

Faculty of Health and Medical Sciences



# Delirium

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# Delirium

Synonyms: Clouding of consciousness, confusion

- Delirium is defined as a transient, usually reversible, cause of mental dysfunction and manifests clinically with a wide range of neuropsychiatric abnormalities. It can occur at any age, but it occurs more commonly in patients who are elderly and have a previously compromised mental status.
- The clinical hallmarks of delirium are decreased attention or awareness and a change in baseline cognition. Delirium often manifests as a waxing and waning type of confusion.

# DSM-5

## diagnostic criteria for delirium

- Disturbance in attention (ie, reduced ability to direct, focus, sustain, and shift attention) and awareness.
- Change in cognition (eg, memory deficit, disorientation, language disturbance, perceptual disturbance) that is not better accounted for by a preexisting dementia.
- The disturbance develops over a short period and tends to fluctuate during the day.
- There is evidence that the disturbance is caused by a direct physiologic consequence of a general medical condition, an intoxicating substance, medication use, or more than one cause.

### *Assessment instruments*

Confusion Assessment Method (CAM)

Delirium Symptom Interview (DSI)

Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)

Intensive Care Delirium Screening Checklist (ICDSC)



**Table 1 A comparison of DSM-IV and DSM-5 criteria for delirium**

DSM-5	DSM-IV	Comments
A. A disturbance in attention (i.e., reduced ability to direct, focus, sustain, and shift attention) and awareness (reduced orientation to the environment).	A. Disturbance of consciousness (i.e., reduced clarity of awareness of the environment) with reduced ability to focus, sustain or shift attention.	The cardinal criterion for DSM-5 and DSM-IV includes both inattention and reduced awareness of the environment. Although attention and awareness are important components of normal consciousness, they do not fully represent it. The suggestion that orientation to the environment indicates awareness is new to DSM-5.
B. The disturbance develops over a short period of time (usually hours to a few days), represents a change from baseline attention and awareness, and tends to fluctuate in severity during the course of a day.	C. The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day	Both capture acuity of onset and fluctuation of severity.  Change from baseline is noted only in DSM-5 as this relates to attention and awareness.
C. An additional disturbance in cognition (e.g. memory deficit, disorientation, language, visuospatial ability, or perception).	B. A change in cognition or the development of a perceptual disturbance that is not better accounted for by a pre-existing, established or evolving dementia.	DSM-5 lists examples of other affected cognitive domains with perception. Change from baseline for other cognitive domains is noted in DSM-IV.
D. The disturbances in Criteria A and C are not better explained by a pre-existing, established or evolving neurocognitive disorder and do not occur in the context of a severely reduced level of arousal, such as coma.		Unlike DSM-IV, DSM-5 criteria specifically excludes coma from being labelled as delirium but suggests that where reduced arousal impairs ability to engage with cognitive testing that this can be deemed evidence of severe inattention. Both exclude dementia as the primary cause of the disturbance while DSM-5 more broadly includes other neurocognitive disorders besides dementia.
E. There is evidence from the history, physical examination or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal, or exposure to a toxin, or is due to multiple etiologies.	D. There is evidence from the history, physical examination or laboratory findings that the disturbance is caused by the direct physiological consequences of a general medical condition.	DSM-5 has a broader list of etiological types.

Note: Adapted to allow direct item comparison from DSM-IV (American Psychiatric Association, 1994) and DSM-5 (American Psychiatric Association, 2013). DSM-IV, *Diagnostic and Statistical Manual* fourth edition; DSM-5, *Diagnostic and Statistical Manual* fifth edition.



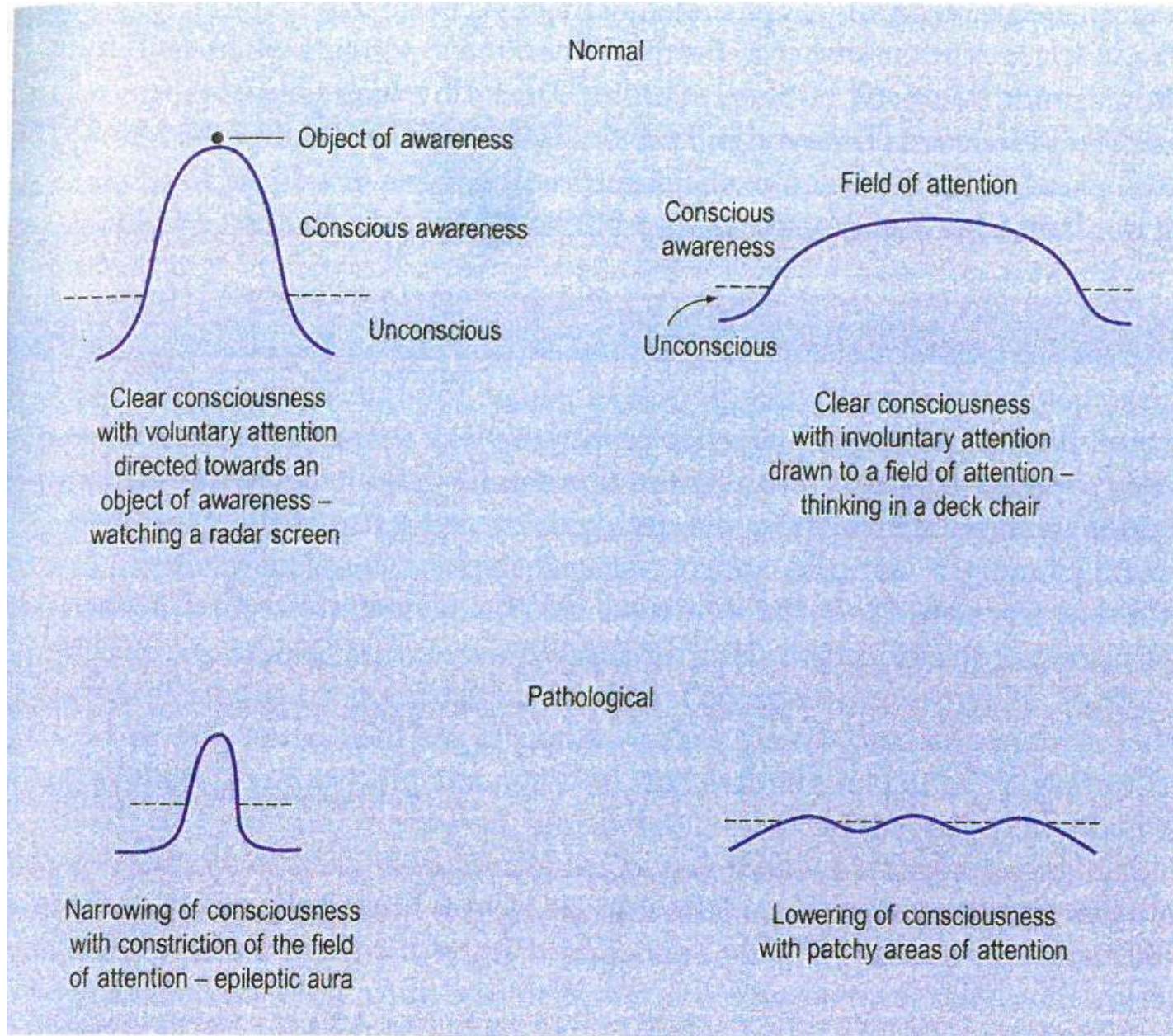


Figure 4.1 Variations in level of awareness.



From A. Wimmer textbook 1936

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Via Elogio n. 26  
Cedof. Mo. Mezzogiorno  
009 7737857  
Wiliana  
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Caraceni A

# Confusion Assessment Method (CAM)

(Adapted from Inouye et al., 1990)

**Instructions:** Assess the following factors.

## Acute Onset

1. Is there evidence of an acute change in mental status from the patient's baseline?  
 YES     NO     UNCERTAIN     NOT APPLICABLE

## Inattention

(The questions listed under this topic are repeated for each topic where applicable.)

- 2A. Did the patient have difficulty focusing attention (for example, being easily distractible or having difficulty keeping track of what was being said)?

Not present at any time during interview  
 Present at some time during interview, but in mild form  
 Present at some time during interview, in marked form  
 Uncertain

- 2B. (If present or abnormal) Did this behavior fluctuate during the interview (that is, tend to come and go or increase and decrease in severity)?

YES     NO     UNCERTAIN     NOT APPLICABLE

- 2C. (If present or abnormal) Please describe this behavior.

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## Disorganized Thinking

3. Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable, switching from subject to subject?

YES     NO     UNCERTAIN     NOT APPLICABLE

## Altered Level of Consciousness

4. Overall, how would you rate this patient's level of consciousness?

Alert (*normal*)  
 Vigilant (*hyperalert, overly sensitive to environmental stimuli, startled very easily*)  
 Lethargic (*drowsy, easily aroused*)  
 Stupor (*difficult to arouse*)  
 Coma (*unarousable*)  
 Uncertain

## Disorientation

5. Was the patient disoriented at any time during the interview, such as thinking that he or she was somewhere other than the hospital, using the wrong bed, or misjudging the time of day?

YES     NO     UNCERTAIN     NOT APPLICABLE

## Memory Impairment

6. Did the patient demonstrate any memory problems during the interview, such as inability to remember events in the hospital or difficulty remembering instructions?

YES     NO     UNCERTAIN     NOT APPLICABLE

## Perceptual Disturbances

7. Did the patient have any evidence of perceptual disturbances, such as hallucinations, illusions, or misinterpretations (for example, thinking something was moving when it was not)?

YES     NO     UNCERTAIN     NOT APPLICABLE

## Psychomotor Agitation

- 8A. At any time during the interview, did the patient have an unusually increased level of motor activity, such as restlessness, picking at bedclothes, tapping fingers, or making frequent, sudden changes in position?

YES     NO     UNCERTAIN     NOT APPLICABLE

## Psychomotor Retardation

- 8B. At any time during the interview, did the patient have an unusually decreased level of motor activity, such as sluggishness, staring into space, staying in one position for a long time, or moving very slowly?

YES     NO     UNCERTAIN     NOT APPLICABLE

## Altered Sleep-Wake Cycle

9. Did the patient have evidence of disturbance of the sleep-wake cycle, such as excessive daytime sleepiness with insomnia at night?

YES     NO     UNCERTAIN     NOT APPLICABLE

## Scoring:

For a diagnosis of delirium by CAM, the patient must display:

1. Presence of acute onset and fluctuating discourse

AND

2. Inattention

AND EITHER

3. Disorganized thinking

OR

4. Altered level of consciousness



# Epidemiology

- 10–31% of hospital admissions
- the incidence of delirium during the admission 3–29%.
- In intensive care units the prevalence of delirium may reach 80%.
- Prevalence of postoperative delirium is 5–10%
- 42% following orthopedic surgery.
- 80% of patients develop delirium near death.
- Extremely common among nursing home residents.
- Any age, but more commonly in elderly with compromised mental status.

# Delirium risk – factors and syndrome

Neurology ward

9 Selected risikofactors:

- History of drug/alcohol
- Infection
- Risk-pharmaca
- Glasgow Coma Score
- Intensive care
- Stroke
- Dehydratio/malnutrition
- Elektrolytederangement
- Age > 65 år
- Immobilisation
- Sanseforstyrrelser
- Dementia
- Sleeplessnes

**Tabel 7. Resultat af screeningen i forhold til antallet af risikofaktorer**

Risikofaktorer	CAM		ICDSC	
	Delirium Ikke til stede	Delirium Til stede	Delirium Ikke til stede	Delirium til stede
0	30	0	30	0
1	29	0	29	0
2	24	0	24	0
3	14	0	14	0
4	1	4	1	4
5	2	6	1	7
6	2	1	1	2
7	0	4	0	4
8	0	1	0	1
9	0	2	0	2
<b>Total</b>	102	18	100	20

Sommer S unpublished

# Patogenesis

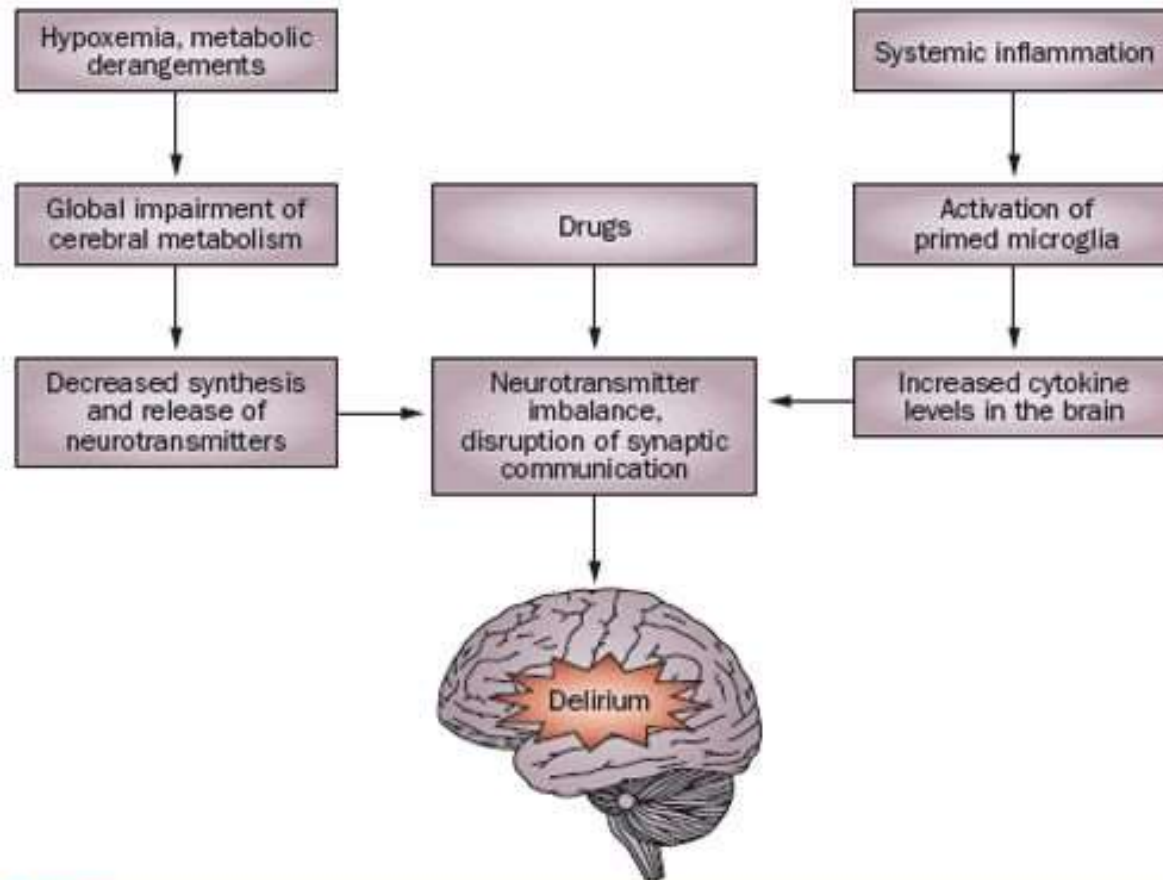
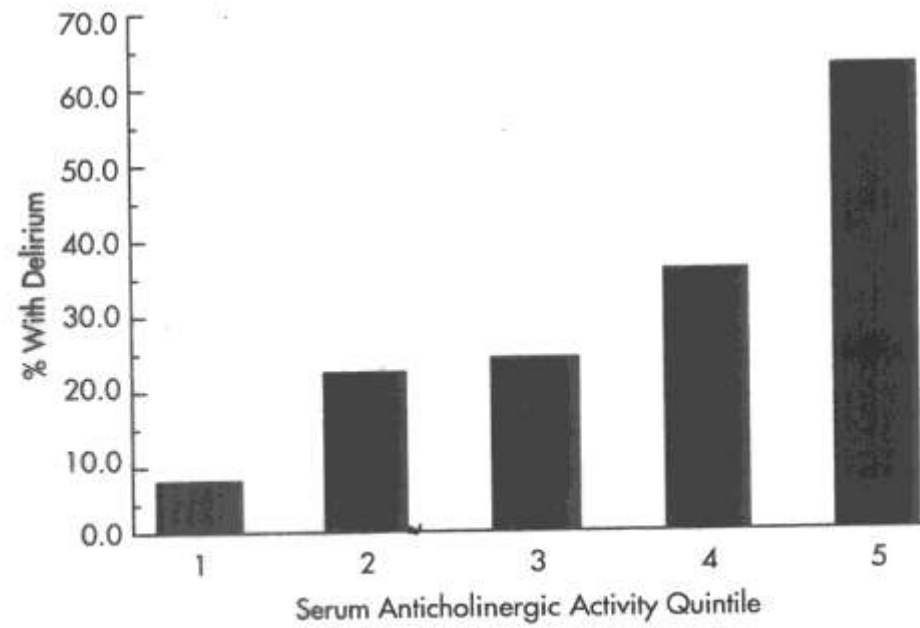
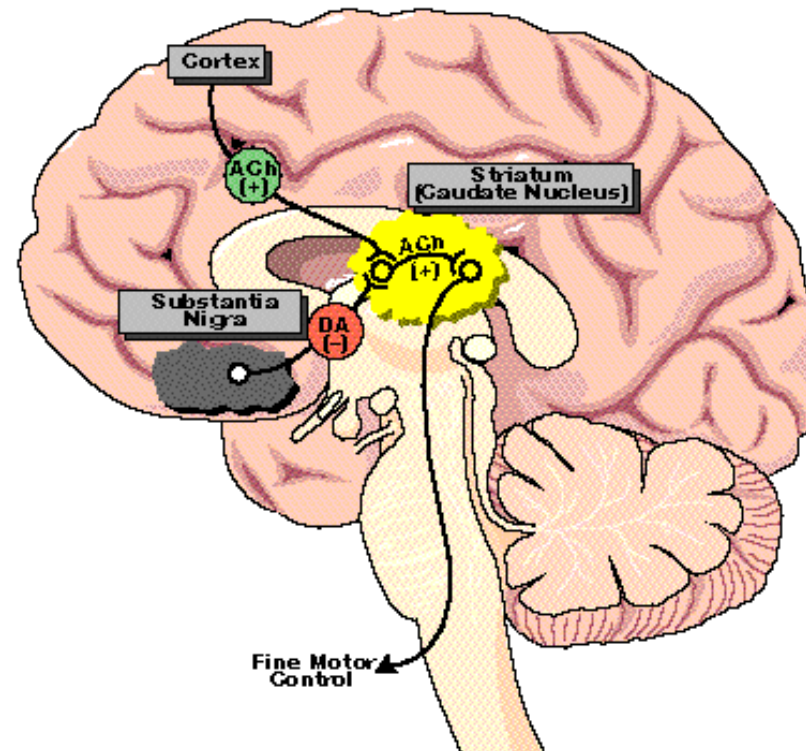


FIGURE 1. Percentage of subjects with delirium by serum anticholinergic activity quintile



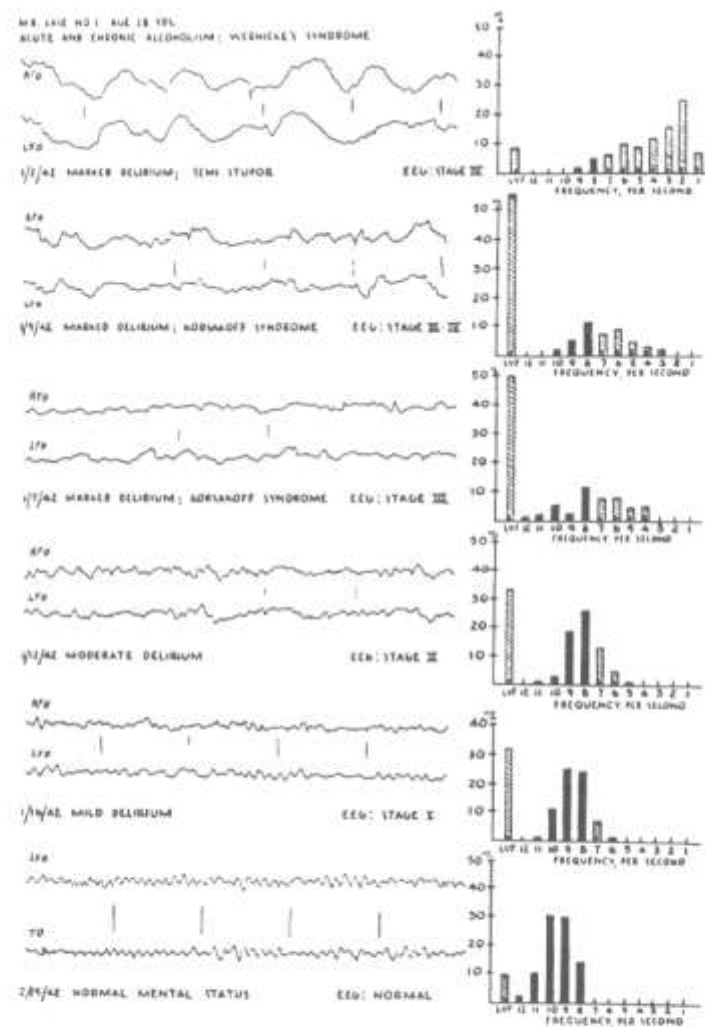
Flacker JM et al (1998) Am J Ger Psychiatry, 6, 31-41.

# Acetylcholin/dopamin



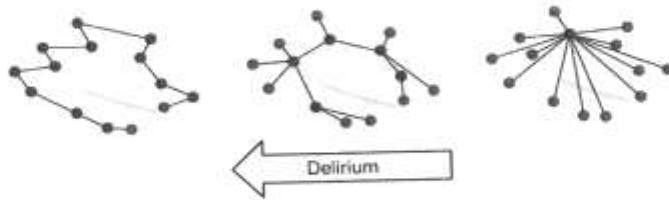
A review of 7 trials of anticholinesterase inhibitors found that in 5 of the studies there was no benefit from the medications in either the prevention or management of delirium (Tampi et al 2016)

EEG reveals diffuse background slowing, typically in the delta range



EEG-forandringer under forløbet fra svært delirium til klinisk restitution hos en 28-årig kvinde med alkoholmisbrug og insuffi-  
cient ernæringstilstand. Der er tale om metabolisk udløst delirium, ikke abstinenspsykose. Spektrum til højre viser distribu-  
tionen af EEG-frekvenser; der ses gradvis øgning i alfa-aktivitet samtidig med, at der indtrådte bedring i opmærksomhedsfunktio-  
nen og øvrige kognition.

## Integrity of functional networks and their connectivity



Van Montfort SJJ et al (2018) *Neuroimage: Clinical*, 20, 35-41



Contents lists available at ScienceDirect

Medical Hypotheses

journal homepage: [www.elsevier.com/locate/mehy](http://www.elsevier.com/locate/mehy)

## Hypothesis for the pathophysiology of delirium: Role of baseline brain network connectivity and changes in inhibitory tone

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..delirium results from an acute breakdown in network connectivity within the brain. The hypothesis predicts that the extent to which the network connectivity breaks down is dependent on two factors: (i) the baseline connectivity within the brain and (ii) the level of inhibitory tone. Baseline connectivity is the connectivity of neural networks within the brain before the precipitating insult provoking delirium

Precipitant events that provoke delirium (modifiable risk factors) are hypothesized to further, and acutely, breakdown network connectivity by increasing inhibitory tone within the brain

**NO! Rather connectivity breaks down due to a general failure of neurotransmission – both inhibitory and excitatory**

# Management

- Determine the cause of the delirium and stop or reverse it.
- Fluid and nutrition: If alcohol withdrawal, include vitamins, especially thiamine.
- Good nursing care: Mobilization, memory cues such as a calendar, clocks, and family photos. The environment stable, quiet, and well-lighted chronobiological support.
- If injury to the patient or others treatment with medications. Medications used are antipsychotic medications - without anticholinergic activity!
- Benzodiazepines for withdrawal states.



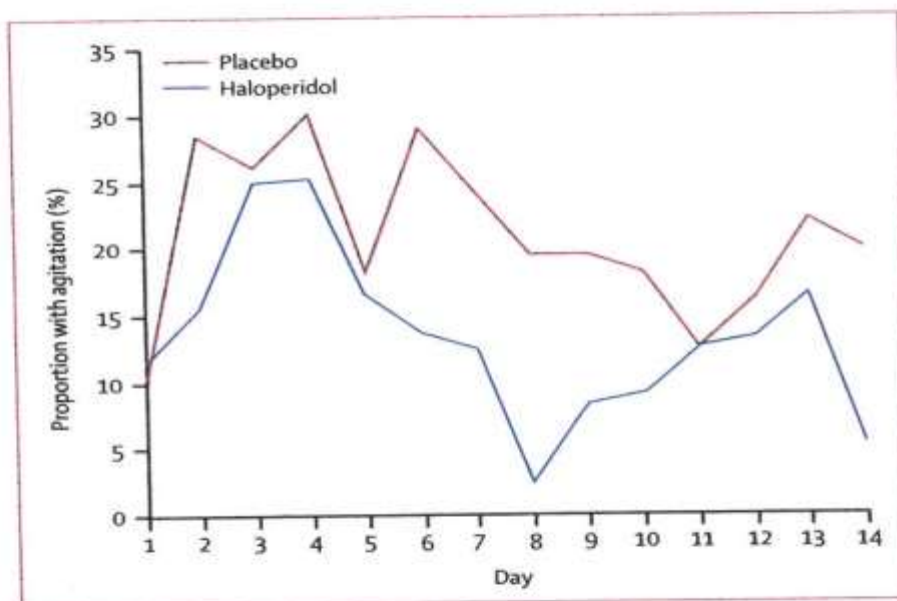


Figure 3: Study patients with agitation in first 14 days

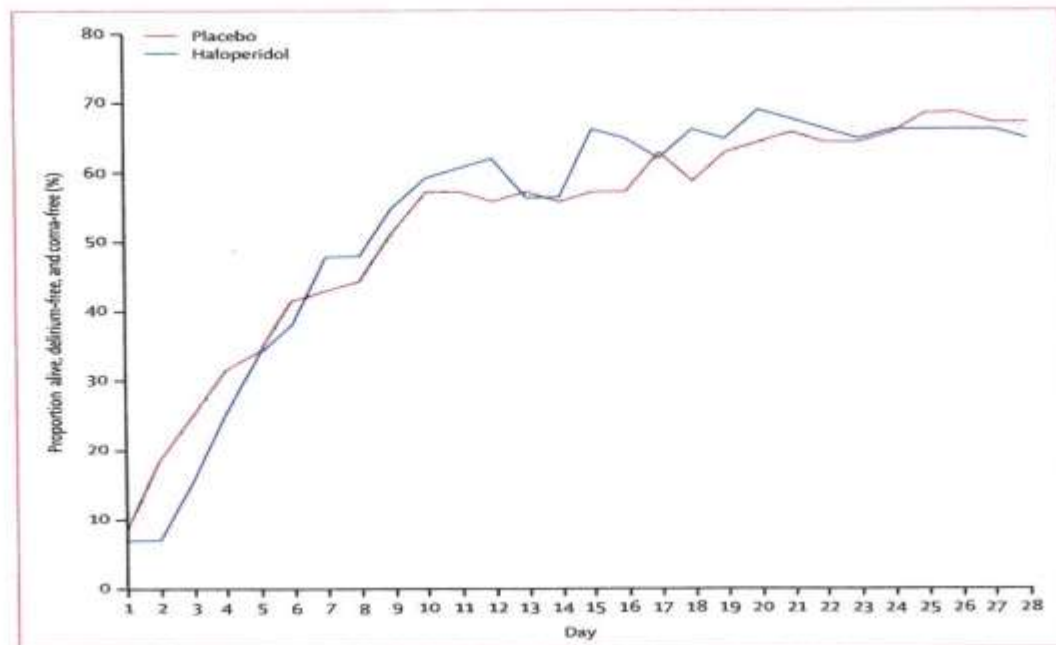


Figure 2: Proportion of study patients with resolution of delirium over time

## Effects of a screening and treatment protocol with haloperidol on post-cardiotomy delirium: a prospective cohort study<sup>†</sup>

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**OBJECTIVES:** Post-cardiotomy delirium is common and associated with increased morbidity and mortality. No gold standard exists for detecting delirium, and evidence to support the choice of treatment is needed. Haloperidol is widely used for treating delirium, but indication, doses and therapeutic targets vary. Moreover, doubt has been raised regarding overall efficacy. The purpose of this study was to assess the effect of a combination of early detection and standardized treatment with haloperidol on post-cardiotomy delirium, with the hypothesis that the proportion of delirium- and coma-free days could be increased. Length of stay (LOS), complications and 180-day mortality are reported.

**METHODS:** Prospective interventional cohort study. One hundred and seventeen adult patients undergoing cardiac surgery were included before introduction of a screening and treatment protocol with haloperidol for delirium, and 123 patients were included after. Nurses screened patients using validated tools (the Delirium Observation Screening (DOS) scale and confusion assessment method for the intensive care unit (CAM-ICU)). In case of delirium, a checklist to eliminate precipitating/ inducing factors and a protocol for standardized dosing with haloperidol was applied. Group comparison was done using non-parametric tests and analysis of fractions, and associations between delirium and predefined covariates were analysed with logistic regression.

**RESULTS:** Incidence of delirium after cardiac surgery was 21 (14–29) and 22 (15–30) %, onset was on postoperative day 1 (1–4) and 1 (1–3), duration was 1 (1–4) day and 3 (1–5) days, respectively, with no significant difference (Period 1 vs 2, all values are given as the median and 95% confidence interval). The proportion of delirium- and coma-free days was 67 (61–73) and 65 (60–70) %, respectively (ns). There was no difference in LOS or complication rate. Delirium was associated to increasing age, increased length of stay and complications.

**CONCLUSIONS:** We observed no increase in the proportion of delirium- and coma-free days after introduction of a combination of early detection and standardized treatment with haloperidol on post-cardiotomy delirium. Most patients were not severely affected, and the few who were, proved difficult to treat, indicating that a simple treatment protocol with haloperidol was ineffective.

# ECT for delirium



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Electronic Articles

**Electroconvulsive therapy as a treatment for protracted refractory delirium in the intensive care unit—Five cases and a review**

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## **Electroconvulsive Therapy in Delirium Tremens**

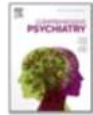
By William H. C. Dudley, Jr. and J. G. Williams

## **The “Forgotten” Treatment of Alcohol Withdrawal Delirium With Electroconvulsive Therapy: Successful Use in a Very Prolonged and Severe Case**

*Laura Kranaster, MD,\* Suna Su Aksay, MD,\* Jan Malte Bumb, MD,\*  
Christoph Janke, MD,† and Alexander Sartorius, MD, PhD\**



**Comprehensive Psychiatry**  
Volume 22, Issue 4, July–August 1981, Pages 368–371



## **Electroconvulsive therapy in acute delirious states**

Peter Kramp<sup>1</sup>, Tom G. Bolwig<sup>2</sup>

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### **Abstract**

The Scandinavian tradition of using ECT in the treatment of acute delirious states is mentioned and the superiority of this treatment modality is illustrated by three case histories. The importance of concomitant treatment of complicating somatic disturbances such as dehydration or infections is pointed out. The possible mode of action of ECT in delirious conditions is briefly discussed, and it is concluded that further research in this area is necessary in spite of the practical and ethical difficulties such research will raise.

Electronic Articles

Electroconvulsive therapy as a treatment for protracted refractory delirium in the intensive care unit—Five cases and a review

Case overview: day: first ICU day is “day 1”

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It can be considered when agitation cannot be controlled with medical treatment, when agitation and delirium make weaning impossible, or prolonged deep sedation the only alternative

	Case 1	Case 2	Case 3	Case 4	Case 5
	Man, 69 y	Man, 61 y	Woman, 71 y	Man, 34 y	Man, 52 years
Diagnosis	Pneumonia, liver failure, alcohol withdrawal syndrome	Bronchiolitis obliterans-organizing pneumonia, cerebral infarctions	Severe myopathy, catatonia, renal adenocarcinoma, malignant neuroleptic syndrome	TBI, subdural and subarachnoid hemorrhage	Subdural hematoma, Myotonic dystrophy
Days in hospital before ICU admission	3	0	0	0	0
First delirium	Day 3	Day 4	Day 35	Day 30	Day 10
Medical treatment before ECT					
Haloperidol	10 d (3-45 mg)	9 d (4-70 mg)	14 d (2-75 mg)	1 d (12.5 mg/d)	6 d (5-75 mg)
Olanzapine		12 d (10-40 mg)	6 d (7.5-30 mg)	39 d (10-90 mg)	15 d (10-70 mg)
Clonidine	6 d (150-600 µg)	22 d (50-1200 µg)		5 d (75-1200 µg)	9 d (100-600 µg)
Midazolam	2 d (2 mg)	26 d (5-82 mg)		6 d (28-75 mg)	12 d (2-70 mg)
Lorazepam				5 d (4-12 mg) <sup>b</sup>	8 d (0.5-0.5 mg)
First ECT	Day 17	Day 26	Day 51	Day 50	Day 33
ECT total (no.)	9	8	5	5	8
Resolution of agitation	Day 21	Day 35	Day 54	Day 55	Day 40
Clinical resolution of delirium (clinical record)	Day 34	Day 35	Day 57	TBI, PTA	Day 49
First CAM-ICU negative	NA	NA	Day 56	NA	NA
Follow-up					
ICU discharge	Day 34	Day 45	Day 150	Day 59	Day 49
Hospital discharge	Day 46	Day 100	Day 207 <sup>a</sup>	In-hospital at day 360	Day 118 <sup>c</sup>
30 d after ICU adm	Hospital	ICU	ICU	ICU	ICU
6 mo after ICU adm	Home	Home	Hospital	Hospital; PTA	Dead <sup>b</sup>

PTA indicates posttraumatic amnesia; NA, not available due to transfer to other ward; adm, Admission.

Medical treatment of delirium before ECT is displayed as number of days, where the drug was administered, and the dose range used per day.

<sup>a</sup> Medical record incomplete.

<sup>b</sup> Discharged to rehabilitation center.

<sup>c</sup> With home mechanical ventilation.

# References