1.10-3.17)</td>
<td>1.16 (0.52-2.59)</td>
</tr>
<tr>
<td>Azothemia</td>
<td>3.00 (1.74-5.16)</td>
<td>2.55 (1.20-5.40)</td>
</tr>
<tr>
<td>Hyponatremia</td>
<td>1.99 (1.13-3.50)</td>
<td>1.63 (0.74-3.56)</td>
</tr>
<tr>
<td>Presence of infection</td>
<td>4.03 (2.29-7.09)</td>
<td>2.54 (1.15-5.61)</td>
</tr>
<tr>
<td>Severe illness</td>
<td>8.57 (4.23-17.38)</td>
<td>5.18 (2.10-12.76)</td>
</tr>
<tr>
<td>Dementia</td>
<td>5.54 (3.10-9.92)</td>
<td>5.52 (2.51-12.14)</td>
</tr>
<tr>
<td>Depression</td>
<td>2.38 (1.01-5.62)</td>
<td>1.93 (0.58-6.44)</td>
</tr>
<tr>
<td>Impaired BADLs</td>
<td>2.16 (1.20-3.91)</td>
<td>0.69 (0.30-1.59)</td>
</tr>
</tbody>
</table>
Risk Factors for Developing Delirium in Older Patients Admitted to General Medical Wards

- A prospective observational study

- Risk factors
  - Preexisting dementia (OR = 5.52, 95% CI = 2.51-12.14),
  - Severe illness (OR = 5.18, 95% CI = 2.10-12.76)
  - Presence of infection (OR = 2.54, 95% CI = 1.15-5.61)
  - Azothemia (OR = 2.55, 95% CI = 1.20-5.40).
Etiology- case report

- Cognitive decline in an old woman: Do not miss a rare etiology!
  - Brussels, Belgium

- Report a case of a woman with neurological symptoms
  - ?dementia

- Final diagnosis
  - Late-onset SLE
  - Leads to misdiagnosis
Figure 1 | Relationships between various etiological factors in delirium. Systemic inflammation can be the result of systemic infection, trauma or surgery. Neurotransmitters with possible roles in delirium include acetylcholine, dopamine, 5-hydroxytryptamine, norepinephrine, glutamate and γ-aminobutyric acid.
Pathophysiology

- Plasma levels of procalcitonin and CRP
  - Critically ill patients
- High baseline inflammatory biomarkers
- Predicted prolonged periods of acute brain dysfunction
Pathophysiology

- Plasma cholinesterase activity
  - (acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE))

- Inflammatory mediators
  - (C-reactive protein (CRP), interleukin (IL)-1 beta, tumor necrosis factor alpha, IL-6, IL-8, IL-10)

- Unbalanced inflammatory response

- Dysfunctional interaction
  - Between the cholinergic and immune systems
How?
Diagnostic Criteria: ICD-10

- ICD-10 Diagnostic Criteria

- For a definite diagnosis, symptoms, mild or severe, should be present in each one of the following areas:
  - A. Impairment of consciousness and attention
  - B. Global disturbance of cognition
  - C. Psychomotor disturbances
  - D. Disturbance of the sleep - wake cycle
  - E. Emotional disturbances

Diagnostic Criteria: CAM

- The Confusion Assessment Method (CAM) Diagnostic Algorithm

  - Feature 1. Acute onset and fluctuating course
  - Feature 2. Inattention
  - Feature 3. Disorganized thinking
  - Feature 4. Altered level of consciousness

  - The diagnosis by CAM
    - Requires the presence of features 1 and 2 and of either 3 or 4

Diagnosing delirium in elderly Thai patients:
Utilization of the CAM algorithm

Table 1 The patients’ demographics

<table>
<thead>
<tr>
<th>Items</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (years)</td>
<td>74.53 ± 8.07*</td>
</tr>
<tr>
<td>Min age (years)</td>
<td>60</td>
</tr>
<tr>
<td>Max age (years)</td>
<td>93</td>
</tr>
<tr>
<td>Number of males (%)</td>
<td>39 (59.1)</td>
</tr>
<tr>
<td>Mode of formal education (years)</td>
<td>4</td>
</tr>
<tr>
<td>Min education (years)</td>
<td>0</td>
</tr>
<tr>
<td>Max education (years)</td>
<td>16</td>
</tr>
<tr>
<td>Mean of MMSE (out of 30)</td>
<td>34(25.6)†</td>
</tr>
<tr>
<td>% dementia by MMSE-Thai 2002</td>
<td></td>
</tr>
<tr>
<td>Comorbidity, n (%)</td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>2(3.2)</td>
</tr>
<tr>
<td>Cardio-respiratory</td>
<td>7(11.1)</td>
</tr>
<tr>
<td>Surgery</td>
<td>11(17.5)</td>
</tr>
<tr>
<td>Infection</td>
<td>6(9.5)</td>
</tr>
<tr>
<td>Metabolic</td>
<td>5(7.9)</td>
</tr>
<tr>
<td>Electrolyte imbalance</td>
<td>4(6.3)</td>
</tr>
<tr>
<td>Intracranial causes</td>
<td>6(9.5)</td>
</tr>
<tr>
<td>Blood dyscrasia</td>
<td>1(1.6)</td>
</tr>
<tr>
<td>Others</td>
<td>3(4.8)</td>
</tr>
<tr>
<td>More than one diagnosis</td>
<td>18(28.6)</td>
</tr>
</tbody>
</table>

N = 66, *There was a significant difference between the delirium and non-delirium group using both CAM algorithm and the DSM-IV TR (t = 3.0 vs. t = 2.3, p < 0.05), † Mann-Whitney U statistics indicated that there was a significant difference between the delirium and non-delirium groups using both the CAM algorithm and DSM-IV TR (p < 0.05).

Table 2 Number of elderly patients with delirium

<table>
<thead>
<tr>
<th></th>
<th>By CAM algorithm</th>
<th>By DSM-IV TR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Delirium</td>
<td>No delirium</td>
</tr>
<tr>
<td>Positive</td>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>Negative</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>29</td>
</tr>
</tbody>
</table>

Sensitivity: 91.9%
Specificity: 100.0%
PPV: 100.0%
NPV: 90.6%
Box 2 | Diagnostic criteria for delirium

The following criteria are derived from the Diagnostic and Statistical Manual of Mental Disorders, 4th edn, text revision (DSM-IV-TR®; American Psychiatric Publishing, Inc., Arlington, VA). All four criteria (A–D) are required to confirm a diagnosis of delirium.

General diagnostic criteria
- (A) Disturbance of consciousness (that is, reduced clarity of awareness of the environment) with reduced ability to focus, sustain, or shift attention
- (B) A change in cognition (such as memory deficit, disorientation, language disturbance) or the development of a perceptual disturbance that is not better accounted for by a pre-existing, established, or evolving dementia
- (C) The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day

For delirium due to a general medical condition
- (D) Evidence from the history, physical examination, or laboratory findings indicates that the disturbance is caused by the direct physiological consequences of a general medical condition

For substance intoxication delirium
- (D) Evidence from the history, physical examination, or laboratory findings indicates that of either (1) the symptoms in Criteria A and B developed during substance intoxication, or (2) medication use is etiologically related to the disturbance

For substance withdrawal delirium
- (D) History, physical examination, or laboratory findings indicate that the symptoms in Criteria A and B developed during, or shortly after, a withdrawal syndrome

For delirium due to multiple etiologies
- (D) History, physical examination, or laboratory findings indicate that the delirium has more than one etiology (for example, more than one etiological general medical condition, a general medical condition plus substance intoxication or medication side effect)
Confusion Assessment Method
<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAM</td>
<td>Most widely used screening test for the presence of delirium; a four-item instrument based on DSM-III-R delirium criteria, requires the presence of acute onset and fluctuating course, inattention, and disorganized thinking or loss of consciousness</td>
<td>Inouye et al. (1990)(^52) Wei et al. (2008)(^53)</td>
</tr>
<tr>
<td>CAM–ICU</td>
<td>Delirium is diagnosed when patients demonstrate an acute change in mental status or fluctuating changes in mental status, inattention measured with either an auditory or a visual test, and either disorganized thinking or an altered level of consciousness. Importantly, the CAM–ICU can only be administered if the patient is arousable in response to a voice without the need for physical stimulation</td>
<td>Ely et al. (2001)(^113) Ely et al. (2001)(^114)</td>
</tr>
<tr>
<td>DRS-R98</td>
<td>16-item scale, including 13 severity items and 3 diagnostic items. Severity scores range from 0 to 39, with higher scores indicating more-severe delirium; delirium typically involves scores ≥15 points</td>
<td>Trzepacz et al. (2001)(^115)</td>
</tr>
<tr>
<td>DSI</td>
<td>A structured interview detects the presence or absence of seven DSM-III criteria for delirium; delirium is said to be present if disorientation, perceptual disturbance or disturbance of consciousness have presented within the past 24h</td>
<td>Albert et al. (1992)(^116)</td>
</tr>
<tr>
<td>MDAS</td>
<td>Measures delirium severity on a 10-item, four-point observer-rated scale with scores that range from 0 to 30</td>
<td>Breitbart et al. (1997)(^54)</td>
</tr>
<tr>
<td>NEECHAM Confusion Scale</td>
<td>Nine scaled items divided into three subscales: subscale I, information processing (score range 0–14 points), evaluates components of cognitive status; subscale II, behavior (score range 0–10 points), evaluates observed behavior and performance ability; subscale III, performance (score range 0–16 points), assesses vital function (that is, vital signs, oxygen saturation level and urinary incontinence). Total scores can range from 0 (minimal function) to 30 (normal function). Delirium is present if the score is ≤24 points</td>
<td>Neelon et al. (1996)(^117)</td>
</tr>
<tr>
<td>ICDSC</td>
<td>Bedside screening tool for delirium in the intensive care unit setting; eight-item checklist based on DSM-IV (^*) criteria, items scored as 1 (present) or 0 (absent); a score ≥4 points indicates delirium</td>
<td>Bergeron et al. (2001)(^118)</td>
</tr>
<tr>
<td>Cognitive Test for Delirium</td>
<td>Can be used with patients unable to speak or write; assesses orientation, attention, memory, comprehension and vigilance, primarily with visual and auditory modalities. Each individual domain is scored 0–6 in two-point increments, except for comprehension, which is scored in single-point increments. Total scores range from 0 to 30, with higher scores indicating better cognitive function</td>
<td>Hart et al. (1997)(^119) Hart et al. (1996)(^120)</td>
</tr>
</tbody>
</table>

Abbreviations: CAM, Confusion Assessment Method; CAM–ICU, Confusion Assessment Method–Intensive Care Unit; DRS-R98, Delirium Rating Scale; DSI, Delirium Symptom Interview; DSM, Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, Arlington, VA); ICDSC, Intensive Care Delirium Screening Checklist; MDAS, Memorial Delirium Assessment Scale.
CONFUSION ASSESSMENT METHOD IN THE ICU (CAM-ICU)

- TARGET POPULATION:
  - Should be used on all older adults admitted to the ICU
  - Promptly identify
  - Any potential delirium and prevent negative outcomes

Confusion Assessment Method for the ICU (CAM-ICU) Flowsheet

1. Acute Change or Fluctuating Course of Mental Status:
   - Is there an acute change from mental status baseline? OR
   - Has the patient's mental status fluctuated during the past 24 hours?

   YES

2. Inattention:
   - "Squeeze my hand when I say the letter 'A'."
     Read the following sequence of letters: S A V E A H A A R T
     ERRORS: No squeeze with 'A' & Squeeze on letter other than 'A'
   - If unable to complete Letters → Pictures

   > 2 Errors

3. Altered Level of Consciousness
   Current RASS level

   RASS = zero

4. Disorganized Thinking:
   1. Will a stone float on water?
   2. Are there fish in the sea?
   3. Does one pound weigh more than two?
   4. Can you use a hammer to pound a nail?

   Command: "Hold up this many fingers" (Hold up 2 fingers)
   "Now do the same thing with the other hand" (Do not demonstrate)
   OR "Add one more finger" (If patient unable to move both arms)

   > 1 Error
   0 - 1 Error

CAM-ICU negative NO DELIRIUM
CAM-ICU positive DELIRIUM Present
CAM-ICU negative NO DELIRIUM
### Assessing Consciousness: Linking Sedation and Delirium Monitoring

#### Step 1 Level of Consciousness: RASS

**The Richmond Agitation-Sedation Scale**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+4</td>
<td>COMBATIVELY</td>
<td>Combative, violent, immediate danger to staff</td>
</tr>
<tr>
<td>+3</td>
<td>VERY AGITATED</td>
<td>Pulls to remove tubes or catheters; aggressive</td>
</tr>
<tr>
<td>+2</td>
<td>AGITATED</td>
<td>Frequent non-purposeful movement, fights ventilator</td>
</tr>
<tr>
<td>+1</td>
<td>RESTLESS</td>
<td>Anxious, apprehensive, movements not aggressive</td>
</tr>
<tr>
<td>0</td>
<td>ALERT &amp; CALM</td>
<td>Spontaneously pays attention to caregiver</td>
</tr>
<tr>
<td>-1</td>
<td>DROWSY</td>
<td>Not fully alert, but has sustained awakening to voice (eye opening &amp; contact &gt;10 sec)</td>
</tr>
<tr>
<td>-2</td>
<td>LIGHT SEDATION</td>
<td>Briefly awakens to voice (eyes open &amp; contact &lt;10 sec)</td>
</tr>
<tr>
<td>-3</td>
<td>MODERATE SEDATION</td>
<td>Movement or eye opening to voice (no eye contact)</td>
</tr>
</tbody>
</table>

If RASS is ≥ -3 proceed to CAM-ICU (Is patient CAM-ICU positive or negative?)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>DEEP SEDATION</td>
<td>No response to voice, but movement or eye opening to physical stimulation</td>
</tr>
<tr>
<td>-5</td>
<td>UNAROUSEABLE</td>
<td>No response to voice or physical stimulation</td>
</tr>
</tbody>
</table>

If RASS is -4 or -5 → STOP (patient unconscious), RECHECK later

---

Thai Delirium Rating Scale*

- Develop Thai Delirium Rating Scale

- Thai Delirium Rating Scale (TDRS)
  - Good reliability and validity
  - For discriminate delirium from other psychiatric patients
  - Sensitivity: 97%
  - Specificity: 91%

- TDRS is a reliable and valid instrument to diagnose delirium for medical personal and for delirium research
Dose the Scores of Thai Delirium Rating Scale Correlate with the Severity of Delirium?

- Study the correlation between total scores of
  - TDRS VS the severity of delirium
  - 5-item scores in Thai Delirium Rating Scale
    - psychomotor activity, cognitive status during formal testing, sleep-wake cycle disturbance, lability of mood, and variability of symptoms

- The 5-item version of TDRS can be used to indicate the severity of delirium
Development of Thai Version of Delirium Rating Scale

- Develop and validate TDRS for nonpsychiatric physicians
- Thai version of Delirium Rating Scale appeared to be useful for detecting delirium by trained physicians with good levels of validity and reliability

Validity of thai delirium rating scale 6 items version

- The Thai Delirium Rating scale 6 items version
  - A brief, feasible and valid instrument to diagnose delirium instead of the Thai Delirium Rating Scale 10 items version
### Table 1.

<table>
<thead>
<tr>
<th>TDRS score</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Positive predictive value (%)</th>
<th>Negative predictive value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/13</td>
<td>75.0</td>
<td>97.8</td>
<td>96.8</td>
<td>81.5</td>
</tr>
<tr>
<td>11/12</td>
<td>85.0</td>
<td>97.8</td>
<td>97.1</td>
<td>88.0</td>
</tr>
<tr>
<td>10/11</td>
<td>95.0</td>
<td>97.8</td>
<td>97.4</td>
<td>95.7</td>
</tr>
<tr>
<td>9/10</td>
<td><strong>97.5</strong></td>
<td><strong>97.8</strong></td>
<td><strong>97.5</strong></td>
<td><strong>97.8</strong></td>
</tr>
<tr>
<td>8/9</td>
<td>97.5</td>
<td>93.3</td>
<td>92.9</td>
<td>97.7</td>
</tr>
<tr>
<td>7/8</td>
<td>97.5</td>
<td>86.7</td>
<td>86.7</td>
<td>97.5</td>
</tr>
<tr>
<td>6/7</td>
<td>97.5</td>
<td>82.2</td>
<td>82.8</td>
<td>97.4</td>
</tr>
</tbody>
</table>

### Table 2.

<table>
<thead>
<tr>
<th>TDRS Item</th>
<th>Correlation coefficient</th>
<th>Alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>ข้อ 1</td>
<td>0.7920</td>
<td>0.8721</td>
</tr>
<tr>
<td>ข้อ 5</td>
<td>0.7518</td>
<td>0.8804</td>
</tr>
<tr>
<td>ข้อ 6</td>
<td>0.6796</td>
<td>0.8915</td>
</tr>
<tr>
<td>ข้อ 7</td>
<td>0.7286</td>
<td>0.8860</td>
</tr>
<tr>
<td>ข้อ 8</td>
<td>0.7329</td>
<td>0.8852</td>
</tr>
<tr>
<td>ข้อ 10</td>
<td>0.7928</td>
<td>0.8745</td>
</tr>
</tbody>
</table>

สถาบันจิตเวชศาสตร์สมเด็จเจ้าพระยา

Thai Delirium Rating Scales 6 ITEM

กรุณาวางกลมล้อมรอบคะแนนไปแต่ละข้อ

ข้อ 1. ระยะเวลายังที่เริ่มมีอาการ

0 ไม่มีการเปลี่ยนแปลงของพฤติกรรมในช่วงเวลานี้ยังชัดเจน โดยเฉพาะโรคเรื้อรังหรือโรคเรื้อรังที่เก่าเก็บได้
1 อาการเกิดขึ้นอย่างต่อเนื่องเป็นต่อไป ภายในไม่เกิน 6 เดือน
2 มีการเปลี่ยนแปลงต้านพฤติกรรมหรือพฤติกรรมทางอารมณ์ในช่วง 1 เดือน
3 มีการเปลี่ยนแปลงต้านพฤติกรรมอย่างชัดเจนภายใน 1 ถึง 3 วัน

ข้อ 2. พฤติกรรมการเคลื่อนไหว

0 ไม่มีพฤติกรรมที่เชื่องช้า หรือ รูนวยอย่างชัดเจน
1 มีอาการกระตุ้นกระตุ้น ตัวสั้น วิตกกังวล เพียงเล็กน้อย ซึ่งสังเกตได้จากพฤติกรรมที่เปลี่ยนไปของผู้ป่วยหรือ การพูดและการเคลื่อนไหวตลอดสองเล็กน้อยแต่ยังไม่ได้ตอบได้ปกติทั้งขณะตัวอย่างภาวะ
2 มีอาการรุนแรง เดินไปมา ต้องคานน้ำแก้ว หรือพฤติกรรมอื่นๆ หรือ การพูดและการเคลื่อนไหวตลอดอย่างมากต้องกระตุ้นอย่าง superficial pain ซึ่งได้ตอบได้
3 มีอาการรุนแรงอย่างมากจมจุกจำเป็นต้องมัดผู้ป่วย ท้าทีก้าวข้าว หรือ แยกตัวจากสิ่งแวดล้อมอย่างชัดเจน ไม่พูด ไม่เคลื่อนไหวตัวเองต้องกระตุ้นอย่าง deep pain ซึ่งอาการเหล่านี้ไม่ได้รับสมเหตุมาจากโรคซึมเศร้า โรคจิตมหาชนิด catatonia
ข้อ 3. cognitive status ของผู้ป่วย

0 ไม่มี cognitive deficits หรือ มีแต่เป็นเนื้อสมองจากการศึกษาหรือมีการเปรียบเทียบอย่างผิดอยู่เดิม (มีคะแนน TMSE เกิน 21 และไม่มีส่วนใดได้ ครั้งหนึ่งของคะแนนเต็มในส่วนนี้)

1 มี cognitive deficits น้อยมาก (มีคะแนน TMSE ระหว่าง 15-21 และไม่มีส่วนใดได้ ครั้งหนึ่งของคะแนนเต็มในส่วนนี้) เพราะขาดความสนใจจากอาการแปลก อ่อนเพลีย อารมณ์เศร้าหรือวิตกกังวลโรคทางกาย

2 มี cognitive deficits เต็มหรือเพียงส่วนเดียว (คะแนนส่วนใดส่วนหนึ่งใน TMSE ซึ่งไม่ใช่ส่วนของ orientation ได้ ครั้งหนึ่งของคะแนนเต็มในส่วนนี้) ในขณะที่ส่วนอื่นปกติ เช่น มิติปกติเฉพาะด้าน recall
(ได้คะแนนส่วน recall ไม่เกิน 1 คะแนน)

3 มี cognitive deficits หลายส่วนซึ่งรวมกับความมิติปกติของการรับรู้เวลา สถานที่ อย่างน้อยหนึ่งช่วงในระยะ 24 ชั่วโมง registration และ recall มิติปกติ สมรรถจิต

4 มี cognitive deficits อย่างมาก เช่น motor หรือ vocal perseveration, confabulation ความมิติปกติของการรับรู้บุคคล ความมิติปกติค้านความจำทาง recent และ remote และไม่สามารถรู้ได้ในภาวะตรวจสภาพจิต
ข้อ 4. โรคทางกาย
0 ไม่มีโรคทางกาย หรือมีแต่อาการคงที่
1 มีโรคทางกายที่อาจมีผลต่อสภาพจิตได้
2 มีโรคทางกายซึ่งในช่วงเวลาหนึ่งอาจเกี่ยวข้องกับการเป็นสาเหตุของการเปลี่ยนแปลงตัว
 พฤติกรรมและสภาพจิต

ข้อ 5. ความผิดปกติของวงจรการหลับตื้น
0 ไม่มีความผิดปกติ ผู้ป่วยสามารถตื่นและรู้ตัวติ้งในช่วงกลางวันและหลับเป็นปกติในช่วงกลางคืน
1 บางครั้งมีอาการง่วงซึมในช่วงกลางวันและหลับตื้น ๆ ในช่วงกลางคืนเพียงเล็กน้อย อาจมีอาการ
 ผิดร้ายแต่สามารถแยกจากความเป็นจริงได้
2 มีการรีบหลับช่วงกลางวันบ่อย ๆ และไม่หลับช่วงกลางคืนซึ่งแสดงว่ามีการเปลี่ยนของวงจรการ
 หลับตื้นขัดเจน
3 ง่วงซึมเป็นส่วนใหญ่และไม่สามารถตื่นตัวขึ้นจะมีภูมิ
 ไม่สามารถตื่นตัวขึ้นจะมีภูมิ
4 อยู่ในภาวะ stupor หรือ coma

ข้อ 6. การเปลี่ยนแปลงของอาการต่าง ๆ
0 อาการคงที่และมีในช่วงกลางวันเป็นส่วนใหญ่
2 อาการแย่ลงในช่วงกลางคืน
4 ความรุนแรงของอาการเปลี่ยนแปลงซึ่ง ๆ ในช่วง 24 ชั่วโมง
Assessment of risk factors for delirium

- First present to hospital or long term care
  - Any risk factors?

- Keep observation
  - Every opportunity
  - For any changes in the risk factors for delirium
Assessment of risk factors for delirium

- **Risk factors**
  - Age 65 years or older
  - **Cognitive impairment** (past or present), and/ or dementia
    - If cognitive impairment is suspected, confirm it using a standardised and validated cognitive impairment measure (mini mental state examination)
  - Current hip fracture
  - Severe illness

*BMJ 2010;341:c3704*
<table>
<thead>
<tr>
<th>Feature</th>
<th>Delirium</th>
<th>Alzheimer disease</th>
<th>Psychotic disorders</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive features</td>
<td>Confusion and inattention</td>
<td>Memory loss</td>
<td>Loss of contact with reality</td>
<td>Sadness, anhedonia</td>
</tr>
<tr>
<td>Onset</td>
<td>Acute</td>
<td>Insidious</td>
<td>Acute or slow</td>
<td>Slow</td>
</tr>
<tr>
<td>Course</td>
<td>Fluctuating, often worse at night</td>
<td>Chronic, progressive</td>
<td>Chronic, with exacerbations</td>
<td>Single or recurrent episodes; can be chronic</td>
</tr>
<tr>
<td>Duration</td>
<td>Hours to months</td>
<td>Months to years</td>
<td>Months to years</td>
<td>Weeks to months</td>
</tr>
<tr>
<td>Consciousness</td>
<td>Altered</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Attention</td>
<td>Impaired</td>
<td>Normal, except in late stages</td>
<td>May be impaired</td>
<td>May be impaired</td>
</tr>
<tr>
<td>Orientation</td>
<td>Fluctuates</td>
<td>Poor</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Speech</td>
<td>Incoherent</td>
<td>Mild errors</td>
<td>Normal or pressured</td>
<td>Normal or slow</td>
</tr>
<tr>
<td>Thought</td>
<td>Disorganized</td>
<td>Impoverished</td>
<td>Disorganized</td>
<td>Normal</td>
</tr>
<tr>
<td>Illusions and hallucinations</td>
<td>Common (often visual)</td>
<td>Rare, except in late stages</td>
<td>Common</td>
<td>Not usually</td>
</tr>
<tr>
<td>Perceptions</td>
<td>Altered</td>
<td>Altered or normal</td>
<td>Altered</td>
<td>Normal</td>
</tr>
<tr>
<td>Psychomotor changes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Reversibility</td>
<td>Usually</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Possibly</td>
</tr>
<tr>
<td>EEG reading</td>
<td>Moderate to severe background slowing</td>
<td>Normal or mild diffuse slowing</td>
<td>Normal</td>
<td>Normal</td>
</tr>
</tbody>
</table>

What’s next?

“Delirium”
Prevention is the best!
Prevention

- Non-pharmacologic approach
- Pharmacologic approach
Interventions to prevent delirium

- Within 24 hours of admission, assess precipitating factors:
  - Cognitive impairment, disorientation, or both
  - Dehydration, constipation, or both
  - Hypoxia
  - Immobility or limited mobility
Interventions to prevent delirium

- Within 24 hours of admission, assess precipitating factors:
  - Infection
  - Multiple medications
  - Pain
  - Poor nutrition
  - Sensory impairment
  - Sleep disturbance
### Preventing delirium in a person at risk by addressing clinical factors identified at assessment

<table>
<thead>
<tr>
<th>Clinical factor identified</th>
<th>Preventive intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive impairment, disorientation, or both</td>
<td>Provide appropriate lighting and clear signage. A clock (potentially a 24 hour clock in critical care) and a calendar should also be easily visible to the person at risk. Reorient the person by explaining where they are, who they are, and what your role is. Introduce cognitively stimulating activities (for example, reminiscence). Facilitate regular visits from family and friends.</td>
</tr>
<tr>
<td>Dehydration, constipation, or both</td>
<td>Encourage the person to drink. Consider offering subcutaneous or intravenous fluids if necessary. Seek advice if necessary when managing fluid balance in a person with comorbidities (for example, heart failure or chronic kidney disease).</td>
</tr>
<tr>
<td>Hypoxia</td>
<td>Assess for hypoxia and optimise oxygen saturation if necessary.</td>
</tr>
<tr>
<td>Immobility or limited mobility</td>
<td>Encourage the person to: (a) mobilise soon after surgery; (b) walk (provide walking aids if needed—these should be accessible at all times). Encourage the person to carry out active range of motion exercises, even if unable to walk.</td>
</tr>
<tr>
<td>Infection</td>
<td>Look for and treat infection.</td>
</tr>
<tr>
<td></td>
<td>Avoid unnecessary catheterisation.</td>
</tr>
<tr>
<td></td>
<td>Implement infection control procedures in line with the NICE guideline on infection control.</td>
</tr>
<tr>
<td>Multiple medications</td>
<td>Carry out a medication review in a person taking multiple drugs, taking into account both the type and number of medications.</td>
</tr>
<tr>
<td>Pain</td>
<td>Assess for pain. Look for non-verbal signs of pain, particularly in a person with communication difficulties (for example, a person with learning difficulties or dementia, or a person on a ventilator or who has a tracheostomy). Start and review appropriate pain management in any person in whom pain is identified or suspected.</td>
</tr>
<tr>
<td>Poor nutrition</td>
<td>Follow the advice given in the NICE guideline on nutrition.</td>
</tr>
<tr>
<td></td>
<td>If a person has dentures, ensure they fit properly.</td>
</tr>
<tr>
<td>Sensory impairment</td>
<td>Resolve any reversible cause of the impairment (such as impacted earwax).</td>
</tr>
<tr>
<td></td>
<td>Ensure working hearing and visual aids are available to and used by those who need them.</td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td>Promote good sleep patterns and sleep hygiene by: avoiding nursing or medical procedures during sleeping hours, if possible; scheduling medication rounds to avoid disturbing sleep; and reducing noise to a minimum during sleep periods. For more information on sleep hygiene see BMJ 2010;341:c3704.</td>
</tr>
</tbody>
</table>
The Hospital Elder Life Program

- A model of care to prevent cognitive and functional decline in older hospitalized patients
- Screened on admission for six risk factors
  - Cognitive impairment, sleep deprivation, immobility, dehydration, vision or hearing impairment
  - **Interdisciplinary team**
  - Other experts consultation twice-weekly

Volunteer Opportunities

The Hospital Elder Life Program

Communication and Comfort Program

Meal Program

Exercise Program

Recreation and Relaxation Program

Reducing delirium after hip fracture: a randomized trial

- “Proactive geriatrics consultation”
  - One case of delirium was prevented for every 5.6 patients
  - Reduced delirium by over one-third
  - Reduced severe delirium by over one-half
The REACH-OUT trial

- **Homebased rehabilitation** vs **Inpatient hospital setting**
  - Frail older patients
- Lower incidence of delirium
- Lower cost
- Greater satisfaction
Pilot randomized trial of donepezil hydrochloride for delirium after hip fracture.

- N = 16, aged 70 and older with hip fracture
- Donepezil 5 mg or placebo
- Initiated within 24 hrs of surgery, pre/postoperatively
- Daily treatment was continued for 30 days or until side effects or the clinical situation required termination
- Donepezil had no significant improvement in delirium presence or severity but experienced more side effects
Haloperidol prophylaxis decreases delirium incidence in elderly patients after noncardiac surgery: a randomized controlled trial

- Short-term low-dose intravenous haloperidol
- Prospective, randomized, double-blind, and placebo-controlled trial in two centers
Haloperidol prophylaxis decreases delirium incidence in elderly patients after noncardiac surgery: a randomized controlled trial

- The primary end point
  - Incidence of delirium within the first 7 days after surgery

- Secondary end points
  - Time to onset of delirium
  - Number of delirium-free days
  - Length of intensive care unit stay
Dexmedetomidine for postoperative sedation in elderly patients with cognitive impairment

- **N = 10/ 70 to 90 years**

- **DEX**
  - 0.2-0.4 microg /kg/ hr: 30 to 60 min before the end of the operation
  - 0.1-0.2 microg /kg/ hr: by the time of extubation,
  - Increased 0.1 microg /kg/ hr: depend

Dexmedetomidine for postoperative sedation in elderly patients with cognitive impairment

- 7/10 calm
- 3/10 the dose had to be increased by 0.1 microg x kg(-1) x hr(-1)
- No serious complication, except bradycardia (2/10)
- Low-dose DEX is safe and useful for postoperative sedation in elderly patients with cognitive impairment

Hospital admission

Monitor cognitive function
  Perform formal cognitive assessment
  Establish baseline cognitive function and recent changes
  Monitor patient for changes in mental status

Change in mental status

Chronic
  Perform dementia evaluation

Acute
  Perform cognitive assessment and evaluation for delirium

Delirium confirmed

Identify and address predisposing and precipitating factors

Initial evaluation
  Obtain history (including alcohol and benzodiazepine use)
  Obtain vital signs
  Perform physical and neurologic examination
  Order selected laboratory tests
  Search for occult infection

Potential contributing factor identified

Yes
  Remove or alter potentially harmful drugs
  Change to a less noxious alternative
  Lower doses

No
  Further options
  Order laboratory tests: thyroid-function tests, measurement of drug levels, toxicology screen, measurement of ammonia or cortisol levels, test for vitamin B₁₂ deficiency and arterial blood gas levels
  Electrocardiography
  Neuroimaging
  Lumbar puncture, electroencephalography

Provide supportive care and prevent complications

Prevent complications
  Protect airway, prevent aspiration
  Maintain volume status
  Provide nutritional support
  Provide skin care, prevent pressure sores
  Use mobilization, prevent deep venous thrombosis, pulmonary embolus

Rule out depression, mania, acute psychosis

Provide supportive care and prevent complications

Prevent complications
  Protect airway, prevent aspiration
  Maintain volume status
  Provide nutritional support
  Provide skin care, prevent pressure sores
  Use mobilization, prevent deep venous thrombosis, pulmonary embolus

Manage symptoms of delirium

All patients
  Nonpharmacologic treatment strategies
  Continue delirium prevention
  Reorient patient, encourage family involvement
  Use sitter
  Avoid use of physical restraints and Foley catheters
  Use nonpharmacologic approaches for agitation: music, massage, relaxation techniques
  Use of eyeglasses, hearing aids, interpreters
  Maintain patient's mobility and self-care ability
  Normalize sleep-wake cycle, discourage naps, aim for uninterrupted period of sleep at night
  At night, have patient sleep in quiet room with low-level lighting

Patients with severe agitation
  Pharmacologic management
  Reserve this approach for patients with severe agitation at risk for interruption of essential medical care (e.g., intubation) or for patients who pose safety hazard to themselves or staff
  Start low doses and adjust until effect achieved
  Maintain effective dose for 2–3 days
1. Hospital admission

2. Prevention of delirium
   - Address risk factors for delirium
   - Provide orienting communication
   - Encourage early mobilization
   - Use visual and hearing aids
   - Prevent dehydration
   - Provide uninterrupted sleep time
   - Avoid psychoactive drugs

3. Monitor cognitive function
   - Perform formal cognitive assessment
   - Establish baseline cognitive function and recent changes
   - Monitor patient for changes in mental status

4. Change in mental status

5. Chronic
   - Perform dementia evaluation

6. Acute
   - Perform cognitive assessment and evaluation for delirium

Delirium confirmed

Rule out depression, mania, acute psychosis
9. Identify and address predisposing and precipitating factors

Initial evaluation
- Obtain history (including alcohol and benzodiazepine use)
- Obtain vital signs
- Perform physical and neurologic examination
- Order selected laboratory tests
- Search for occult infection

Potential contributing factor identified

Yes
- Evaluate and treat as appropriate for each contributing factor

No
- Further options
  - Order laboratory tests: thyroid-function tests, measurement of drug levels, toxicology screen, measurement of ammonia or cortisol levels, test for vitamin B₁₂ deficiency and arterial blood gas levels
  - Electrocardiography
  - Neuroimaging
  - Lumbar puncture, electroencephalography

10. Provide supportive care and prevent complications

Prevent complications
- Protect airway, prevent aspiration
- Maintain volume status
- Provide nutritional support
- Provide skin care, prevent pressure sores
- Use mobilization, prevent deep venous thrombosis, pulmonary embolus
Manage symptoms of delirium

All patients

Nonpharmacologic treatment strategies
- Continue delirium prevention
- Reorient patient, encourage family involvement
- Use sits
- Avoid use of physical restraints and Foley catheters
- Use nonpharmacologic approaches for agitation: music, massage, relaxation techniques
- Use of eyeglasses, hearing aids, interpreters
- Maintain patient’s mobility and self-care ability
- Normalize sleep–wake cycle, discourage naps, aim for uninterrupted period of sleep at night
- At night, have patient sleep in quiet room with low-level lighting

Patients with severe agitation

Pharmacologic management
- Reserve this approach for patients with severe agitation at risk for interruption of essential medical care (e.g., intubation) or for patients who pose safety hazard to themselves or staff
- Start low doses and adjust until effect achieved
- Maintain effective dose for 2–3 days
Management

- Indication of pharmacologic management
  - Threaten their own safety
  - Safety of other persons
  - Interruption of essential therapy
    - Mechanical ventilation or central venous catheters

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Adverse effects</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute therapy</strong></td>
<td></td>
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<tr>
<td>Antipsychotics&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Haloperidol</td>
<td>0.5–1mg PO or IM; can repeat every 4h (PO) or every 60min (IM)</td>
<td>Extrapyramidal syndrome, prolonged QT interval</td>
<td>Randomized, controlled trials demonstrate reduction in symptom severity and duration&lt;sup&gt;81,82&lt;/sup&gt;</td>
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<tr>
<td>Atypical antipsychotics&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Risperidone</td>
<td>0.5mg BID</td>
<td>Extrapyramidal syndrome, prolonged QT interval</td>
<td>Randomized, controlled trials comparing efficacy against haloperidol showed comparable response rates&lt;sup&gt;83–84&lt;/sup&gt;</td>
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<tr>
<td>Olanzapine</td>
<td>2.5–5mg daily</td>
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<tr>
<td>Quetiapine</td>
<td>25mg BID</td>
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<tr>
<td>Benzodiazepines&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
<td>Lorazepam</td>
<td>0.5–1mg PO; can repeat every 4h</td>
<td>Paradoxical excitation, respiratory depression, excessive sedation, confusion</td>
<td>Did not show improvement in condition; treatment limited by adverse effects&lt;sup&gt;81&lt;/sup&gt;</td>
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<tr>
<td>Cholinesterase inhibitors&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td>Donepezil</td>
<td>5mg QD</td>
<td>Nausea, vomiting, diarrhea</td>
<td>No randomized, controlled studies have been conducted; some case studies have indicated promise&lt;sup&gt;83–85&lt;/sup&gt;</td>
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<tr>
<td><strong>Prophylactic therapies (potential)&lt;sup&gt;e&lt;/sup&gt;</strong></td>
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<td>0.5–1mg PO or IM; can repeat every 4h (PO) or every 60min (IM)</td>
<td>Extrapyramidal syndrome, prolonged QT interval</td>
<td>Use in surgical cases may reduce delirium incidence,&lt;sup&gt;59&lt;/sup&gt; needs to be confirmed in additional studies</td>
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<td>Cholinesterase inhibitors</td>
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<td>Prevention studies have not demonstrated efficacy&lt;sup&gt;81,82&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Antipsychotics are the most widely used drugs for the treatment of delirium-related agitation but can have marked adverse effects. <sup>b</sup>Benzodiazepines should be reserved for treatment of drug withdrawal, diffuse Lewy body disease, or as second-line treatment following failure of antipsychotics. <sup>c</sup>Not currently accepted clinical therapies. Abbreviations: BID, twice daily; IM, intramuscularly; PO, per os (by mouth); QD, once daily.
Effect of rivastigmine as an adjunct to usual care with haloperidol on duration of delirium and mortality in critically ill patients: a multicentre, double-blind, placebo-controlled randomised trial

- Higher mortality 3-time
- Longer median duration of delirium 5:3 days
Summary

“Delirium”
Summary

Why?
- Common
- Morbidity and mortality
- Poor quality of life

What?
- Identify risk group
- Interaction Between the cholinergic and immune systems
Summary

- **How?**
  - CAM / CAM-ICU/TDRS
  - Delirium/Dementia/Depression/Acute psychosis

- **What’s next?**
  - Preventive measure
  - Early diagnosis and early intervention
THANK YOU