

DELIRIUM

Debra Eagles PGY3
September 23, 2010



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- **Jason Frank, MD**
- **Laura Wilding, RN**



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- Currently how many patients over the age of 65 are seen in the ED?
 - 1/2
 - 1/4
 - 1/6
 - 1/8
 - 1/10



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- Currently how many patients over the age of 65 are seen in the ED?
 - 1/2
 - 1/4
 - 1/6
 - 1/8



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- In 2030, how many patients over the age of 65 will be seen in the ED?
 - 1/2
 - 1/4
 - 1/6
 - 1/8
 - 1/10



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- In 2030, how many patients over the age of 65 will be seen in the ED?
 - 1/2



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“Delirium is a true medical emergency that occurs frequently but is commonly overlooked....delirium can be the sole presentation of an acute life-threatening illness.”



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OBJECTIVES

- Define delirium
- Appreciate the consequences of missing the diagnosis
- Learn screening tool to facilitate identification of patients with delirium
 - Confusion Assessment Method (CAM)

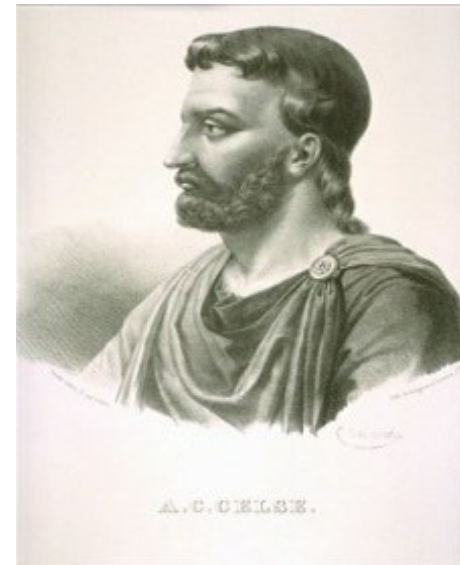


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HISTORICAL PERSPECTIVE

- 500 BC
 - Hippocrates: “phrenitis”
- 1 AD
 - A. Cornelius Celsus: delirium
- 1600’s
 - poor prognosis recognized;
 - complication of surgery

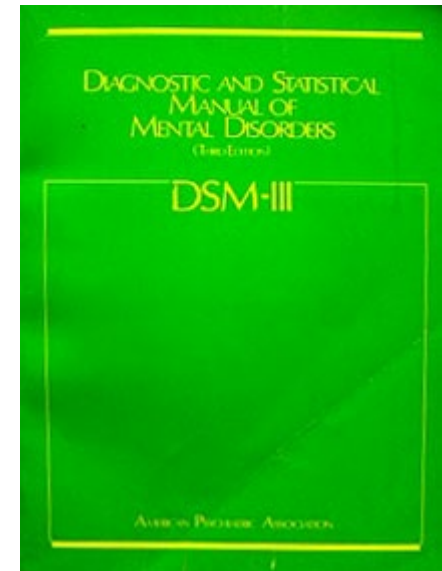


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HISTORICAL PERSPECTIVE

- 1700's
 - hyper vs hypoactive delirium
 - Disorientation, hallucinations
- 1800's
 - fluctuation/ clouding of consciousness
 - Separation of delirium from Etoh delirium
- 1900's
 - distinction between delirium and confusion
 - 1980 DSM III



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CASE 1:

- ID: 74♂ from home
- HPI: multiple recent falls; today tripped, fell while walking outside; c/o elbow pain
- PMHx: alzheimers, anemia, myelodysplastic syndrome
- Meds: asa, aricept, eprex



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CASE 1:

- Vitals: 36.8°C, HR 84 BP 118/72 RR 18 O2 sats 97%
- Physical Exam:
 - tender on palpation of elbow
 - Neuro normal, ambulating independently
- Labs:
 - wbc 16.1
 - Urinalysis negative
- Imaging:
 - Chest nil acute
 - Humerus, elbow – no fracture
 - CT Head nil acute



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CASE 1:

- Management/Disposition?



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CASE 1:

○ Management/Disposition

- Referral to geriatrics for frequent falls, memory impairment and decreased function



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CASE 1:

○ Management/Disposition

- Referral to geriatrics for frequent falls, memory impairment and decreased function
- Consult to Internal Medicine



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CASE 1:

○ Management/Disposition

- Referral to geriatrics for frequent falls, memory impairment and decreased function
- Consult to Internal Medicine
 - Impression “74 year old male with falling secondary to trip with superficial trauma and incidental elevated wbc”
 - Documented that family prefer to take the patient home



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CASE 1:

○ Management/Disposition

- Referral to geriatrics for frequent falls, memory impairment and decreased function
- Consult to Internal Medicine
 - Impression “74 year old male with falling secondary to trip with superficial trauma and incidental elevated wbc”
 - Documented that family prefer to take the patient home

○ Discharge diagnosis: falls/ataxia



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What are the key features of delirium?



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ALTERED MENTAL STATUS

- two main components:
 - Level of consciousness, arousal or attention
 - Content of consciousness or cognition



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ALTERED MENTAL STATUS

- two main components:
 - **Level of consciousness, arousal or attention**
 - may present as:
 - Hypoactive
 - Hyperactive
 - Mixed
 - Normal psychomotor activity
 - Content of consciousness or cognition



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ALTERED MENTAL STATUS

- two main components:
 - Level of consciousness, arousal or attention
 - **Content of consciousness or cognition**
 - impairment of short term memory
 - Perceptual disturbances including delusion, illusions, hallucinations



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DSM-IV

- **Disturbance of consciousness** with reduced ability to focus, sustain, or shift attention



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DSM-IV

- **Disturbance of consciousness** with reduced ability to focus, sustain, or shift attention
- **Change in cognition** that is not better accounted for by a pre-existing, established, or evolving dementia



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DSM-IV

- **Disturbance of consciousness** with reduced ability to focus, sustain, or shift attention
- **Change in cognition** that is not better accounted for by a pre-existing, established, or evolving dementia
- **Development over a short period of time** (usually hours to days) and disturbance **tends to fluctuate** during the course of the day



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DSM-IV

- ❑ **Disturbance of consciousness** with reduced ability to focus, sustain, or shift attention
- ❑ **Change in cognition** that is not better accounted for by a pre-existing, established, or evolving dementia
- ❑ **Development over a short period of time** (usually hours to days) and disturbance **tends to fluctuate** during the course of the day
- ❑ 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.**

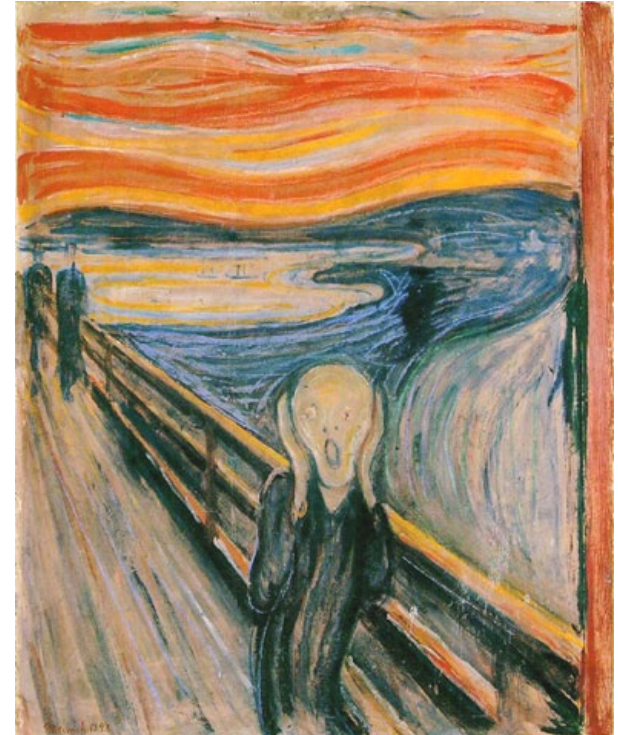


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OTHER SYMPTOMS OF DELIRIUM

- Altered sleep wake patterns
- Emotional disturbances
- Nonfocal neurological deficits



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CASE 1: THE STORY CONTINUES...

- April 26th GEM does telephone followup
- April 30th seen by Geriatric Outreach and referred back to the ED



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CASE 1: THE STORY CONTINUES...

- Vitals: 36.2°C, HR 77 BP 118/56 RR 18 O2 sats 99%
- Physical Exam:
 - Non contributory
- Labs:
 - wbc 29.1
 - Urinalysis negative
- Imaging:
 - Chest nil acute
 - CT Head nil acute
 - CT abdo nil acute



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CASE 1: THE STORY CONTINUES...

- Management/Disposition?



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CASE 1: THE STORY CONTINUES...

- Management/Disposition?
 - Social Work consult
 - To arrange CCAC referral for PSW support and home safety assessment



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CASE 1: THE STORY CONTINUES...

- Management/Disposition?
 - Social Work consult
 - To arrange CCAC referral for PSW support and home safety assessment
- Discharge Diagnosis: dementia



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How good are emergency physicians at
diagnosing delirium?



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UNRECOGNIZED DELIRIUM IN ED GERIATRIC PATIENTS

LM LEWIS ET AL. AM J EMERG MED 1995; 13:142



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UNRECOGNIZED DELIRIUM IN ED GERIATRIC PATIENTS

LM LEWIS ET AL. AM J EMERG MED 1995; 13:142

TABLE 1. Differences Between Delirium and “Probable” Delirium in Sensitivity of Evaluation Performed by Emergency Physician, Admission Rate, and Mortality

CAM Score	3 (n = 15)	4 (n = 20)	3 or 4 (n = 35)
EP Sensitivity	1 (7%)	5 (25%)	6 (17%)
Admission Rate*	10 (67%)	11 (58%)	21 (62%)
Mortality Rate	1 (7%)	4 (20%)	5 (14%)

* 1 patient with a CAM score of 4 left against medical advice.



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PREVALENCE AND DETECTION OF DELIRIUM IN ELDERLY ED PATIENTS

M ELIE ET AL. CMAJ 2000; 163 (8):977-81

Appendix 1: Checklist for mental status of patient

Check all that apply:

- ☐ Cognitive impairment
 - ☐ Depression
 - ☐ Psychosis
 - ☐ Delirium
 - ☐ Dementia
 - ☐ Other psychiatric condition: (specify): _____
 - ☐ No mental disorder
-



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PREVALENCE AND DETECTION OF DELIRIUM IN ELDERLY ED PATIENTS

M ELIE ET AL. CMAJ 2000; 163 (8):977-81

Table 2: Detection rate of delirium by ED chart review or mental status checklist*

Detection method	Patients with delirium (<i>n</i> = 34)		Patients without delirium (<i>n</i> = 131)	
	Detected	Sensitivity (95% CI), %	Detected	Specificity (95% CI), %
ED chart review	8	23.5 (9.3–37.8)	0	100
Mental status checklist	7	20.6 (7.0–34.2)	2	98.5 (96.4–100)
Either ED chart review or mental status checklist	12†	35.3 (19.2–51.4)	2	98.5 (96.4–100)

Note: ED = emergency department.

**N* = 165 patients for whom both the chart review and mental status checklist were completed.

†Delirium was detected in 3 additional patients by both methods.



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DELIRIUM IN OLDER ED PATIENTS: RECOGNITION, RISK FACTORS AND PSYCHOMOTOR SUBTYPES

HAN ET AL. ACAD EMERG MED 2009; 16:193-200



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DELIRIUM IN OLDER ED PATIENTS: RECOGNITION, RISK FACTORS AND PSYCHOMOTOR SUBTYPES

HAN ET AL. ACAD EMERG MED 2009; 16:193-200

- Dementia, functional dependence and hearing impairment were independent risk factors
- 92% were hypoactive psychomotor subtype
- 24% were recognized by EP
- Upon admission only a further 6.2% of patients with delirium were identified



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BOTTOM LINE:

- Prevalence of delirium in older patients presenting to the ED is approx 10%
- Our current clinical acumen and conventional work up in elderly patients presenting to the ED are not sensitive in detecting delirium;
- Vast majority of delirious older patients presented to the ED with the hypoactive subtype



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BARRIERS TO SUCCESSFUL IDENTIFICATION

- Lack of knowledge of diagnostic criteria
- Limited use of standard screening tools
- Spectrum of clinical presentation
- Delirium sub-types
- Fluctuation in symptoms



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CASE 1: THE CONCLUSION



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CASE 1: THE CONCLUSION

- Returns to ED May 1st
- Febrile, delirious
- Admitted for aspiration pneumonia
- Discharged May 11th, below baseline level of function



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Diagnosing Delirium...Does it matter?



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HOSPITAL USE, INSTITUTIONALISATION AND MORTALITY ASSOCIATED WITH DELIRIUM

EELES ET AL. AGE AND AGEING 2010; 39: 470-475



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HOSPITAL USE, INSTITUTIONALISATION AND MORTALITY ASSOCIATED WITH DELIRIUM

EELES ET AL. AGE AND AGEING 2010; 39: 470-475

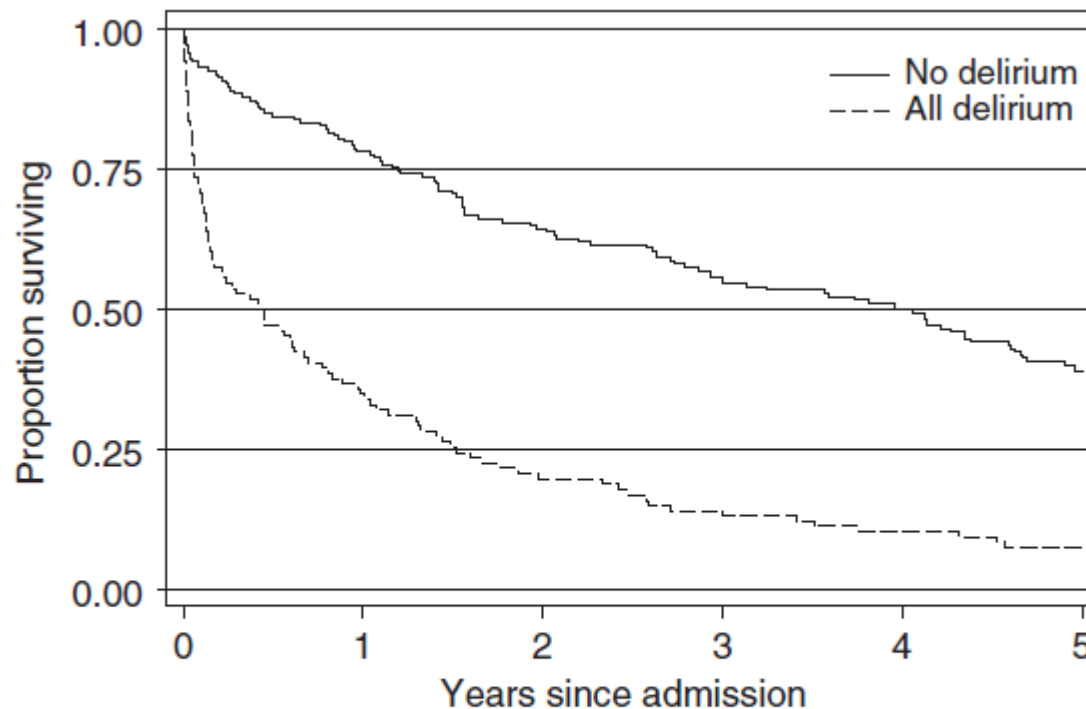


Figure 1. Five-year survival in patients aged ≥ 75 years admitted to a general medical service.



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HOSPITAL USE, INSTITUTIONALISATION AND MORTALITY ASSOCIATED WITH DELIRIUM

EELES ET AL. AGE AND AGEING 2010; 39: 470-475

Table 2. Hazard ratio for death within 5 years for patients aged ≥ 75 years admitted acutely to a general medical service

	Hazard ratio (95% confidence interval)		P-value
	Unadjusted	Adjusted ^a	
Effect of delirium on mortality during index admission	4.5 (3.0–6.8)	3.5 (2.3–5.6)	<0.0001
Effect of delirium on mortality during first year after admission	4.0 (2.8–5.9)	3.2 (2.1–4.8)	<0.0001
Effect of delirium on mortality from second to fifth year after admission	2.4 (1.6–3.6)	2.0 (1.3–3.2)	0.002
Dementia	2.1 (1.6–2.8)	1.3 (0.9–1.8)	0.14
>85 years	1.8 (1.3–2.4)	1.5 (1.1–2.0)	0.01
Male gender	1.1 (0.8–1.5)	1.2 (0.9–1.6)	0.31
Institutionalised	2.8 (2.0–3.9)	1.4 (0.9–2.1)	0.17
Greenfield illness severity ^b	1.9 (1.4–2.6)	1.8 (1.3–2.6)	<0.0001
Charlson co-morbidity ^c	1.6 (1.2–2.2)	1.4 (1.1–2.0)	0.02
Dependency on admission ^d	2.5 (1.5–4)	1.6 (0.9–2.9)	0.14

^aAdjustment made for multiple confounders age, dementia, placement, illness severity, co-morbidity and dependency.

^bGreenfield severity score >4.

^cCharlson co-morbidity score >2.

^dBarthel Index score <8.



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DELIRIUM IN OLDER EMERGENCY DEPARTMENT PATIENTS DISCHARGED HOME: EFFECT ON SURVIVAL

KAKUMA ET AL. JAGS 2003; 51:443



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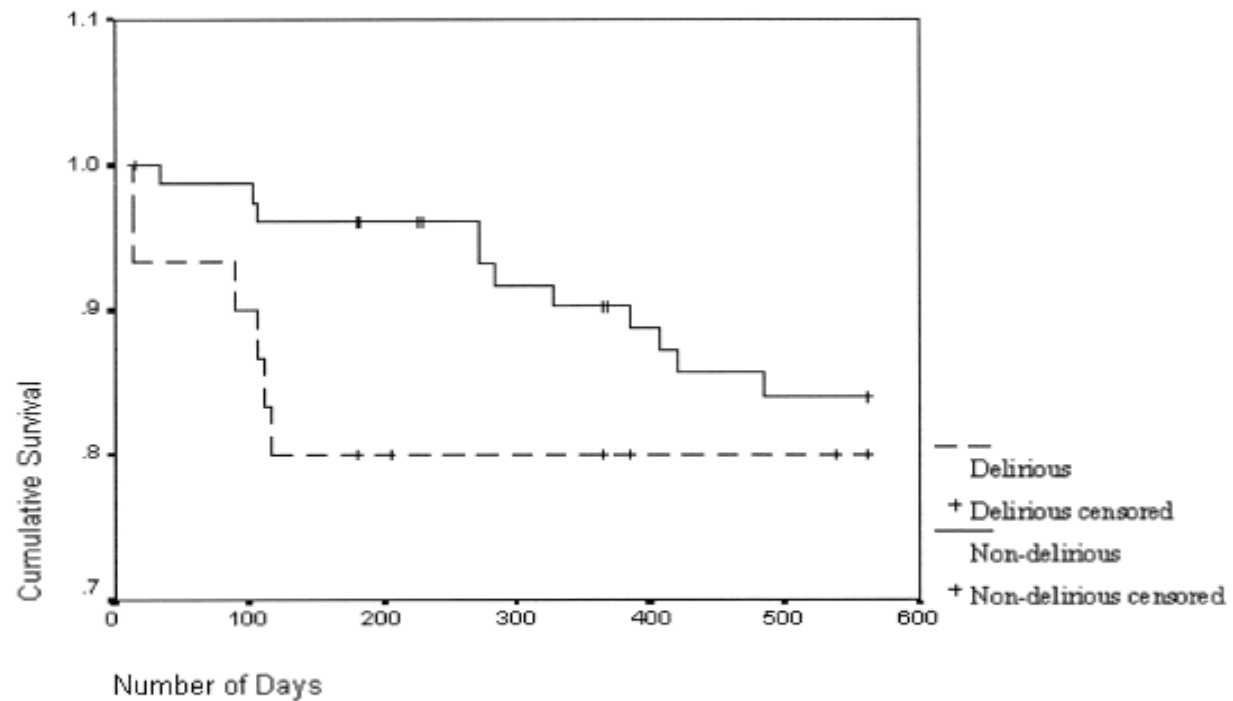


Figure 1. Survival for delirious and nondelirious subjects.

Hazard ratio for delirium up to 6 months from index event 5.47



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Table 2. Multivariate Cox Model for 6-Month Mortality

Characteristic	Parameter Estimate	Standard Error	P-value	Hazard Ratio (95% Confidence Interval)
Delirium	1.979	0.764	.010	7.24 (1.62–32.35)
Male	0.530	0.715	.459	1.70 (0.42–6.90)
Age	0.018	0.057	.748	1.02 (0.91–1.14)
Total activity of daily living score	−0.143	0.061	.020	0.87 (0.77–0.98)
Number of medications	0.306	0.129	.018	1.36 (1.06–1.75)

Note: Each variable adjusted for all others in the model.



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Table 3. Bivariate Comparison by Detection Status

Characteristic	No Delirium (n = 77)	Detected Delirium (n = 17)	Undetected Delirium (n = 13)	Pearson χ^2 P-value
Male, n (%)	27 (35.1)	8 (47.1)	5 (38.5)	.649
Age, mean $\pm$ SD	80.40 $\pm$ 8.67	79.47 $\pm$ 6.54	78.92 $\pm$ 4.46	.780
Total activities of daily living score, mean $\pm$ SD	21.10 $\pm$ 7.18	22.06 $\pm$ 6.34	20.62 $\pm$ 5.98	.837
Informant Questionnaire on Cognitive Decline in the Elderly score, mean $\pm$ SD	3.62 $\pm$ 0.72	3.78 $\pm$ 0.81	3.82 $\pm$ 0.77	.553
Died by 6 months, n (%)	3 (3.9)	2 (11.8)	4 (30.8)	.005
Died by 18 months, n (%)	11 (14.3)	2 (11.8)	4 (30.8)	.284
Number of comorbid conditions, mean $\pm$ SD	5.83 $\pm$ 2.20	6.18 $\pm$ 2.48	5.62 $\pm$ 2.50	.784
Number of medications, mean $\pm$ SD	4.06 $\pm$ 2.84	4.81 $\pm$ 2.61	5.31 $\pm$ 2.53	.252

SD = standard deviation.



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DELIRIUM IN THE ED: AN INDEPENDENT PREDICTOR OF DEATH WITHIN 6 MONTHS

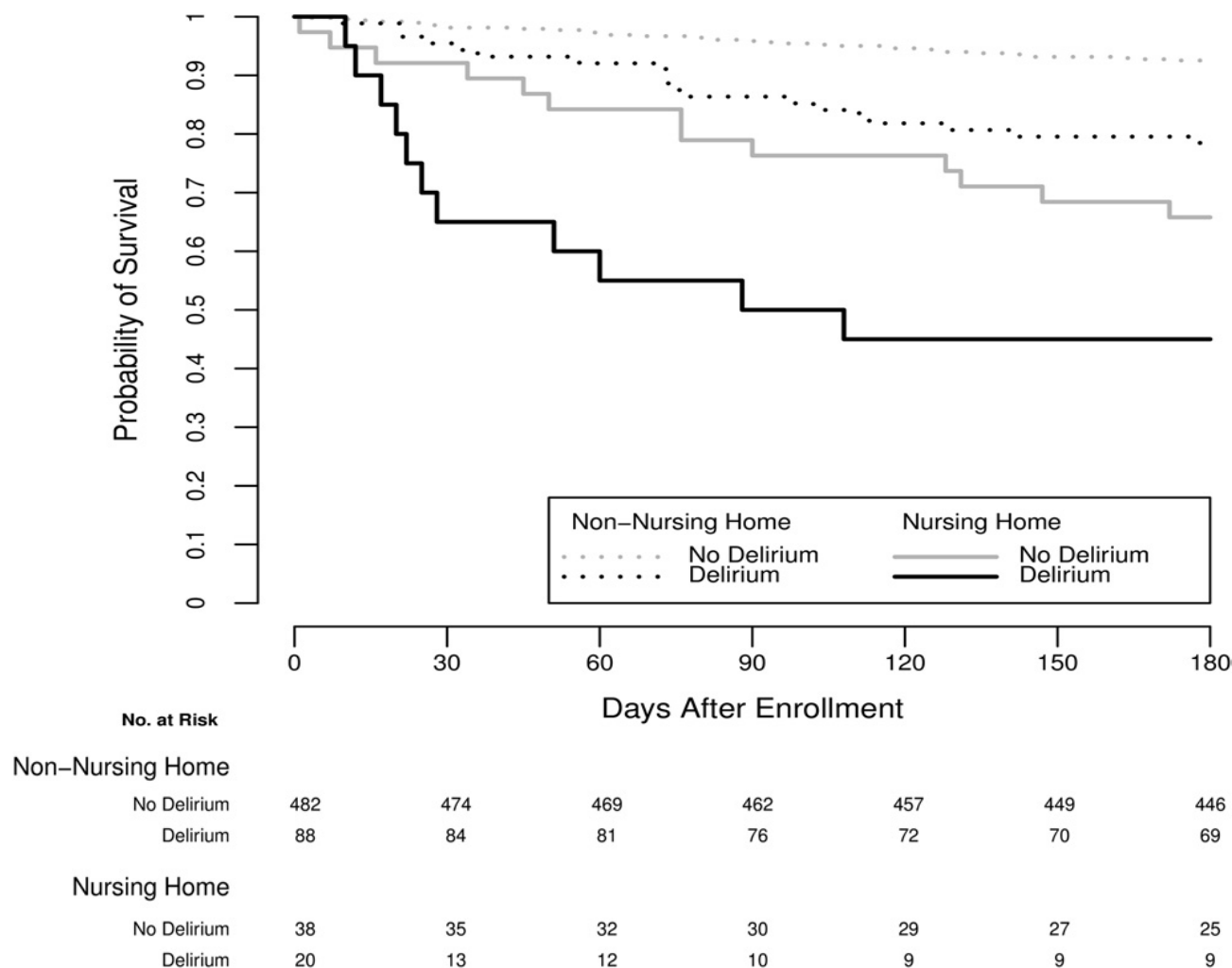
JH HAN ET AL. ANN EMERG MED 2010



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FIGURE 3. KAPLAN-MEIER SURVIVAL CURVES IN OLDER ED PATIENTS, STRATIFIED BY DELIRIUM AND NURSING HOME STATUS.



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BOTTOM LINE:

- Older emergency department patients with delirium have a higher mortality rate even after adjusting for age, dementia, comorbidities, severity of illness
- Patients with undiagnosed delirium are at greatest risk



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RISK FACTORS

- Advanced age
- Cognitive impairment
- Higher comorbidities
- Greater illness severity
- More functionally dependent
- Nursing home residents



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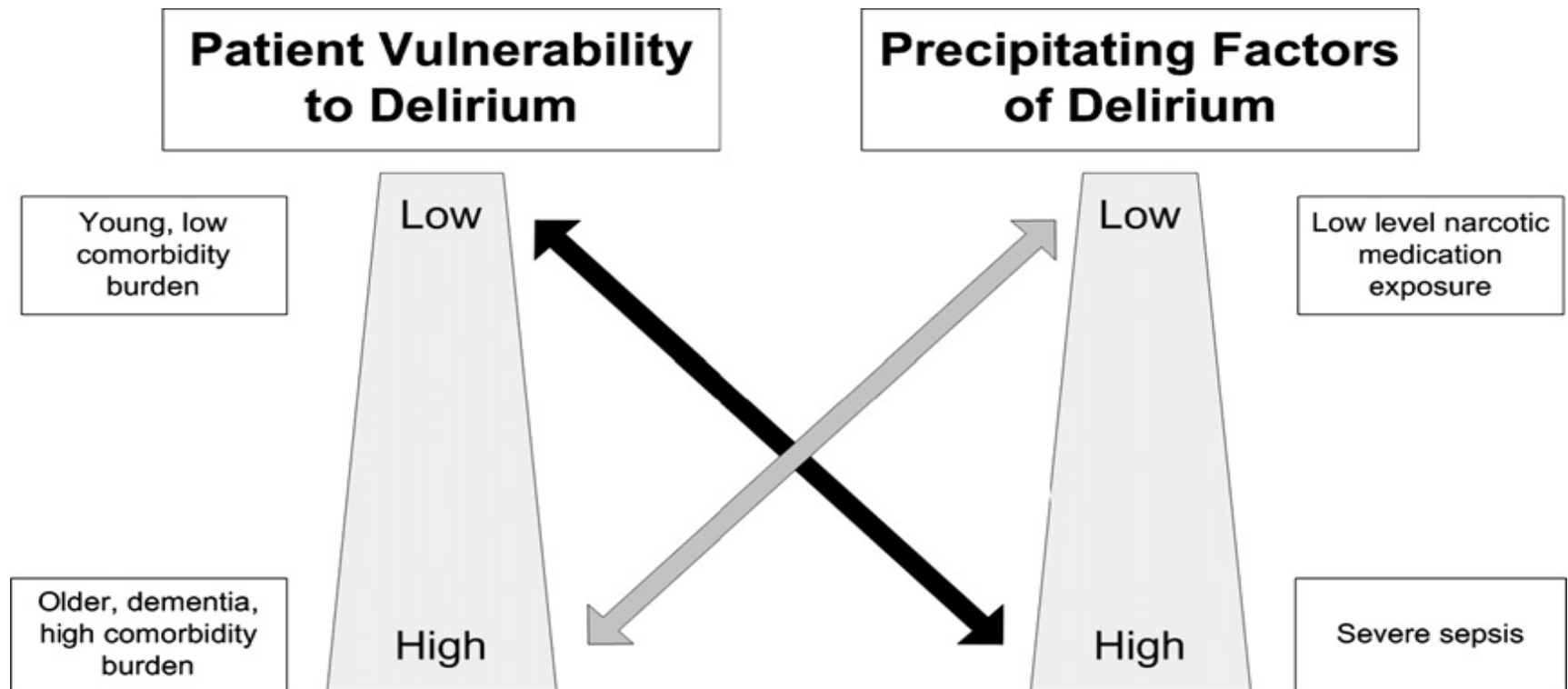


Fig. 1. The interrelationship between patient vulnerability and precipitating factors in the development of delirium. Patients who have little vulnerability require significant noxious stimuli to develop delirium (black arrow). Conversely, patients who are highly vulnerable require only minor noxious stimuli to develop delirium (gray arrow). (Data from Inouye SK, Charpentier PA. Precipitating factors for delirium in hospitalized elderly persons. Predictive model and interrelationship with baseline vulnerability. JAMA 1996;275(11):852–7.)



COMMON AND SERIOUS ETIOLOGIES OF DELIRIUM IN OLDER PATIENTS

○ Primary CNS disease

- CVA, subdural hematoma, encephalitis, meningitis, seizures (nonconvulsive status, postictal), hypertensive encephalopathy

○ Systemic diseases

- Infections (lung, UTI, skin), acute MI, CHF, arrhythmia, cardiogenic shock, acute or chronic respiratory failure, uremia, hepatic encephalopathy, fluid/electrolyte abnormalities (hypernatremia, hypoglycemia, hyper/hypocalcemia)

○ Medications

- Anticholinergic, antihistamines, antiemetics, antiparkinsonian, antispasmodics

○ Withdrawal

- Alcohol, sedative hypnotics, other medications



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DIAGNOSTIC WORK UP

- Cbc, lytes, urea, creatinine, glucose
- Ca, Mg, PO₄
- LFTs, TSH
- Consider cardiac biomarkers
- Chest x ray
- Urinalysis
- ECG
- CT head only if history of trauma, substantially impaired consciousness or new focal neurologic findings



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CASE 2:

- ID: 89 ♀ from retirement home
- HPI: c/o left sided chest and hip pain following fall
- PMHx: DDD, hyperthyroid, dyslipidemia, HTN, OA
- Meds: asa, lipitor, alendronate, lasix



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- Vitals: 36.2°C, HR 85 BP 190/95 RR 20 O2 sats 94%
- Physical Exam:
 - tender on palpation of lower lateral rib cage;
 - Bruising L hip
- Labs: unremarkable
- Xray
 - Pelvis/femur – no fracture
 - Rib views – fracture of 5,6,7th rib



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CASE 2:

- Management/Disposition?



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CASE 2:

○ Management/Disposition

- Given dilaudid 0.25 mg s/c at 1945 and 2145hr
- Admitted to CDU for pain control and mobilization
- Given tylenol 650 mg and ibuprofen 300 mg po at 2300 and 0500 hr



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CASE 2:

○ Management/Disposition

- Given dilaudid 0.25 mg s/c at 1945 and 2145hr
- Admitted to CDU for pain control and mobilization
- Given tylenol 650 mg and ibuprofen 300 mg po at 2300 and 0500 hr
- Seen by GEM, able to mobilize but delirious
- Admitted to trauma for 13 days then transferred to GAU for a further 13 days
- Ultimately discharged back to RH at previous level of function



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How do we diagnose delirium?



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DOES THIS PATIENT HAVE DELIRIUM?: VALUE OF BEDSIDE INSTRUMENTS

WONG ET AL. JAMA 2010 303(7): 779



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Table. Summary Data for Diagnostic Accuracy of Bedside Instruments for Diagnosing Delirium^a

Source	Sample Size	Delirium Prevalence, %	Examiner Specialty	% (95% Confidence Interval)		Likelihood Ratio (95% Confidence Interval)	
				Sensitivity	Specificity	Positive	Negative
CAC							
Pompei et al, ³⁹ 1995	428	15	Research assistant	36 (24-49)	95 (92-97)	7.4 (4.2-13)	0.67 (0.56-0.81)
CAM ^b							
Farrell and Ganzini, ³⁴ 1995	72	45	Osteopathic physician	93 (77-98)	93 (80-98)	13 (4.4-39)	0.07 (0.02-0.28)
Gaudreau et al, ³¹ 2005	59	32	Nurse	98 (70-100)	95 (82-99)	16 (4.8-53)	0.03 (0.00-0.42)
Gonzalez et al, ³² 2004	123	24	General physician or psychiatrist	90 (73-97)	99 (92-100)	167 (10-2654)	0.11 (0.04-0.31)
Hestermann et al, ⁵⁰ 2009 ^c	39	33	Gerontologist or resident physician in geriatric medicine	77 (48-92)	96 (77-99)	20 (2.9-140)	0.24 (0.09-0.65)
Inouye et al, ¹⁵ 1990 (site 1)	30	33	Geriatrician	95 (55-100)	95 (72-99)	13 (2.8-63)	0.05 (0.00-0.74)
Inouye et al, ¹⁵ 1990 (site 2)	26	62	Geriatrician	94 (66-99)	90 (53-99)	9.4 (1.5-60)	0.07 (0.01-0.47)
Laurila et al, ³⁶ 2002 ^d	81	40	Geriatrician	81 (64-91)	84 (71-92)	5.0 (2.6-9.6)	0.22 (0.11-0.47)
Leung et al, ³⁷ 2008	100	25	Family physician	76 (56-89)	99 (90-100)	114 (7.1-1822)	0.25 (0.13-0.49)
Pompei et al, ³⁹ 1995	428	15	Research assistant	46 (34-58)	92 (89-94)	5.8 (3.7-9.0)	0.59 (0.47-0.74)
Rolfson et al, ⁴¹ 1999 ^e	30	27	Nurse	13 (0-53)	100 (85-100)	7.7 (0.34-171)	0.85 (0.63-1.1)
Ryan et al, ⁵¹ 2009 ^f	52	33	Hospitalist	88 (63-97)	99 (82-100)	65 (4.1-1034)	0.14 (0.04-0.45)
Zou et al, ⁴³ 1998	87	49	Nurse	93 (80-98)	77 (63-87)	4.1 (2.4-7.1)	0.09 (0.03-0.27)
Pooled ^g	1036			86 (74-93)	93 (87-96)	9.6 (5.8-16.0)	0.16 (0.09-0.29)
DOSS (13-Item) ^b							
van Gemert and Schuurmans, ⁴⁵ 2007	87	10	Nurse	89 (50-98)	88 (79-94)	7.6 (4.0-15)	0.13 (0.02-0.80)
Schuurmans et al, ⁴⁶ 2003	92	20	Nurse	94 (69-99)	76 (65-84)	3.9 (2.6-5.9)	0.07 (0.01-0.50)
Pooled ^g	178			92 (74-98)	82 (66-92)	5.2 (2.7-9.9)	0.10 (0.03-0.37)
DRS ≥ 10 ^{b,h}							
Grassi et al, ³³ 2001	105	63	Research psychologist	95 (87-99)	62 (46-75)	2.5 (1.7-3.7)	0.07 (0.02-0.23)
Rockwood et al, ⁴⁰ 1996 ⁱ	67	37	Resident physician in geriatric medicine or psychiatry	82	94	14	0.19
Rosen et al, ⁴² 1994	791	9	Research clinician	94 (86-98)	82 (79-84)	5.1 (4.3-6.0)	0.07 (0.03-0.18)
Trzepacz et al, ⁴⁷ 1988	47	43	Psychiatrist	98 (71-100)	98 (77-100)	55 (3.5-853)	0.02 (0.00-0.38)
Pooled ^g	943			95 (90-98)	79 (58-91)	4.3 (2.1-9.1)	0.07 (0.03-0.13)
DRS-R-98 > 20 ^{b,h}							
de Negreiros et al, ⁴⁴ 2008	64	40	Researcher	93 (75-98)	95 (81-99)	17 (4.4-66)	0.08 (0.02-0.30)
de Rooij et al, ³⁰ 2006	65	35	Geriatrician or psychiatrist	93 (65-99)	82 (69-90)	5.2 (2.8-9.5)	0.08 (0.01-0.54)
Pooled ^g	129			93 (80-98)	89 (68-97)	8.0 (2.6-25)	0.08 (0.03-0.24)
Digit Span Test							
Pompei et al, ³⁹ 1995	419	15	Research assistant	34 (22-48)	90 (87-93)	3.4 (2.1-5.5)	0.73 (0.61-0.89)
GAR < 7							
O'Keeffe and Gosney, ³⁸ 1997	87	21	Geriatrician	94 (73-100)	99 (92-100)	65 (9.3-458)	0.06 (0.01-0.38)
MDAS ≥ 10 ^{b,h}							
Breitbart et al, ²⁹ 1997	33	52	Psychiatrist	82 (57-94)	75 (49-90)	3.3 (1.4-7.9)	0.24 (0.08-0.68)
Kazmierski et al, ³⁵ 2008	260	12	Psychiatrist	97 (80-100)	96 (92-98)	22 (12-41)	0.04 (0.01-0.24)
Matsuoka et al, ⁴⁶ 2001	37	43	Psychiatrist	97 (66-100)	98 (72-100)	43 (2.8-662)	0.03 (0.00-0.46)
Pooled ^g	330			92 (75-98)	92 (70-98)	12 (2.4-58)	0.09 (0.02-0.38)
MMSE < 24							
Grassi et al, ³³ 2001	105	63	Trained research psychologist	96 (87-99)	38 (23-55)	1.6 (1.2-2.0)	0.12 (0.04-0.38)
Nu-DESC > 0							
Leung et al, ³⁷ 2008	100	25	Nurse	96 (80-100)	69 (59-79)	3.1 (2.3-4.4)	0.06 (0.01-0.40)
Vigilance "A" Test							
Pompei et al, ³⁹ 1995	421	15	Research assistant	61 (47-74)	77 (73-81)	2.7 (2.0-3.5)	0.50 (0.36-0.71)

Abbreviations: CAC, Clinical Assessment of Confusion; CAM, Confusion Assessment Method; DOSS, Delirium Observation Screening Scale; DRS, Delirium Rating Scale; DRS-R, Delirium Rating Scale-Revised; GAR, Global Attention Rating; MDAS, Memorial Delirium Assessment Scale; MMSE, Mini-Mental State Examination; Nu-DESC, Nursing Delirium Screening Scale.

^aReliability measures are available at eTable 2, see <http://www.jama.com>.

^bHeterogeneity was explored using I^2 , which describes the percentage of total variation across studies that is due to heterogeneity rather than chance. Heterogeneity was categorized as low, moderate, and high, respective to I^2 values of 25%, 50%, and 75%. Positive and negative F_i values were 65 and 65 for CAM, 65 and 0 for DOSS, 14 and 0.19 for DRS, 73 and 0 for DRS-R-98, and 85 and 69 for MDAS.

^cCalculated using the more conservative results of the 2 examiners.

^dUsing *Diagnostic and Statistical Manual of Mental Disorders* Fourth Edition criteria as the reference standard.

^eStudy not included in the summary data because results were based only on 8 patients with delirium and only 1 patient in the entire study population received positive screening results using the CAM instrument.

^fThere was also a pilot study with 32 patients in the same publication.

^gUnivariate random effects.

^hSpecific threshold chosen based on summary diagnostic odds ratio and validation in multiple studies.

ⁱIndividual data not available for confidence interval calculations or inclusion in meta-analysis.



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Table. Summary Data for Diagnostic Accuracy of Bedside Instruments for Diagnosing Delirium^a

Source	Sample Size	Delirium Prevalence, %	Examiner Specialty	% (95% Confidence Interval)		Likelihood Ratio (95% Confidence Interval)	
				Sensitivity	Specificity	Positive	Negative
CAM ^b							
Farrell and Ganzini, ³⁴ 1995	72	45	Osteopathic physician	93 (77-98)	93 (80-98)	13 (4.4-39)	0.07 (0.02-0.28)
Gaudreau et al, ³¹ 2005	59	32	Nurse	98 (70-100)	95 (82-99)	16 (4.8-53)	0.03 (0.00-0.42)
Gonzalez et al, ³² 2004	123	24	General physician or psychiatrist	90 (73-97)	99 (92-100)	167 (10-2654)	0.11 (0.04-0.31)
Hestermann et al, ⁵⁰ 2009 ^c	39	33	Gerontologist or resident physician in geriatric medicine	77 (48-92)	96 (77-99)	20 (2.9-140)	0.24 (0.09-0.65)
Inouye et al, ¹⁵ 1990 (site 1)	30	33	Geriatrician	95 (55-100)	95 (72-99)	13 (2.8-63)	0.05 (0.00-0.74)
Inouye et al, ¹⁵ 1990 (site 2)	26	62	Geriatrician	94 (66-99)	90 (53-99)	9.4 (1.5-60)	0.07 (0.01-0.47)
Laurila et al, ³⁶ 2002 ^d	81	40	Geriatrician	81 (64-91)	84 (71-92)	5.0 (2.6-9.6)	0.22 (0.11-0.47)
Leung et al, ³⁷ 2008	100	25	Family physician	76 (56-89)	99 (90-100)	114 (7.1-1822)	0.25 (0.13-0.49)
Pompei et al, ³⁹ 1995	428	15	Research assistant	46 (34-58)	92 (89-94)	5.8 (3.7-9.0)	0.59 (0.47-0.74)
Rolfson et al, ⁴¹ 1999 ^e	30	27	Nurse	13 (0-53)	100 (85-100)	7.7 (0.34-171)	0.85 (0.63-1.1)
Ryan et al, ⁵¹ 2009 ^f	52	33	Hospitalist	88 (63-97)	99 (82-100)	65 (4.1-1034)	0.14 (0.04-0.45)
Zou et al, ⁴³ 1998	87	49	Nurse	93 (80-98)	77 (63-87)	4.1 (2.4-7.1)	0.09 (0.03-0.27)
Pooled ^g	1036			86 (74-93)	93 (87-96)	9.6 (5.8-16.0)	0.16 (0.09-0.29)



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EVALUATION OF THE CAM AS A SCREENING TOOL FOR DELIRIUM IN THE ER

MONETTE ET AL. GEN HOSP PSYCH 2001; 23:20



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EVALUATION OF THE CAM AS A SCREENING TOOL FOR DELIRIUM IN THE ER

MONETTE ET AL. GEN HOSP PSYCH 2001; 23:20

Table 1

Sensitivity, specificity, positive predictive value, negative predictive value, and kappa coefficient (with 95% confidence intervals) comparing CAM diagnostic algorithm results obtained by the lay interviewers to those obtained by the geriatricians

	A G+ LI+	B G+ LI-	C G- LI+	D G- LI-	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Kappa	Lower Kappa	Upper Kappa
Inattention	36	1	3	70	0.97	0.96	0.92	0.99	0.92	0.84	1.00
Disorganized thinking	40	4	3	63	0.91	0.96	0.93	0.94	0.87	0.77	0.97
Altered level of consciousness	16	7	1	86	0.70	0.99	0.94	0.93	0.76	0.60	0.92
Acute onset and fluctuations	24	3	0	83	0.89	1.00	1.00	0.97	0.92	0.84	1.01
Disorganized thinking OR Altered level	45	7	2	56	0.87	0.97	0.96	0.89	0.84	0.731	0.94
CAM total	18	3	0	89	0.86	1.00	1.00	0.97	0.91	0.81	1.01
CAM total for patients with possible or probable dementia	27	1	5	18	0.96	0.78	0.84	0.95	0.76	0.58	0.94
CAM total for patients without dementia	18	1	2	38	0.95	0.95	0.90	0.97	0.86	0.76	1.01

A: number of subjects for whom both the geriatrician (G) and the lay interviewer (LI) indicated a positive result.

B: number of subjects for whom the geriatrician (G) indicated a positive result and the lay interviewer (LI) indicated a negative result.

C: number of subjects for whom the geriatrician (G) indicated a negative result and the lay interviewer (LI) indicated a positive result.

D: number of subjects for whom both the geriatricians (G) and the lay interviewer (LI) indicated a negative result.



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CLARIFYING CONFUSION: THE CONFUSION ASSESSMENT METHOD

INOUE ET AL. ANN INT MED 1990; 113:941-48



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Table 3. The Sensitivity, Specificity, and Predictive Accuracy of the Confusion Assessment Method (CAM)*

Measure	Patients at Site 1	Patients at Site 2
	<i>n/N (%) [95% CI]</i>	
Sensitivity	10/10 (100) [66-100]	15/16 (94) [68-100]
Specificity	19/20 (95) [73-100]	9/10 (90) [54-100]
Positive predictive accuracy	10/11 (91)	15/16 (94)
Negative predictive accuracy	19/19 (100)	9/10 (90)

* The likelihood ratios were 20.0 and 9.4 for patients at sites 1 and 2, respectively.



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Table 5. Interobserver Reliability*

Variable	Agreement Concordance	
	%	κ
Overall diagnosis	100	1.0
All nine clinical features	88.2	0.67
Four CAM features	93.4	0.81
Individual features		
Acute onset and fluctuating course	89.5	0.73
Inattention	100	1.0
Disorganized thinking	100	1.0
Altered level of consciousness	84.2	0.56

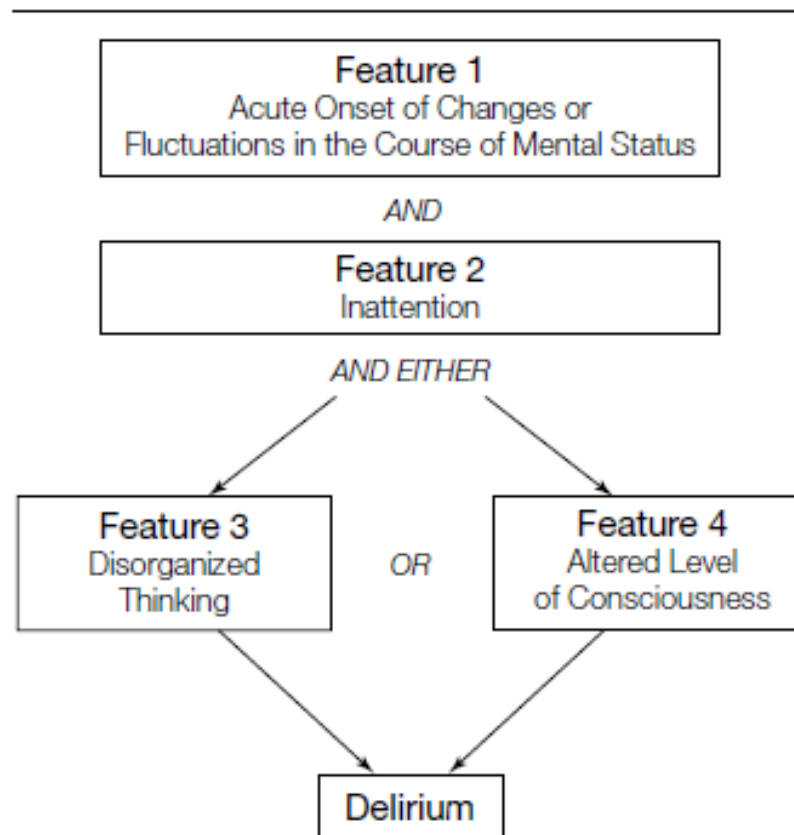
* On the basis of 19 pairs of observations, CAM = confusion assessment method.



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THE CONFUSION ASSESSMENT METHOD (CAM) DIAGNOSTIC ALGORITHM



The diagnosis of delirium requires the presence of acute onset of changes or fluctuations in the course of mental status, and inattention, and either disorganized thinking or an altered level of consciousness.



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EVALUATING DELIRIUM AT TOH

- Delirium Task Force
- Delirium Prevalence Report
- TOH CAM



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☐ Civ. ☐ Gen.-Gén. ☐ HI-IC ☐ TRC-LCR

DELIRIUM RISK FACTOR ALERT AVIS DE FACTEUR DE RISQUE DU DÉLIRIUM

Please be advised your patient has been identified as displaying some/all of the symptoms for Delirium.

Veuillez prendre note que votre patient a été identifié démontrant certain/tous les symptômes du délirium.

Confusion Assessment Method (CAM)-Méthode diagnostique du délirium (MDD)

Must have (1) & (2) plus either (3) or (4) to score (+) ☒ Tick off symptoms observed

Diagnostique du délire : critères nos 1 et 2, plus critère no 3 ou no 4 ☒ Veuillez cocher les symptômes observés

☐ **1 Abrupt onset**

Is there evidence of an acute change in mental status from baseline?

☐ **2 Inattention**

a Did the patient have difficulty focusing attention? Easily distractable? Can't keep track of what was said?

b (if present or abnormal) did this fluctuate during the interview? ie. Tend to come and go?

c (if present or abnormal) Please describe behaviour.

☐ **3 Disorganized Thinking**

Was the patient's thinking disorganized or incoherent, such as rambling, irrelevant, unclear or illogical flow of ideas, unpredictable switching of topics?

☐ **4 Altered Level of Consciousness**

Overall how would you rate the level of consciousness?

☐ alert

☐ vigilant (hyperalert) overly sensitive to stimuli? Startles easily?

☐ lethargic (drowsy, easily aroused)

☐ stupor ☐ coma ☐ uncertain

☐ **Disorientation**

Was the patient disoriented?

☐ **Memory Impairment**

Demonstration of memory problems: can't remember instructions, events since admission etc

☐ **Perceptual Disturbances**

Evidence of disturbances: hallucinations? illusions?

☐ **Psychomotor Changes**

☐ **Agitation:** restlessness? picking at clothes?

☐ **Retardation:** ↓ motor activity?

☐ **Altered sleep-wake cycle**

Disturbance of routines? Excessive daytime sleepiness with insomnia at night?

☐ CAM -

☐ CAM +

☐ **1 Changement soudain de l'état mental**

Un changement important de l'état mental par rapport à l'état de base est-il perceptible?

☐ **2 Inattention**

a Le patient éprouve-t-il de la difficulté à demeurer concentré? Est-il facilement distrait? Se souvient-il de ce qui a été dit?

b (En cas d'anomalie) Ce comportement a-t-il fluctué pendant l'entretien, se manifeste-t-il par intermittence?

c (En cas d'anomalie) Veuillez décrire le comportement.

☐ **3 Pensée désorganisée**

La pensée du patient est-elle incohérente et désorganisée? Sa conversation est-elle décousue, illogique, hors de propos, embrouillée? Change-t-il abruptement de sujets?

☐ **4 Altération de l'état de conscience**

Comment décrivez-vous son état de conscience?

☐ alerte

☐ irascible (hyperalerte), il réagit exagérément aux stimulus, il sursaute.

☐ léthargique (somnolent, mais facile à réveiller)

☐ stuporeux ☐ comateux ☐ hésitant

☐ **Désorientation**

Le patient est-il désorienté?

☐ **Altération de la mémoire**

Manifeste des troubles de mémoire, ne peut se souvenir de directives ou de ce qui s'est passé depuis son admission.

☐ **Troubles de la perception**

Hallucinations, illusions?

☐ **Anomalies psychomotrices**

☐ **Agitation:** nerveux, joue avec ses vêtements?

☐ **Ralentissement:** réduction de l'activité motrice?

☐ **Altération du cycle éveil-sommeil**

Perturbation du rythme circadien? Dort de façon excessive le jour et souffre d'insomnie la nuit?

☐ CAM -

☐ CAM +

Adapted from: Inouye SK, vanDyck CH, Alessi CA, Balkin S, Siegel AP, Horwitz RI. Clarifying confusion: The Confusion Assessment Method. A new method for detection of delirium. Ann Intern Med. 1990; 113: 941-948. Confusion Assessment Method: Training Manual and Coding Guide, Copyright 2003, Sharon K. Inouye, M.D., MPH.

Printed name-Nom en lettres moulées

Signature

Date (yyaa/mm/dj)

Time-Heure



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DISPOSITION

- ADMIT unless:

- single, clear, and reversible etiology

AND

- discharged with family or friends who can observe the patient until the delirium resolves



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GEM

- Provide geriatric assessments in order to medically optimize the patient and facilitate their follow-up with the geriatric specialists.
- Target population:
 - 65 years of older
 - From home or retirement home
 - At risk for decline
 - Will be discharged home from the ED
 - Mobile with minimal assist
 - Quick response unit



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SUMMARY

- Approximately 10% of older patients presenting to the ED are delirious
- Emergency physicians make the diagnosis in less than 33% of cases
- Up to 38% of patients with unrecognized delirious are discharged home from the ED
- Unrecognised delirium has significantly higher morbidity and mortality than those in whom this syndrome is recognised



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- “when does this consistent data on the high prevalence of mental status impairment in older ED patients become convincing enough to change our clinical practice”



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- “when does this consistent data on the high prevalence of mental status impairment in older ED patients become convincing enough to change our clinical practice”
- “one can reason that some assessment for cognitive function in older ED patients does not represent screening but is part of the basic assessment of the older patient’s chief complaint”



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