Altered Mental Status

Reza Roodsari
Downstate medical center PGY-2

Special thanks to Adedoyin Adesina

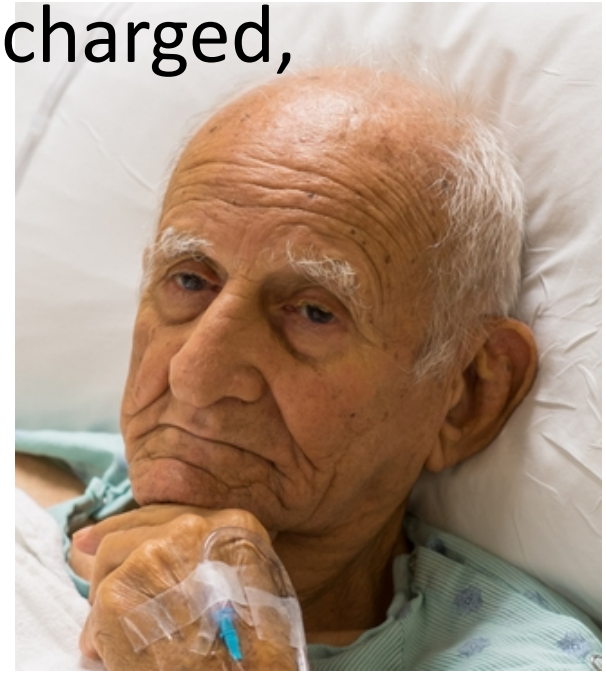
What we are going to cover today

- What is altered mental status?
- How it happens?
- What Causes it?
- How to make the diagnosis?
  - History
  - Physical exam
  - Labs
  - Imaging
- What to do in the ER?

Presented with AMS …

Case 1

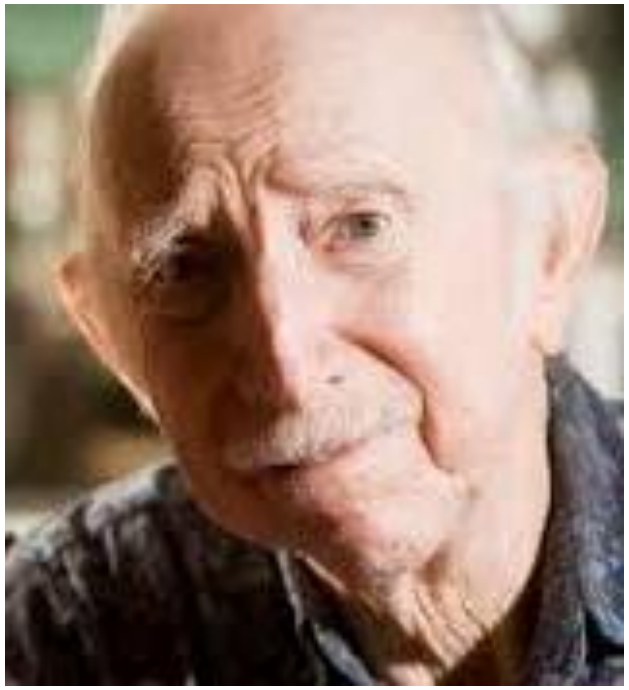
72 yo male, Confused for 2 weeks walking around the house, no longer prepare food, trouble walking, Seen in another ED last week sent lab work, discharged, answers yes and no only



Presented with AMS …

Case 2

72 yo male, AMS 2 months, Can not remember the address, forgets what happened today, Is scared because he is getting Alzheimer, Can walk and eat, answers appropriately



Presented with AMS …

Case 3

52 yo f, brought by

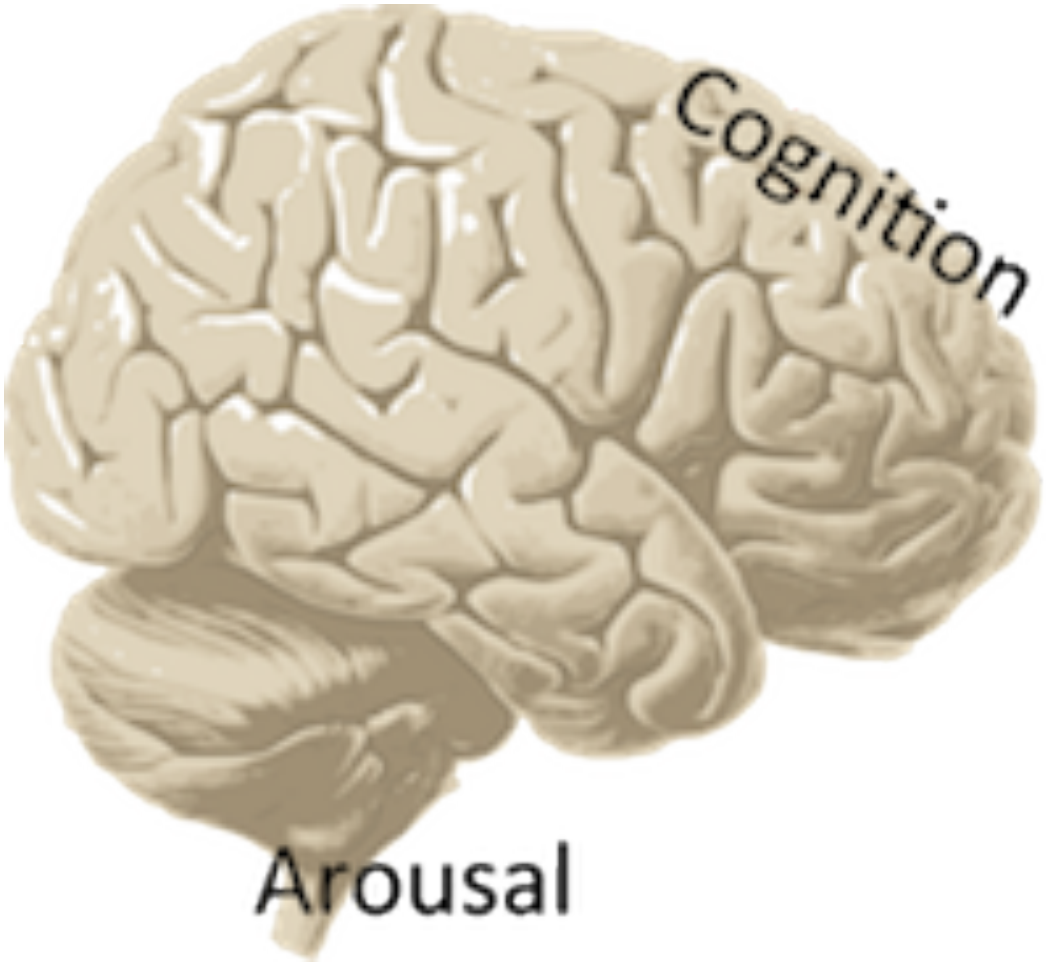
Grocery store owner. Everyday costumer, a very respectful lady. Today she is joking, laughing, swearing inappropriately!

What is AMS?

- Inappropriate behavior
- Confusion
- Aggression, depression, psychosis
- Hyperalertness
- Obtundation
- Stupor
- Coma

Alert and Oriented

It is all about the brain

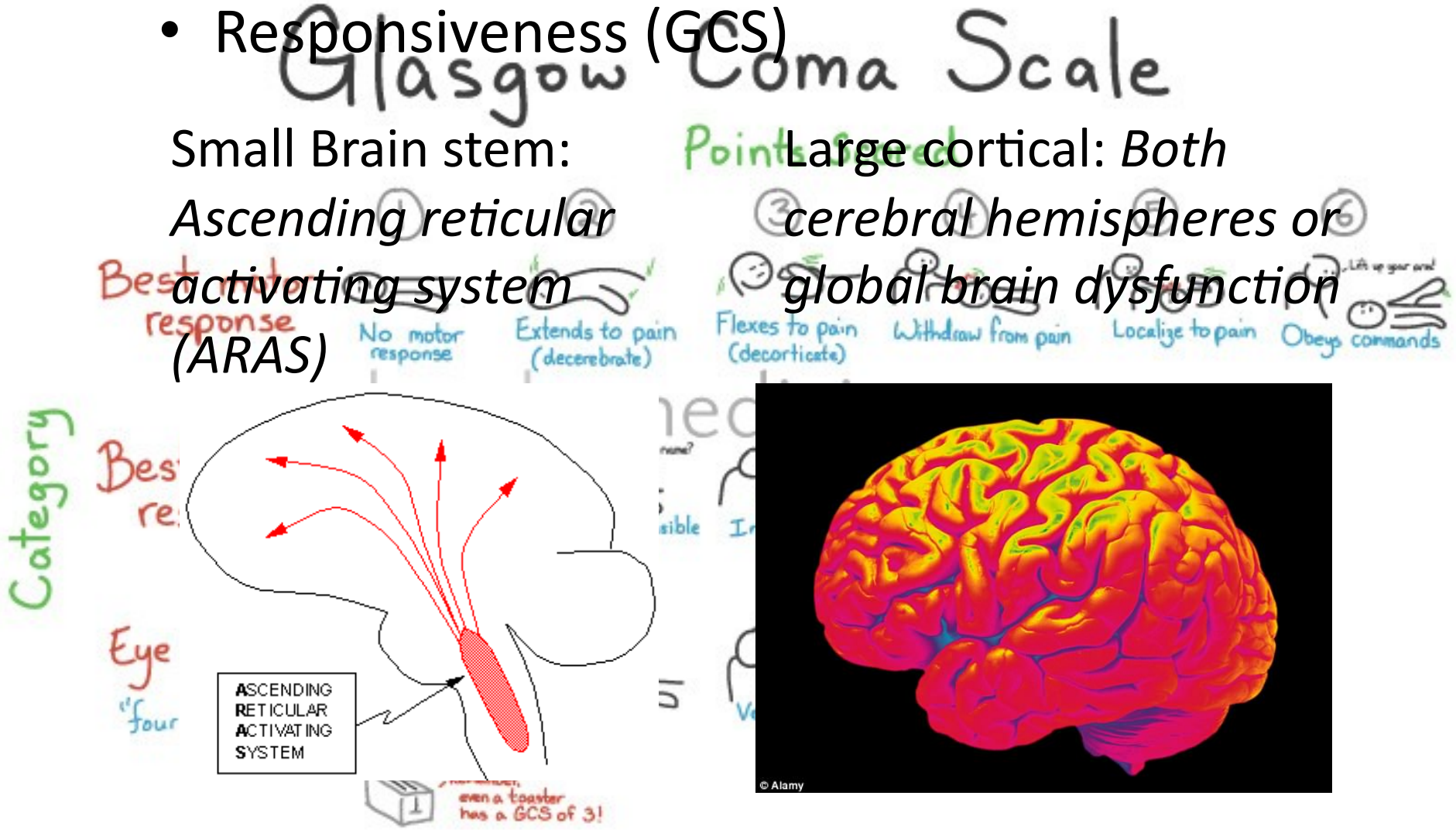


Alert and …
Depressed Consciousness: Arousal

- Responsiveness (GCS)

Small Brain stem: *Ascending reticular activating system (ARAS)*

Large cortical: *Both cerebral hemispheres or global brain dysfunction*



… Oriented*3
Confusion: Cognition

- Cerebral cortex
  - General: Appearance? Agitation? Abnormal behavior?
  - Attitude: Toward you
  - Speech
  - Mood
  - Perception: Hallucinations (Touch, Audio, visual)
  - Thought: Process (organized?), Content?
  - Memory and Attention

AMS: 10% of ED patients

Confusion: 2% of ED patients

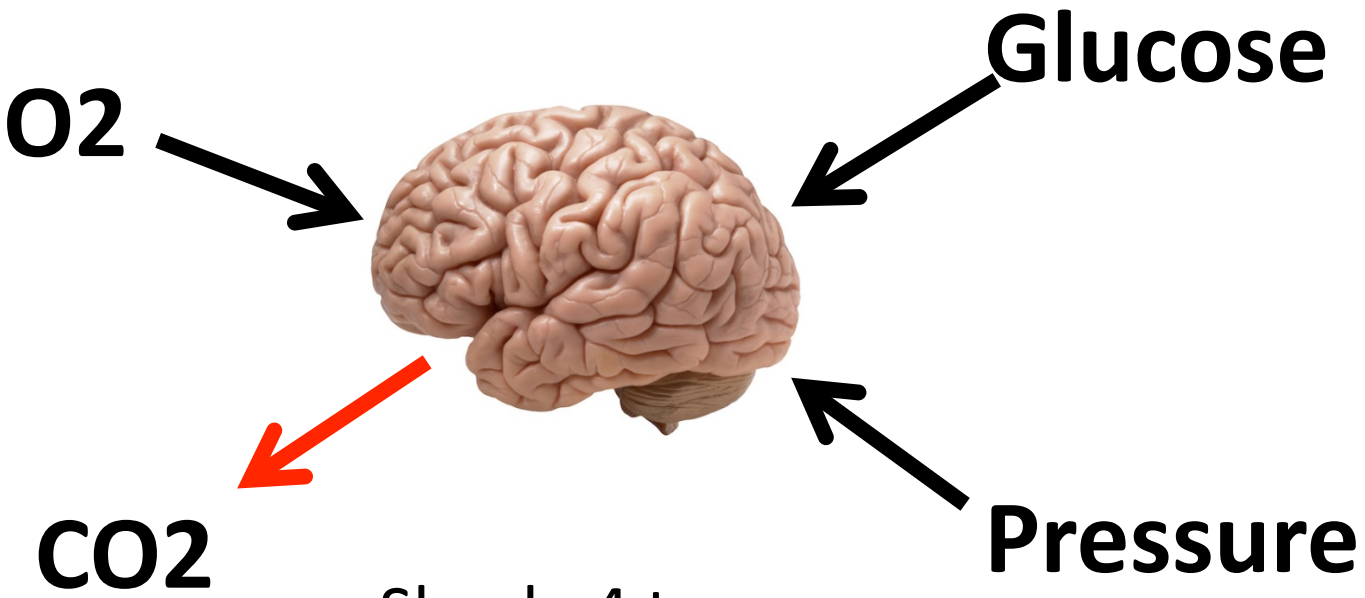
10% of all hospitalized patients

50% of elderly hospitalized

How it happens?

Something is wrong with the brain
Outside the brain, inside the brain

Outside the brain: the basics



Shock: 4 types

COPD, CHF, PE, Asthma

Syncope: arrhythmia, vasodilatation

Still outside the brain

Something wrong in the blood reaching the brain

Infectious: UTI, pneumonia, sepsis, even gastroenteritis and URI!

Drugs and Tox: CO, Alcohol, Narcotic, Meds (BB, CCB, TCA, Dig, Anticolinergics, Antihistamines, serotonin? NMS? sedatives, steroid), Withdrawal

Metabolic: Sugar, Electrolyte (hypos/hypers: Na, Ca), Liver, Thyroid (low and high), DKA, Kidney, Osmolarity, TTP

Deficiency: B12, Thiamine, B6

Something wrong in the brain (neurologic)

- Stroke (ischemic, hemorrhagic)
- Seizure
- Trauma
- Mass
- Degenerative
- Venous sinus thrombosis
- Brain Edema (high altitude)
- Inflammation and infection (Vasculitis, Meningitis, syphilis, Encephalitis, Herpes)
- Temperature (hypo/hyper)
- Dementia
- Delirium

– Psychiatric: We don't know what is going on!

- A alcohol, ammonia, alzheimer
- E endocrine, electrolyte, encephalopathy
- I infection, intoxication
- O opiates, overdose, oxygen, C**O**$_2$
- U uremia
- T tumor, trauma
- I insulin (hypoglycemia)
- P poisonings, psychosis
- S stroke, seizures, syncope, shock, SAH,

Let's talk a bit more about delirium

- Highest M&M when missed (independent predictor of increased mortality within 6 months), up to 83% missed in the ED
  - Dopamine vs Acetylcholine pathways
  - Disorganized thinking, Attention, Hallucination, Acute, Fluctuation
    - Hyperactive----Excited: Pain tolerance, sweating, tachypnea, agitation, hyperthermia , noncompliance with police, lack of tiring, unusual strength, inappropriate clothing , Metabolic derangement and death
    - Hypoactive: More common

The Confusion Assessment Method (CAM) Diagnostic Algorithm

Feature 1: ***Acute Onset or Fluctuating Course***
This feature is usually obtained from a family member or nurse and is shown by positive responses to the following questions: Is there evidence of an acute change in mental status from the patient's baseline? Did the (abnormal) behavior fluctuate during the day, that is, tend to come and go, or increase and decrease in severity?

Feature 2: ***Inattention***
This feature is shown by a positive response to the following question: Did the patient have difficulty focusing attention, for example, being easily distractible, or having difficulty keeping track of what was being said?

Feature 3: ***Disorganized thinking***
This feature is shown by a positive response to the following question: 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?

Feature 4: ***Altered Level of consciousness***
This feature is shown by any answer other than "alert" to the following question: Overall, how would you rate this patient's level of consciousness? (alert [normal]), vigilant [hyperalert], lethargic [drowsy, easily aroused], stupor [difficult to arouse], or coma [unarousable])

The diagnosis of delirium by CAM requires the presence of features 1 and 2 and either 3 or 4.

Table 2. Delirium Versus Dementia[7,37,38]

Characteristic	Delirium	Dementia
Onset	Abrupt; hours to days	Gradual; months to years
Course	Fluctuates	Slow decline
Attention	Impaired	Intact early in course
Sleep-wake cycle	Disrupted	Usually normal
Alertness	Impaired	Intact early in course
Behavior	Agitated, withdrawn, depressed, or a combination of the above	Intact early in course
Speech	Variable; can be disorganized, rapid, or slowed	Word-finding problems
Thoughts	Disorganized, with delusions possible	Impoverished
Perception	Distorted, sometimes with hallucinations	Usually intact early in course
Level of consciousness	Characterized by altered level of consciousness	Normal
Disorganization	May be present	Typically absent
Reversibility	Usually reversible	Rarely reversible

Adapted from Lynn E. J. Gower, DO; Medley O. Gatewood, MD; and Christopher S. Kang, MD. "Emergency Department Management of Delirium in the Elderly." *Western Journal of Emergency Medicine.*

Clinical factors that differentiate delirium from psychiatric illness

Characteristics	Delirium	Psychiatric Illness
Onset	Acute[a]	Subacute or chronic[a]
Course	Fluctuation	Constant
Vital signs	Usually abnormal	Usually normal (except in acute agitation)
Orientation	Usually impaired	Rarely impaired
Attention	Impaired	Usually normal
Hallucinations	Primarily visual	Primarily auditory
Awareness	Impaired	Usually intact

How to make a diagnosis?

What history tells you?

The greatest diagnostic value

The story; Alternative source of history?

- Acute?
- Fever?
- Trauma?
- Fluctuation?
- Headache? Pain?
- PMH?
- Meds?
- Drug use?

Age

Causes of altered mental status in patients ages 18 to 64 and greater than 65 years

Cause of Altered Mental Status	18–64 y, n (%)	>65 y, n (%)	*P* Value
Ischemic stroke	36.8	59.3	<.001
Hemorrhagic stroke	34.4	20.6	.004
Infection	11.9	25.8	<.001
Toxicologic	16.6	4	<.001
Cardiac	4.2	10.8	<.001
Psychiatric	14	3.1	<.001

Patients can have more than one cause of altered mental status.

From Leong LB, Wei Jian KH, Vasu A, et al. Identifying risk factors for an abnormal computed tomographic scan of the head among patients with altered mental status in the emergency department. Eur J Emerg Med 2010;17(4):222.

What exam can tell you?

- Vitals?
  - Fever
  - Hypotension, hypertension
  - Bradycardia, Tachycardia
  - Hyperventilation, hypoventilation

Pathologies to consider with vital sign abnormality in altered mental status

Vitals Sign Abnormality	Consider
Temperature[a]	Infection Endocrinopathy (eg, thyroid) Environmental (hyperthermia or hypothermia) Toxicology (NMS, sympathomimetics)
Respiratory rate	Toxicology (opiate or benzodiazepine overdose) DKA Sepsis Salicylate overdose
Blood pressure	Hypertensive encephalopathy Intracranial hemorrhage
Heart rate	Endocrinopathy Cardiac cause Toxicology (drugs of abuse) Infection
Hypoxia	Infection Infarction Substance overdose

[a] Rectal temperature is recommended in all patients with altered mental status, as mouth breathing could cause misrepresentation of true temperature.

Mental status: A&O (GCS, MMSE)
Eyes: Pupils? Nystagmus? Movements?
Neck: Trauma? Stiffness?
Lungs: All lung stuff: Rales? Wheezing?
Cardiac: Murmur? Regular?
Abdomen: Tenderness? Sepsis? Trauma?
Skin: Rash? Shock?
Neurologic exam:
- Focal? Non focal?
- Brain stem: Oculocephalic reflex
- Oculovestibular (COWS)

What labs will tell you?

- Glucose
- Everything!
  - CMP: Sodium? Ca? LFT? AG?
  - Blood Gas: PH? O2? CO2? CO?
  - CBC: WBC? Hgb? Plt?
  - UA?
  - Drugs?
  - Cardiac? Thyroid? Coag? LP? Drug levels?
  - LP even in absence of fever, also in new onset psychosis (Authoimune, anti-NMDA rec)

What imaging will tell you?

EKG?

CXR?

CT? CT angio?

MRI?

US?

ECG?

EEG?

In the ED …

- Stabilization: diagnosis, and treatment simultaneously.
- Airway, breathing, circulation, Disability, Exposure:
    - IV, monitor, intubate if No gag reflex, GCS < 8
- Reversible: The cocktail: hypoglycemia, opiate overdose, O2, thiamine, hypothermia, pain
- Neurologic examination before sedation and chemical paralysis: Focal or non-focal?
- Trauma patients: Spinal immobilization
- Control agitation: Verbal, environment, restrains, meds (Haldol, Versed)
- ECG/Lab/Imaging
- AB? LP? Antidotes? EEG?

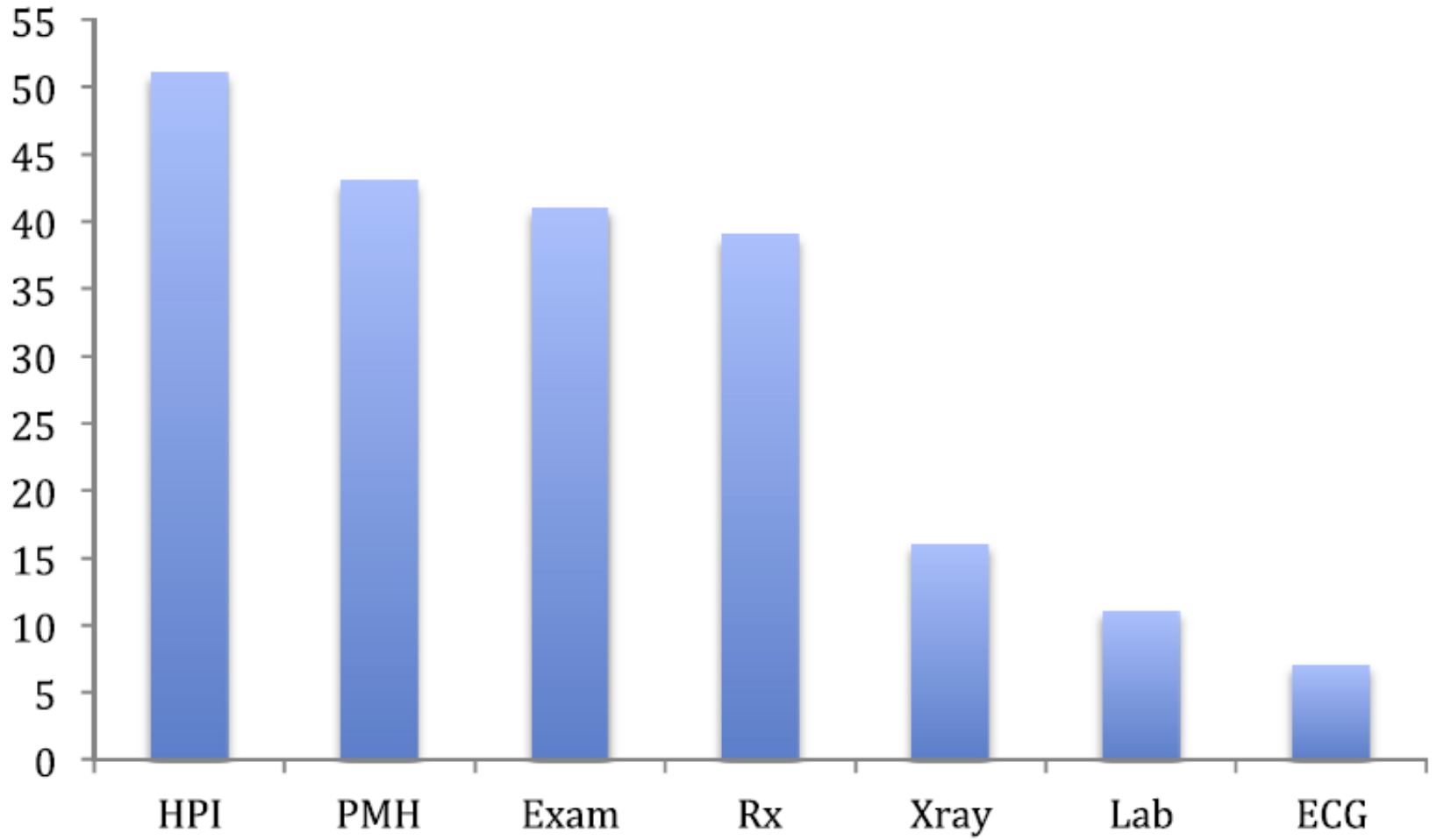
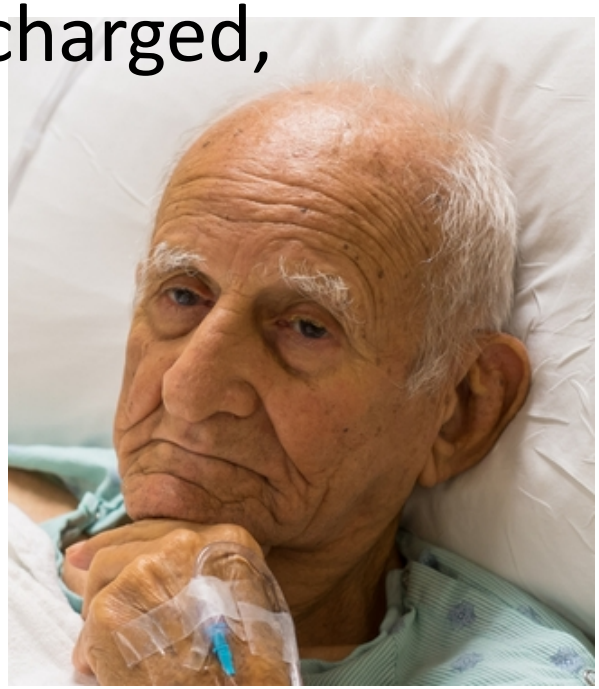


Fig. 1. Value of the various features of the diagnostic evaluation of AMS. The laboratory panel includes chemistry panel (5%), complete blood count (1%), coagulation panel (0%), and urinalysis (11%). (*Data from* Kanich W, Brady WJ, Huff JS, et al. Altered mental status: evaluation and etiology in the ED. Am J Emerg Med 2002;20(7):613–7.)

Presented with AMS …

Case 1

72 yo male, Confused for 2 weeks, walking around the house, no longer prepare food, trouble walking, Seen in another ED last week sent lab work, discharged, answers yes and no only.



Case 1: History? Physical exam? Labs? Imaging?

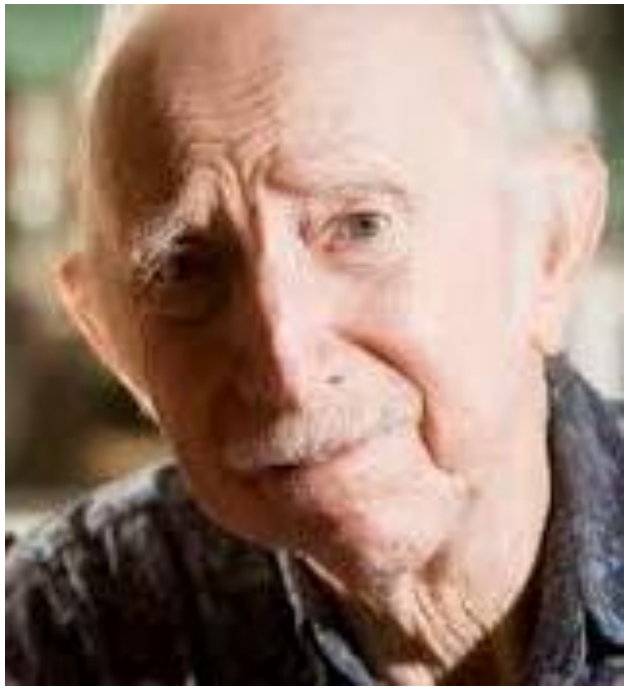
- TSH: 0.000
- T4: upper than detectable!

- Thyroid storm!

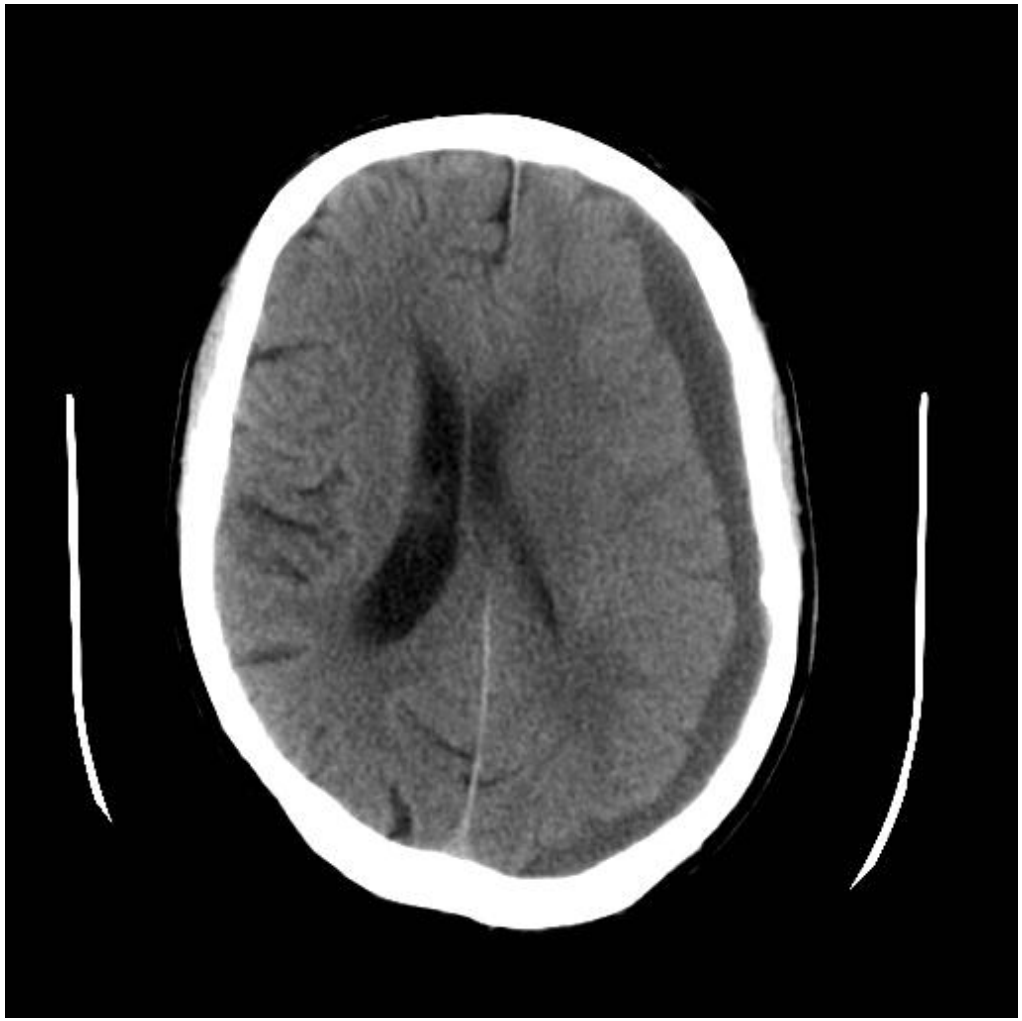
Presented with AMS …

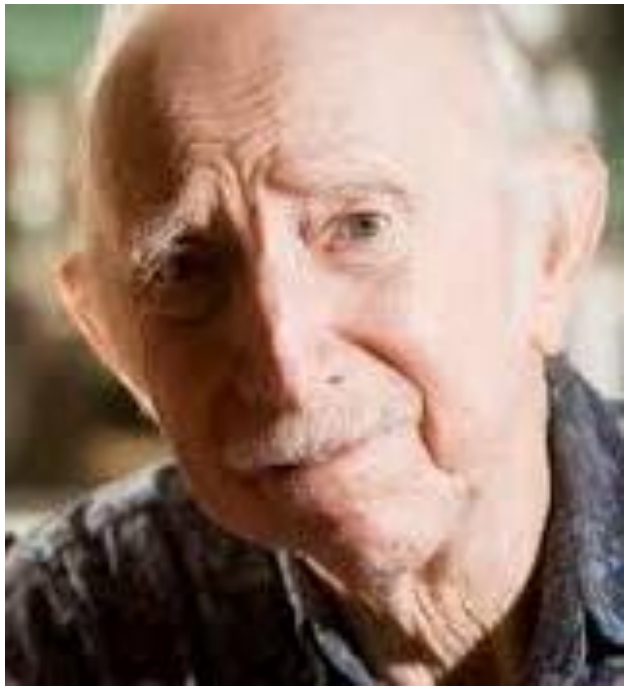
Case 2

72 yo male, AMS 1 months,
Can not remember the address, forgets what happened today, Is scared because he is getting Alzheimer, Can walk and eat, answers appropriately



Case 2: History? Physical exam? Labs? Imaging?





Presented with AMS …

Case 3

52 yo f, brought by

Grocery store owner. Everyday costumer, a very respectful lady. Today she is joking, laughing, swearing inappropriately!

Case 3: History? Physical exam? Labs? Imaging?

Finger stick: 20

Immediately responsive to dextrose, personality change!

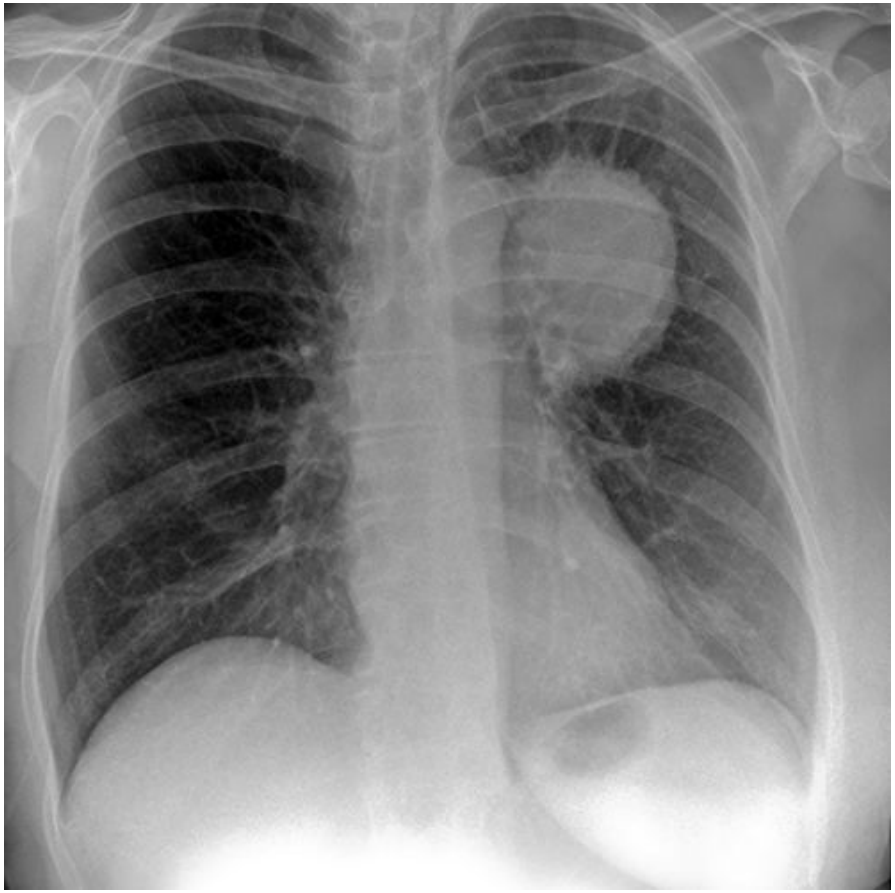
Presented with AMS …

Case 4

75 yo f, brought by family for new onset depression and being more forgetful from a months ago. Is slow, answers appropriately, does not know why she is here

Case 4: History? Physical exam? Labs? Imaging?

Ca: 17



Lung Cancer:
Hypercalcemia

Presented with AMS …

Case 5

30 yo, confused, not responding well, looks to have difficulty remembering, but stays silent. Started this morning when she woke up, unable to walk

Case 5: History? Physical exam? Labs? Imaging?

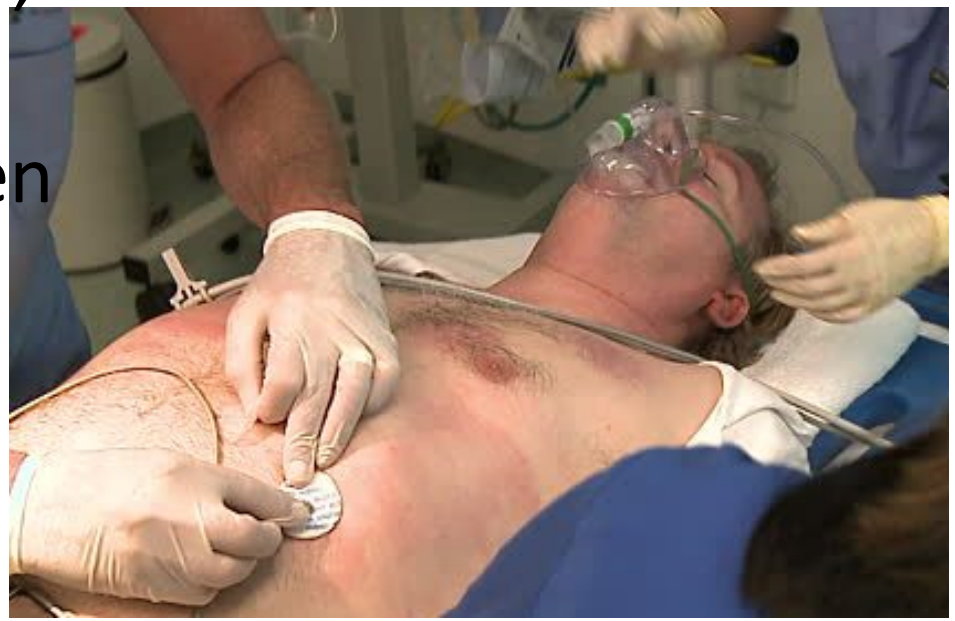
FSG: 550, PH: 7.1, AG: 35

DKA!

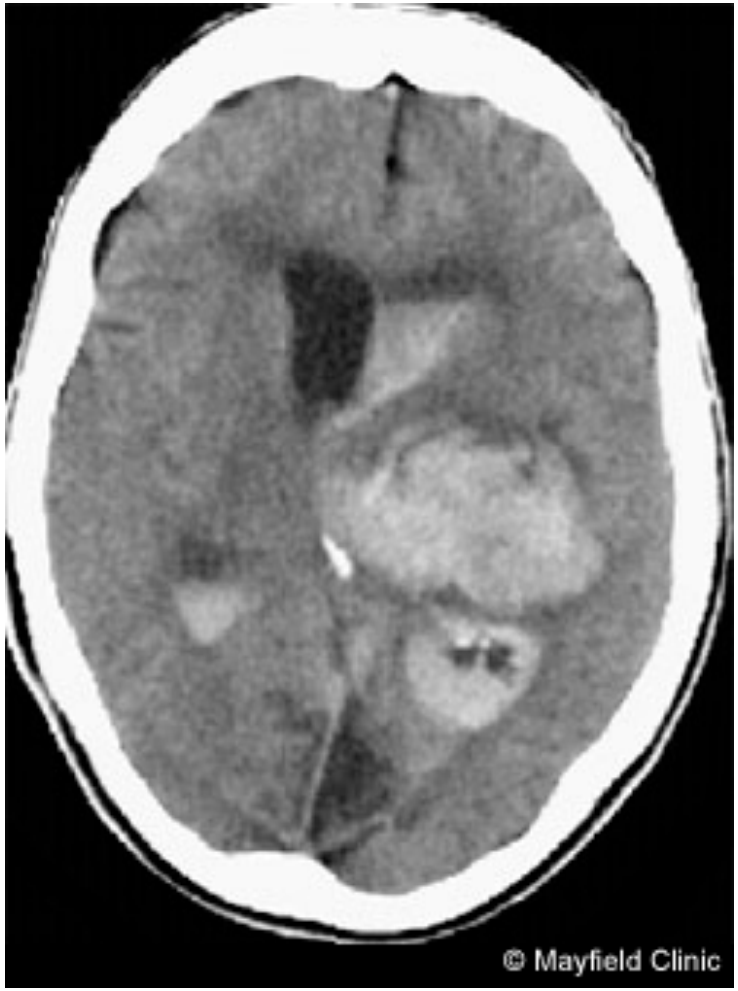
Presented with AMS …

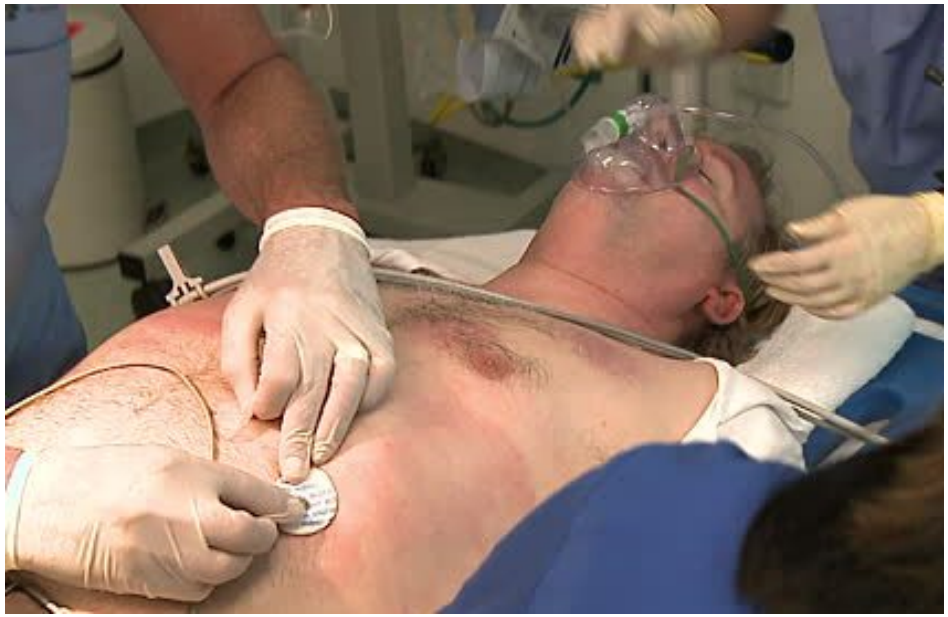
Case 6

52 yo, one hour ago in the store, fell, had shaking for 3 minutes, minimally responsive only to pain since then



Case 6: History? Physical exam? Labs? Imaging?

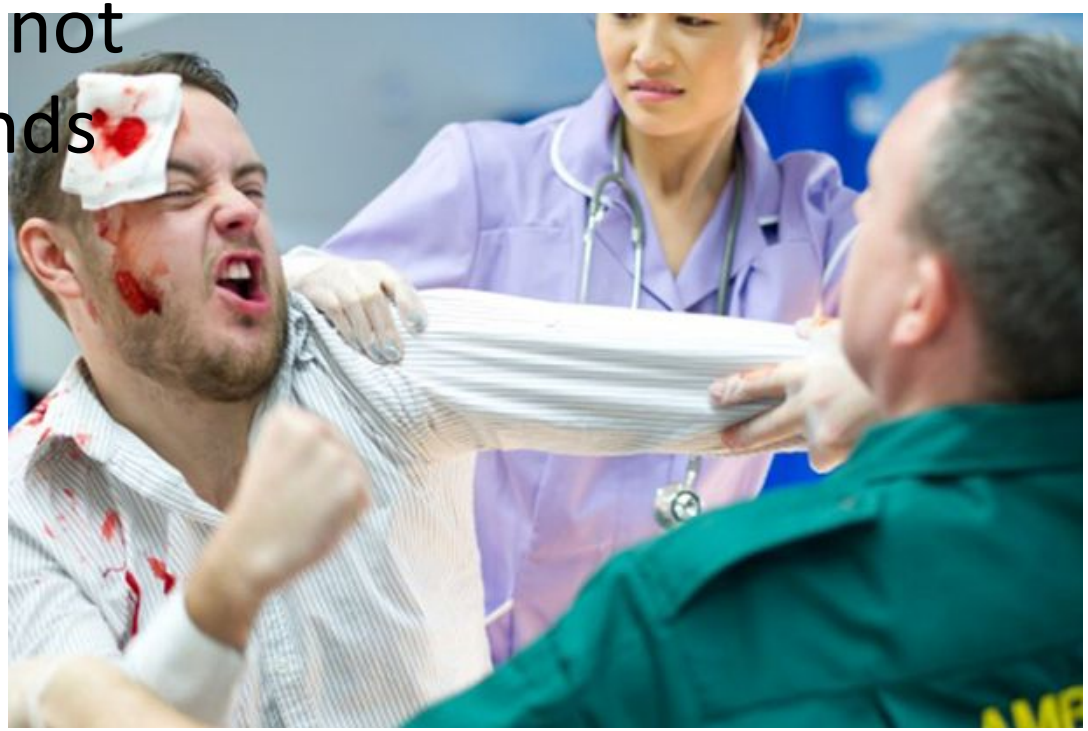




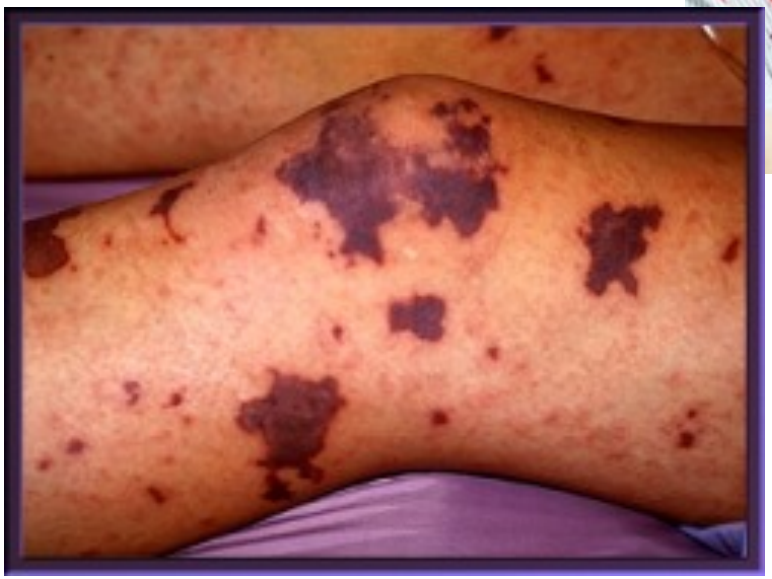
Presented with AMS …

Case 7

22 yo, student, brought
by EMS, awake,
agitated, fighting, not
following commands



Case 7: History? Physical exam? Labs? Imaging?



Meningitis!

Presented with AMS …

Case 8

- 83 yo f, brought by family, week since 2 days ago, can not walk, falls, confused

Case 1: History? Physical exam? Labs? Imaging?

UA: WBC>100, LE pos, Nit: pos, Bacteria: Many

UTI!

The most common causee of delirium in elderly!

Presented with AMS …

Case 9

25 yo m, brought by friends, unresponsive

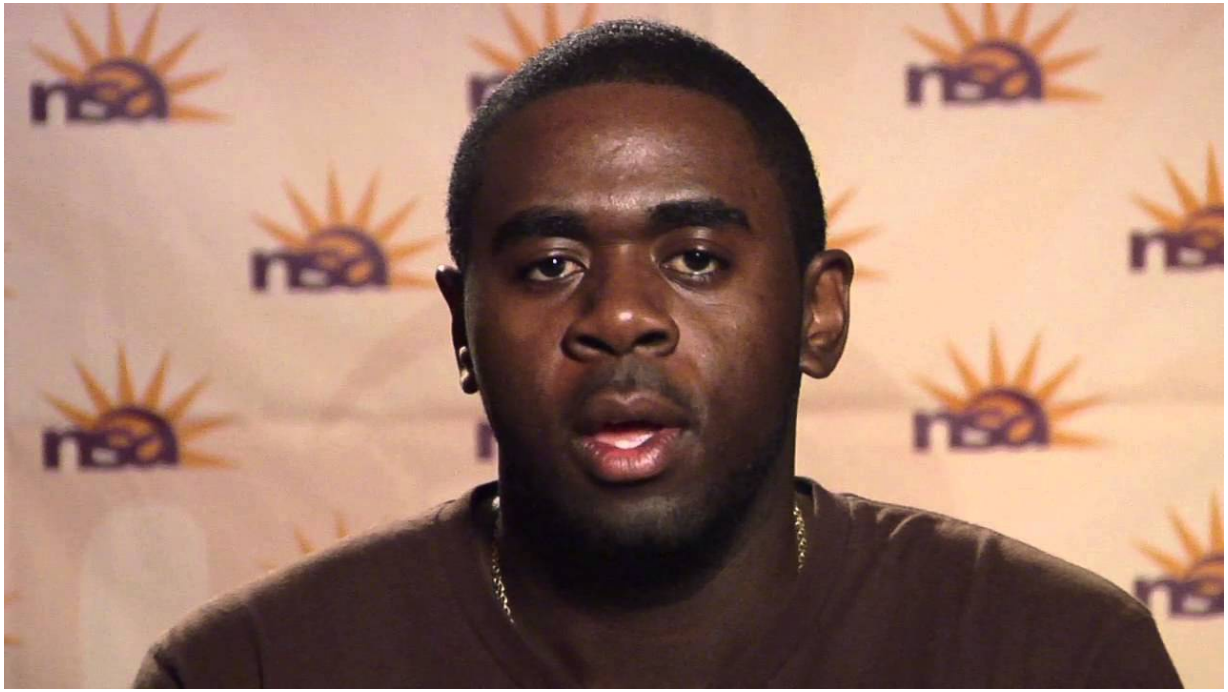
Case 9: History? Physical exam? Labs? Imaging?

Opium Overdose!

Presented with AMS …

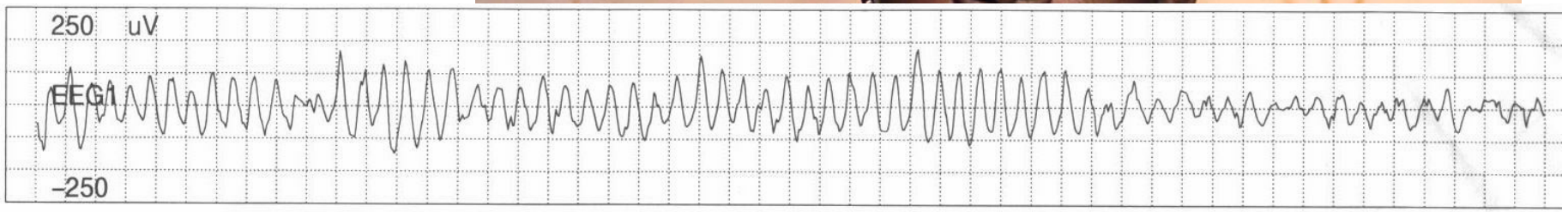
Case 10

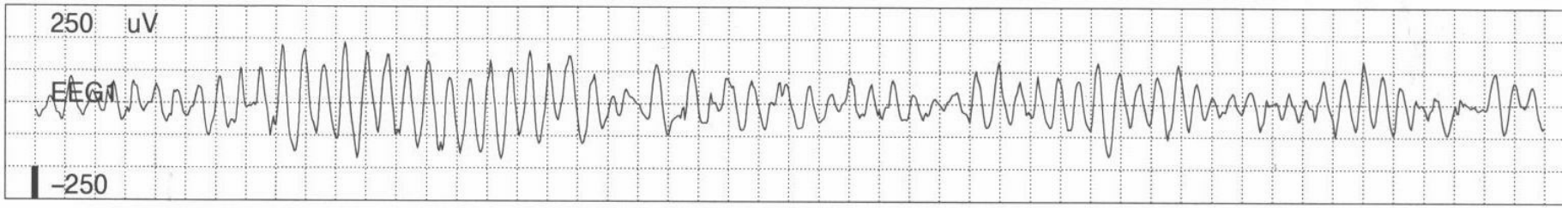
45 yo m, stuttering since yesterday, can not answer the questions



Case 10: History? Physical exam? Labs? Imaging?

Status Epilepticus!





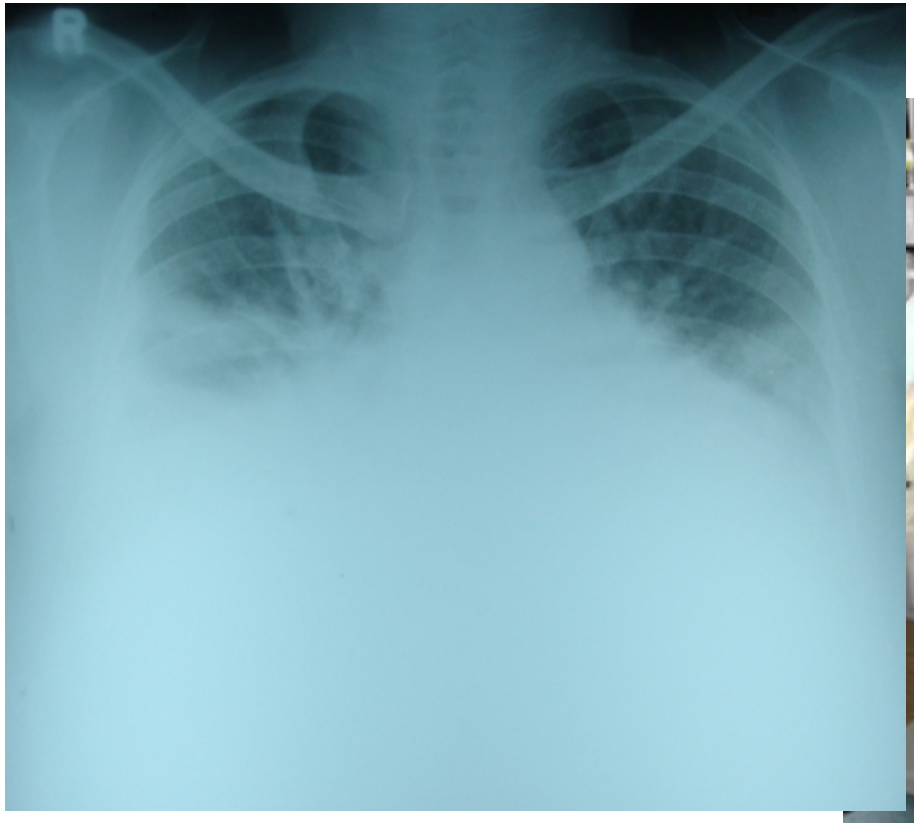
Presented with AMS …

Case 11

67 yo m, agitated, does not stay in the bed, pulls IV, not answering, talks to monkeys

Case 11: History? Physical exam? Labs? Imaging?

Delirium, acute pulmonary edema



Conclusion

- Altered mental status has a wide range of differential diagnosis
- Causes in the brain, and outside of the brain
- **Rapid stabilization in the ER**
- Value of history and physical exam: Guides to use the labs and imaging

- EM clinics of north america
- Tintinally
- EB medicine
- Rosen
- Up to date