



Delirium

Clinical and therapeutic aspects

02/01/2013

Dr. Kagan Ella, MD

Plan

- **Case presentation**
 - **Definitions and diagnosis**
 - **Course, prognosis and Rx**
 - **Case resolution**
-

Case 1

Mr. X. 80

- סיבת ההפניה : הפרעות התנהגות, כאב קשה
ברגליים
- תלונות המטופל: שום דבר לא מפריע, רוצה להיות
בריא
- תלונות בת זוגו: התפרצויות זעם, הזיות ראיתיות ,
חשדן - חושד שמטפלת גונבת ממנו, ירידה בזיכרון -
תלוי במצב ערנות.

כל הבעיות התחילו בחודש אחרון

Case 1

Problem list

- **CIHD- 02/1992. S/aMI. CABG 02/2002**
- **Mild LV dysfunction. Mild MR+ TR- per ECHO 01/2000**
- **s/a CVA. Lt Hemiparesis 04/1999**
- **Bilat. Carotid artery stenosis**
- **PVD. 10/2002**
- **OSA 02/2001**
- **CRF- moderate (Cr 2.3)**
- **Ostoarthritis- hip+ knees - severe**
- **Resection of colonic polyp 07/2004**
- **Iron deficiency anemia 05/2004.**
- **Depression- 2003**

Medications:

1. **FUSID 40 MG**
2. **CIPRALEX 10 MG**
3. **NOVITROPAN 5 MG**
4. **XATRAL SR 5 MG**
5. **ASPIRIN BUFF 325 MG**
6. **OXYCONTIN 20 MG**
7. **NORMITEN 25 MG**
8. **VABEN 10 MG**
9. **TRITACE 2.5 MG**
10. **SIMOVIL 10 MG**
11. **FOLIC ACID 5 MG**
12. **TRIBEMIN CF**
13. **Magnesium citrate**
14. **Nocturna**
15. **Glucosamine sulfide**
16. **Iron**
17. **vit C 500 mg**

כדורים: 31

Case 1**MMSE**

2/5	התמצאות בזמן
3/5	התמצאות במקום
2/3	רישום
0/5	חשבון/ ריכוז
1/3	"זיכרון מיידית"
2/2	שיום
1/1	"חזור אחרי"
0/3	פקודה משולשת
1/1	קריאת משפט
0/1	כתיבת משפט
0/1	העתקת צורות
12 מתוך 28	סה"כ-
	שקלול לגילו והשכלה - 28

Case 2

Mr. Y. 78

■ הובאה לחדר המיון באמבולנס בלווי אשתו

■ החולה אינו יכול להסביר מדוע הובא למיון

■ אשתו מוסרת : משך מספר ימים ישנוני , מדבר בצורה לא ברורה , מאוד מבולבל ומסרב לשתות ולאכול, הקיא מספר פעמים. אתמול היה אירוע של נפילה עם חבלה באגן

לפי דבריה של אשתו התופעות האלו הן חדשות

Case 2

Problem list

- **HTN poorly controlled**
- **Depression**
- **Chronic constipation**
- **Hypothyroidism**
- **SVT**
- **BPH**

Medications:

1. Normiten 50 MGx1
2. Convertin 20 mg x 1
3. Diuretic 12.5 mg x 1
4. Xatral 5 mg x 1
5. Aspirin 100 mg x 1
6. Elatrolet 10 mg x 1
7. Xanax 0.25 mg x 1
8. Eltroxin 100 mcgr x 1
9. Laxativ SOS

Case 2

בדיקות עזר.

- ספירת דם - תקינה
- כימיה:
Cr- **2.5**, Urea - **85**
(קודם הם היו תקינים)
- Natrium - **125**
CT מוח ללא חומר
ניגודי – ללא ממצא
חריג

בבדיקה

- מראה כללי מטופח . מבט בלתי ממוקד .
- אין התמצאות במקום, בזמן ובפרטי
הסיטואציה .
- אין חסר נוירולוגי
- תנועות מוזרות בידיים שלדבריו מנסה
לתפוס את היתושים העפים באוויר.
- לב, ריאות – ב מ פ.
- בטן - רכה , רגישות קלה בבטן תחתונה , כבד
וטחול לא נמושו מוגדלים , סימני "גלובוס" .
- אין בצקות בגפיים . דפקים היקפיים נמושו.
- בבדיקה רקטלית : **גושי צואה קשים** , **בלוטת**
הרמונית מוגדלת.

Mild Cognitive Impairment (MCI)

Clinical criteria

- Self-reported memory complaint
- Detectable memory deficit
- Other cognitive functions normal
- IADL normal (driving, checkbook)
- Dementia absent

Petersen et al. Arch Neurol 1999;56:303-308

Dementia DSM IV criteria

Multiple cognitive deficits

- Memory impairment

+

- One or more of:

- Apraxia

- Agnosia

- Aphasia

- Disturbed executive function

+

- Functional decline

Gradual onset, progressive

SYNONYMS FOR DELIRIUM

“Deliria” (Latin) : “be out of your furrow.”

- *acute confusional state*
- *acute mental status change*
- *altered mental status*
- *organic brain syndrome*
- *reversible dementia*
- *toxic or metabolic encephalopathy*
- *ICU psychosis*

DSM-IV Diagnostic Criteria for Delirium Due to a General Medical Condition

- Disturbance of **consciousness** with ↓ ability to focus, sustain, or shift attention
 - 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 preexisting dementia
 - The disturbance develops over a **short period** of time (usually hours to days) and 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**
-

The Confusion Assessment Method (CAM)

חובה

1. **Acute change** in mental status and **fluctuating** course
2. **Inattention**
3. **Disorganized thinking**
4. **Altered level of consciousness** :vigilant (hyperalert), lethargic (drowsy, easily aroused), stuporous (difficult to arouse), or comatose (unarousable)

אחד מין
השניים

אבחנת הדליריום

The Confusion Assessment Method (CAM)

Diagnostic Algorithm

1. Acute onset and fluctuating course

להיעזר בקרובי משפחה
האם חל שינוי מנטלי מהמצב הבסיסי ?
האם חלים שינויים משך היום ? בעוצמה ?

2. Inattention

לבחון ספירה לאחור של מספרים
קושי בהבנת הנאמר ? , האם יש קשיים בריכוז ?
קושי להמשיך בשיחה ?

3. Disorganized thinking

דיבור שלא לעניין, מבולבל ? שיחה לא הגיונית, לא רלוונטית ?
קו מחשבה לא רציף ? רצף של מחשבות, מעבר מנושא לנושא ?

4. Altered level of Consciousness

כל מצב שונה מעירוני, כגון : אי שקט, ערנות מוגברת, ישנוניות,
אפאטיות, סטופור.

1+2+ (3 or 4)=Delirium אבחנת הדליריום מצריכה

A + I + (D or C) = AIDC

דליריום-מאפיינים קליניים

CORE SYMPTOMS

- Consciousness:
Clouding or occlusion
- Attention:
Difficulty maintaining or shifting attention
- Cognition:
Disorientation, poor word list generation, impaired writing, perseveration, delusions
- Perception:
Misinterpretation, illusions, hallucinations

-
- Inappropriate behavior

 - Perceptual disturbances (90% cases)
 - Delusions
 - Hallucinations (usually visual)

Distinguishing delirium from dementia

	Delirium	Dementia
Onset	Acute or subacute	Insidious
Course	Fluctuating, usually revolves over days to weeks	Progressive
Conscious level	Often impaired, can fluctuate rapidly	Clear until later stages
Cognitive defects	Poor short term memory, poor attention span	Poor short term memory, attention less affected until severe
Hallucinations	Common, especially visual	Often absent
Delusions	Fleeting, non-systematised	Often absent
Psychomotor activity	Increased, reduced, or unpredictable	Can be normal

Differential diagnosis of delirium

	Diagnosis			
	Delirium	Dementia	Depression	Schizophrenia
Onset	Acute	Insidious	Variable	Variable
Course	Fluctuating	Steadily progressive	Diurnal variation	Variable
Consciousness and orientation	Clouded; disoriented	Clear until late stages	Generally unimpaired	Unimpaired but patient may be perplexed in acute stage
Attention and memory	Poor short term memory, inattention	Poor short term memory without marked inattention	Poor attention but <u>memory intact</u>	Poor attention but <u>memory intact</u>
Psychosis present?	Common (psychotic ideas are fleeting and simple in content)	Less common	Occurs in small number (psychotic symptoms are complex and in keeping with prevailing mood)	Frequent (psychotic symptoms are complex and often paranoid)
Electroencephalogram	Abnormal in 80-90%; generalised diffuse slowing in 80%	Abnormal in 80-90%; generalised diffuse slowing in 80%	Generally normal	Generally normal

Meagher D.J., BMJ 2001;322; 144-49

אפידמיולוגיה

33%-11% בקבלה לבה"ח

56%-3% בהמשך האשפוז

Michaud L. et al, J. Psychosomatic Research 2007; 62:371-383

Prevalence

- in the Emergency Department : 7% - 24%



Hustey F et al. (*Ann Emerg Med.* 2003)

Elie M et al. (*CMAJ.* 2000)

Lewis L et al. (*Am J Emerg Med.* 1995)

Hustey F et al. (*Ann Emerg Med.* 2002)

Naughton B et al. (*Ann Emerg Med.* 1995)

Kakuma R et al. (*J Am Geriatr Soc.* 2003)

In 10 – 30% of older patients presenting to ED, delirium - symptom that often heralds the presence of life-threatening conditions.

In ED: 7% - 24% of older patients; in **10 – 30%** of them, delirium - symptom **life-threatening conditions.**

But...

Doctors in ER diagnosed only in 9% to 35% of patients with delirium

**חשוב מאוד בהפניה לכתוב
האם מדובר בבילבול חריף !**

Hustey F et al. (*Ann Emerg Med.* 2003)

Elie M et al. (*CMAJ.* 2000)

Lewis L et al. (*Am J Emerg Med.* 1995)

Hustey F et al. (*Ann Emerg Med.* 2002)

Prevalence

- Delirium in the community: 0.4-1.1 (1-2%)

Eolstein M et al. (*Int Psychogeriatr.* 1991)

Fick D et al. (*J Gerontol A Biol Sci Med Sci.* 2005)

- Prevalence ↑ with age, rising to 14 % among those 85 + years old

- Patients admitted with delirium

- Over age 55 - 9.1% preexisting dementia
- Over age 85 – 31% preexisting dementia

Levkoff SE et al. *Arch Intern Med* 1996;152:334

Outcomes

- ↑ **hospital stay**

Cole M et al. (*CMAJ*. 1993)

McCusker J et al. (*J Am Geriatr Soc*. 2003)

- ↑ **rate of institutionalization**

McCusker J et al. (*Age Ageing*. 1997)

George J et al. (*CMAJ*. 2001)

- ↑ **mortality:**

Kakuma R et al. (*J Am Geriatr Soc*. 2003)

Cole M et al. (*CMAJ*. 1993)

McCusker J et al. (*Arch Intern Med*. 2002)

-31% in patients with undiagnosed delirium

-12% in patients with diagnosed delirium

Kakuma R et al. (*J Am Geriatr Soc*. 2003)

Outcomes

- ❑ 30% mortality in 6 months

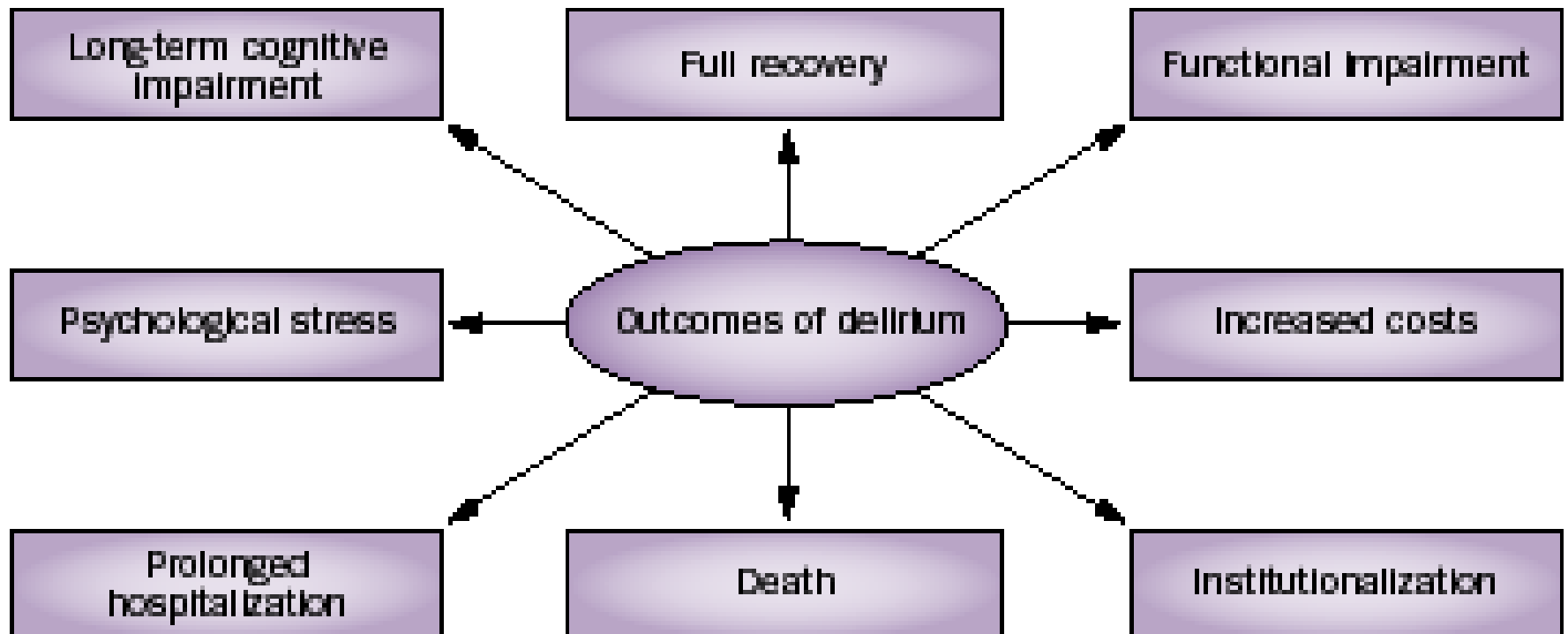
Pitkala (Dem Ger Cogn Disord 2004)

- ❑ The mortality rates among hospitalized patients with delirium range from 22 - 76 %, as high as the rates among patients with acute MI or sepsis.

Am. Psychiatric Association. Practice guideline for the treatment of patients with delirium. 1999

- ❑ The 1-year mortality rate associated with cases of delirium is 35 - 40 %.

Moran J et al (Aust J Hosp Pharm 2001)



פתופיזיולוגיה

■ שינוי ברמות נוירוטרנסמיטורים: בעיקר אצטיל-כולין

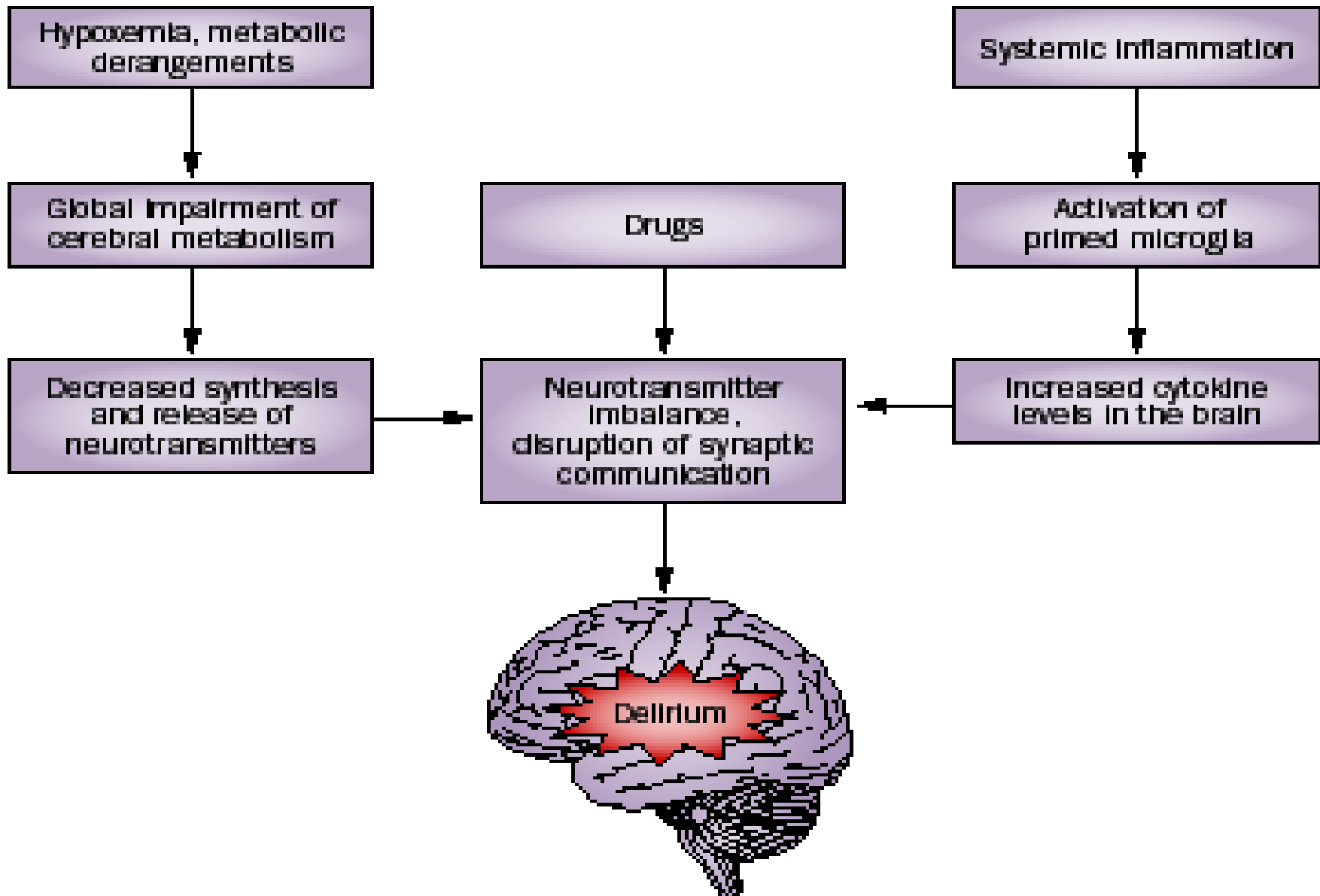
■ ↓ במטבוליזם: ע"י הפרעה בהספקה או בניצול של חומרים למטבוליזם המוחי.

■ חוסר איזון בין ייצור אצטיל-כולין ואדרנלין: עם השפעה על המערכת הרטיקולרית והתלמית.

■ עליה ברמת הנור-אדרנלין: נמצא בעיקר בדליריום טרמנס.

■ תגובה לסטרס/דלקת ו - ↑ ברמת הציטוקינים הדלקתיים

Y. Beloosesky, Geriatric Department,
Beilinson Hospital, Rabin Medical Center



Risk factors

Predisposing:

- Age
- Cognitive impairment
- Severe illness
- Vision and/or hearing impairment
- Depression
- Functional impairment
- Chr. renal insufficiency
- ♂
- History of delirium
- History of falls
- malnutrition

Precipitating:

- Anticholinergic and psychoactive drugs
- Alcohol and drug abuse
- Surgery (Orthopedic, Cardiac and so on)
- Restraints
- Dehydration
- >3 drugs
- Fecal impaction
- Urinary retention
- Infection, fever (UTI and so on)
- Metabolic disturbances
- Pain
- Emotional stress
- Severe and acute illness
- Hypoxemia
- Shock
- Anemia
- Narcotics
- Iatrogenic event
- ICU admission
- High number of hosp. procedures

Agent	Mechanism of Action	Possible Substitute
Alcohol	CNS sedation, withdrawal syndrome	If history of heavy intake, careful monitoring and benzodiazepines if withdrawal symptoms
Antibiotics (ciprofloxacin, penicillin, cefalosporin)	Neurotoxic (specific mechanisms unknown)	Adjust dose or use other antibiotics
Anticholinergics: oxybutynin, benztropine	Anticholinergic toxicity	Lower dose, employ behavioral measures
Anticonvulsants, esp. phenytoin	Unknown	Consider need for agent; lower dosage; use alternative agent
Antidepressants, esp. the tertiary amine tricyclic agents: amitriptyline, imipramine, doxepin	Anticholinergic toxicity	Secondary amine tricyclics: nortriptyline, desipramine; SSRIs or other agents
Antihistamines, including diphenhydramine	Anticholinergic toxicity	Nonpharmacologic protocol for sleep; pseudoephedrine for colds
Antiparkinsonian agents: levodopa-carbidopa, dopamine agonists, amantadine	Dopaminergic toxicity	Lower dose; adjust dosing schedule
Antipsychotics: esp. low-potency anticholinergic agents and atypical agents (clozapine)	Anticholinergic toxicity, CNS sedation	Eliminate, or if necessary use low-dose, high-potency agents
Benzodiazepines, esp. long-acting, including diazepam, flurazepam, chlordiazepoxide	CNS sedation	Nonpharmacologic sleep management, intermediate agents (lorazepam)
Benzodiazepines, ultra-short-acting, including triazolam, alprazolam	CNS sedation and withdrawal	Nonpharmacologic sleep management, intermediate agents (lorazepam)
H₂ blocking agents	Possible anticholinergic toxicity	Lower dosage; consider antacids or proton pump inhibitors
Lithium	Electrolyte imbalance, CNS activation, or sedation	Adjust dose, use other mood stabilizers, correct electrolyte imbalance
Opioid analgesics: esp. meperidine (petidin)	Anticholinergic toxicity, , fecal Impaction, CNS sedation	Use local measures and nonpsychoactive pain drugs round-the-clock; save opioids for breakthrough severe pain
Almost any medication if time course is appropriate		Consider risks vs benefits of all medications in elderly patients

Box 1: Deliriant (drugs causing delirium)

Prescription drugs

- Central acting agents:
 - Sedative hypnotics (for example, benzodiazepines).
 - Anticonvulsants (for example, barbiturates).
 - Antiparkinsonian agents (for example, bztropine, trihexyphenidyl).
- Analgesics:
 - Narcotics (NB. meperidine*).
 - Non-steroidal anti-inflammatory drugs*.
- Antihistamines (first generation—for example, hydroxyzine).
- Gastrointestinal agents:
 - Antispasmodics.
 - H₂-blockers*.
- Antinauseants:
 - Scopolamine.
 - Dimenhydrinate.
- Antibiotics:
 - Fluoroquinolones*.
- Psychotropic medications:
 - Tricyclic antidepressants.
 - Lithium*.
- Cardiac medications:
 - Antiarrhythmics.
 - Digitalis*.
 - Antihypertensives (β -blockers, methyldopa)
- Miscellaneous:
 - Skeletal muscle relaxants.
 - Steroids.

lajiakrishan A. Wiens C.A.,
ostgrad Med J 2004;80: 388-93

Anticholinergic levels of medications

<u>Medication</u>	<u>NG/ML of Atropine equiv</u>
Cimetidine	0.86
Prednisolone	0.55
Theophylline	0.44
Digoxin	0.25
Nifedipine	0.22
Furosemide	0.22
Ranitidine	0.22
Coumadine	0.12
Codeine	0.11
Captopril	0.02

NSAIDS- clinical suspicious in the elderly

- NSAIDS can induce psychiatric symptoms in the non-psychiatric elderly
- Exacerbation of the mental disorders (depression, dementia)
- The effects are not specific
- Idiosyncratic predisposition to NSAIDS as a class
- The effect is transient, dose related

**Check
in drug list!!!**

Table 1 Clinical subtypes of delirium in the elderly and their presentation¹⁴

Hyperactive delirium (21%)	Agitation, confusion, mood lability, psychotic symptoms, disruptive behaviours (see box 1)
Hypoactive delirium (29%)	Lethargy, apathy, confusion (see box 2)
Mixed (43%)	Features of both increased and decreased psychomotor activity
Unclassified (7%)	Psychomotor activity is normal

Although Delirium is a transient phenomenon, **BUT**

A study of very old hospitalized medical and surgical patients found that $> \frac{1}{3}$ of those with incident delirium still met full criteria 3 – 6 months later.

Geriatrics review syllabus.6th edition

(2007)

מדוע נמשכות הפרעות הקוגניטיביות

לאחר הדליריום ?

- הדליריום חושף תהליך דמנטי קודם שמתפתח ברקע ושאינו ידוע.
- הדליריום מתפתח על רקע מערכות ביולוגיות ירודות ולכן גם פגיעות יותר.
- בזמן הדליריום קיימת האצת התהליך הפתולוגי של מחלת האלצהיימר (האצת התהליך הדלקתי).

Management

1) D_x → Recognise !

2) R_x → Underlying disease
→ removal of contributing factors
→ behavioral control
→ avoidance of iatrogenic complications e.g.
drugs
→ **family support**
→ mobilization

DIAGNOSTIC STUDIES IN DELIRIUM

- **Anamnesis !**
- **Medicines**
- **Physical examination!**
- **Metabolic studies (CBC, Chem)**
- **Urinalysis**
- **CXR**
- **ECG**
- **CT/MRI to r/o bleed, tumor (coagulopathies, head trauma)**
- **EEG = diffuse slowing; normal EEG makes delirium less likely**
- **LP to r/o infection (febrile, leukocytosis)**
- **Geriatric assessment**

Environmental and supportive measures in delirium

- Education of all who interact with patient (doctors, nurses, ancillary and portering staff, friends, family)
- Reality orientation techniques
 - Firm clear communication—preferably by same member of staff
 - Use of clocks and calendars
- Creating an environment that optimises stimulation (adequate lighting, reducing unnecessary noise, mobilising patient whenever possible)
- Correcting sensory impairments (providing hearing aids, glasses, etc)
- Ensuring adequate warmth and nutrition
- Making environment safe (removing objects with which patient could harm self or others)

Medical Rx of Agitation

- a) **Pick the symptom and define the target (eg agitation vs hallucinations)**

- b) **High potency anti-psychotics (low doses)**
 - **haloperidol 0.25-1.0 mg IM, PO**
 - **risperidone 0.25-1.0 mg**
 - **quetiapine 12.5- 25 mg x 1-2 /day**
 - **benzodiazepines – ETOH withdrawal (or Parkinsonian pt. :lorazepam 0.25-1 mg)**

Table.4 Delirium in Older Persons Sharon K. et al NEJM 2006.

Drug	Dosage	Adverse effects	Comments
Haloperidol (antipsychotic)	0.5–1 mg twice daily oral; additional doses every 4 h as needed (peak effect 4–6 h) 0.5–1 mg intramuscular; observe effects and repeat after 30–60 min if needed (peak effect in 20–40 min)	Extra pyramidal symptoms especially at doses more than 3 mg, though may take 14 days+ to develop Prolongs QTc interval	Most commonly used drug; few anticholinergic effects; less sedating Effectiveness demonstrated in randomised control trial. Avoid in withdrawal states, hepatic insufficiency, Lewy body dementia, Parkinson's disease, neuroleptic malignant syndrome
Olanzapine (atypical antipsychotic)	2.5–5.0 mg once daily	Prolong QTc interval	Tests in uncontrolled trials have been done; less frequent extrapyramidal side effects noted in some studies; some studies have suggested increased mortality in elderly with dementia or cardiovascular/cerebrovascular risk factors. Olanzapine not licensed for "acute psychosis"
Risperidone (atypical antipsychotic)	0.5 mg twice daily		
Quetiapine (atypical antipsychotic)	25 mg twice daily		
Lorazepam (benzodiazepine)	0.5–1.0 mg oral every 4 h, as needed (up to 3–4 mg in 24 h) (peak effect 120 min) Can be given 0.5–1.0 mg im or iv (peak effect 10 min after iv)	Can cause paradoxical excitation, over sedation, respiratory depression	Second line agent—can be given as adjuvant to antipsychotic when ineffective. Reported to worsen delirium in clinical trials; useful in alcohol or sedative withdrawal, Lewy body dementia, parkinsonism, neuroleptic malignant syndrome

Delirium in the elderly: a clinical review

S Saxena and D Lawley

Postgrad Med J 2009;85:405–413

Explain Prognosis

- symptoms can still met full criteria during 3 – 6 months
- only 4% showed complete resolution at D/C
- quicker in-hospital recovery associated with better outcome

McCuster et al.(J Int Med 2003)



Case 1 resolution

Medications:

1. XATRAL SR 5 MG 1x1
2. ASPIRIN 100 MG 1x1
3. NORMITEN 25 MG 1x1
4. TRITACE 2.5 MG 1x1
5. SIMOVIL 10 MG 1x1
6. Durogesic 1/3

תורופות: 6

MMSE

12/28 → 28/28

1. FUSID 40 MG
2. CIPRALEX 10 MG
3. NOVITROPAN 5 MG
4. XATRAL SR 5 MG
5. ASPIRIN BUFF 325 MG
6. OXYCONTIN 20 MG
7. NORMITEN 25 MG
8. VABEN 10 MG
9. TRITACE 2.5 MG
10. SIMOVIL 10 MG
11. FOLIC ACID 5 MG
12. TRIBEMIN CF
13. Magnesium citrate
14. Nocturna
15. Glucosamine sulfide
16. Iron
17. vit C 500 mg

כדורים: 31

Case resolution

1	2
<ul style="list-style-type: none">■ Age■ ♂■ Polypharmacy■ Depression■ CRF■ Severe illness <hr/> <p>Successful resolution</p>	<ul style="list-style-type: none">■ Age■ ♂■ HTN■ Depression■ Hypothyroidism■ BPH■ Drugs■ Metabolic disturbances■ Fecal impaction■ Urinary retension <hr/> <p>Partially successful resolution</p>

TABLE 1. RISK FACTORS FOR DELIRIUM AND INTERVENTION PROTOCOLS.

TARGETED RISK FACTOR AND ELIGIBLE PATIENTS	STANDARDIZED INTERVENTION PROTOCOLS	TARGETED OUTCOME FOR REASSESSMENT
Cognitive impairment* All patients, protocol once daily; patients with base-line MMSE score of <20 or orientation score of <8, protocol three times daily	Orientation protocol: board with names of care-team members and day's schedule; communication to reorient to surroundings Therapeutic-activities protocol: cognitively stimulating activities three times daily (e.g., discussion of current events, structured reminiscence, or word games)	Change in orientation score
Sleep deprivation All patients; need for protocol assessed once daily	Nonpharmacologic sleep protocol: at bedtime, warm drink (milk or herbal tea), relaxation tapes or music, and back massage Sleep-enhancement protocol: unit-wide noise-reduction strategies (e.g., silent pill crushers, vibrating beepers, and quiet hallways) and schedule adjustments to allow sleep (e.g., rescheduling of medications and procedures)	Change in rate of use of sedative drug for sleep†
Immobility All patients; ambulation whenever possible, and range-of-motion exercises when patients chronically non-ambulatory, bed or wheelchair bound, immobilized (e.g., because of an extremity fracture or deep venous thrombosis), or when prescribed bed rest	Early-mobilization protocol: ambulation or active range-of-motion exercises three times daily; minimal use of immobilizing equipment (e.g., bladder catheters or physical restraints)	Change in Activities of Daily Living score
Visual impairment Patients with <20/70 visual acuity on binocular near-vision testing	Vision protocol: visual aids (e.g., glasses or magnifying lenses) and adaptive equipment (e.g., large illuminated telephone key-pads, large-print books, and fluorescent tape on call bell), with daily reinforcement of their use	Early correction of vision, ≤48 hr after admission
Hearing impairment Patients hearing ≤6 of 12 whispers on Whisper Test	Hearing protocol: portable amplifying devices, earwax disimpaction, and special communication techniques, with daily reinforcement of these adaptations	Change in Whisper Test score
Dehydration Patients with ratio of blood urea nitrogen to creatinine ≥18, screened for protocol by geriatric nurse-specialist	Dehydration protocol: early recognition of dehydration and volume repletion (i.e., encouragement of oral intake of fluids)	Change in ratio of blood urea nitrogen to creatinine

*The orientation score consisted of results on the first 10 items on the Mini-Mental State Examination (MMSE).

†Sedative drugs included standard hypnotic agents, benzodiazepines, and antihistamines, used as needed for sleep.



Risk factors

Predisposing:

- Age
- Cognitive impairment
- Severe illness
- **Vision and/or hearing impairment**
- Depression
- Functional impairment
- Chr.renal insufficiency
- ♂
- History of delirium
- History of falls
- **Malnutrition**

Precipitating:

- Anticholinergic and psychoactive drugs
- Alcohol and drug abuse
- Surgery (Orthopedic, Cardiac and so on)
- **Restraints**
- **Dehydration**
- **>3 drugs**
- **Fecal impaction**
- **Urinary retention**
- Infection, fever (UTI and so on)
- Metabolic disturbances
- **Pain**
- **Emotional stress**
- **Severe and acute illness**
- Hypoxemia
- Shock
- Anemia
- **Narcotics**
- **Iatrogenic event**
- ICU admission
- High number of hosp. procedures

Thank you !

