Geriatric Simulation Case: Polypharmacy

An 80 year old woman is brought to the ED by EMS from home because of worsening confusion over the past 3 days. She has not been eating. She vomited several times today. EMS found that her vital signs were stable and no treatment was given.

Past Medical History: Congestive Heart Failure and Hypertension. 
Medications: Digoxin 0.25 mg, Furosemide 40 mg, Aspirin 81 mg 
Allergies: Penicillin (rash) 
Social History: Patient lives alone and her daughter checks on her when she can. Her daughter is in the waiting room.

PE:
When the physician walks into the examining room, she/he sees a very thin small elderly woman lying on the stretcher. She is lethargic and mumbling to herself. She does not respond to the physician when she/he walks over to and greets the patient. 
VS: BP 100/70, HR 64 irregular, RR 24, T 99.8 oral 
HEENT- airway patent, no evidence of head trauma, PERRLA with mid-size pupils and intact EOM’s, dry mucous membranes 
Neck= supple and no JVD 
Chest- mild tachypnea but no other signs of respiratory distress. Lungs are clear. 
CV- irregular, no murmur 
Abd- soft and non-tender 
Back- no decubiti, no CVA tenderness 
Extrem- no edema 
Neuro- lethargic but responds to painful stimuli by moving all 4 extremities and yelling nonsensical words 
Rectal- good tone, brown Heme neg. stool 
Skin- dry, no rashes 

Labs

WBC 16K 
H&H 15/ 48 
Plts 200 
Na 130 
K 2.8 
Cl 88 
HCO3 25 
BUN 40 
Cr 1.4 
Glucose 110 

CPK 94 
Troponin negative 
UA: WBC 100; Nitrate Positive
Digoxin: 3.2
ASA: 5.0

EKG dig toxicity, afib at 60
CXR mild CHF

**Case Progression**
An 80 year old woman is brought to the ED by EMS from home because of worsening confusion over the past 3 days. She has not been eating. She vomited several times today.

The patient should be put on a cardiac monitor which shows sinus rhythm with PVC’s. A monitor strip is shown when requested.
Pulse oximetry should be done and her O2 sat is 94% and she should be put on Oxygen nasally and if this is done her O2 sat goes up to 100%
Finger stick glucose should be done and it is 108
Vital signs must be closely monitored and a rectal temperature performed. It is 101.8
IV access should be obtained and bloods sent (CBC, BMP, Magnesium, cardiac enzymes, Digoxin and Salicylate levels, PT/PTT and Blood Cultures.)
EKG and a portable Chest X-ray should be obtained. Both are shown when requested.
The EKG shows PVC’s and the Chest x-ray shows Cardiomegaly but no CHF and no infiltrates.
A Foley catheter should be placed and urine sent for analysis and culture

ED Course:
After receiving Oxygen, Fluids, Potassium and Broad Spectrum Antibiotics, the patient becomes more responsive, though she is still slightly confused. Her vital signs remain stable.
Her monitor still shows some PVC’s but less than on presentation. No runs of Ventricular Tachycardia or other Life Threatening Dysrhythmias are seen on her monitor.
She is admitted to the hospital in stable condition.

Final Diagnoses:
Acute AMS
Digitalis Toxicity
Uro-Sepsis
Dehydration and Hypokalemia

**Learning Objectives**

1. To learn how to evaluate elderly patients with acute Alteration of Mental Status (Delirium), including generating an appropriate Differential Diagnosis.

2. To demonstrate how to manage geriatric patients with acute AMS.

3. To learn how to evaluate and manage older patients with Adverse Drug reactions, including Digitalis Toxicity.
4. To learn and apply important principles of Geriatric Emergency Care, including:
   a. Multiple co-morbidities and functional impairments make diagnosis and management more complicated.
   b. Diseases often present atypically in the elderly, often presenting as acute AMS or impairment of function, making diagnosis more difficult.
   c. The elderly, especially the frail elderly, do not tolerate acute diseases well and often may decompensate rapidly.
   d. The elderly have an increased risk of Adverse Drug Reactions, which is an important cause of delirium in this population.
   e. It is important to get a Social History when evaluating elderly patients, as this may effect short and long term treatment and disposition.

**Critical Actions**

1. Evaluate and stabilize the ABC’s
   A. – patent
   B. good but should have pulse oximetry monitoring and O2 nasally
   C. Monitor, IV access and IV Fluids

2. Evaluate for and diagnose reversible dangerous causes of acute AMS
   A. get Finger Stick Glucose to R/O Hypoglycemia
   B. Do appropriate Diagnostic Testing as noted above including EKG, Digoxin Level and putting in a Foley and sending U/A
   C. Recognize the important causes of AMS in this elderly patient
      a. Adverse Drug Reactions - Digitalis Toxicity causing AMS, Cardiac dysrhythmia and GI symptoms
         Furosemide causing dehydration, hypokalemia and hyponatremia
      b. Uro-Sepsis
      c. Dehydration and Electrolyte Abnormalities

3. Treat the Life Threatening Causes of AMS in this Elderly Patient
   a. Adverse Drug Reactions: Stop her medications
      Close Cardiac Monitoring for dangerous dysrhythmias
      Recognize the possible need for Digibind and have it readily available in case the patient develops a dangerous dysrhythmia
      Correct fluid and electrolyte abnormalities especially Hypokalemia
   b. Uro-Sepsis: Give a Broad Spectrum IV Antibiotic such as a 3rd Generation Cephalosporin or a Quinolone but not a Penicillin like Zosyn as she is PCN allergic
   c. Dehydration and Electrolyte abnormalities: Hydrate aggressively with Normal Saline
      Give IV Potassium (10 meq per hour is a Reasonable amount)

4. Admit to the ICU as she needs close monitoring of her vital signs and for dysrhythmias
**Important Actions**

1. Complete the history by speaking to the daughter. In the case of the elderly patient, this should also include obtaining a Social History.

2. Complete the Physical Examination.

3. Obtain a Rectal Temperature.

4. Order appropriate tests.

5. Discuss a full Differential Diagnosis of Acute Altered Mental Status.

6. In addition to the Critical Therapy noted above patient should also receive Tylenol for fever.

7. The resident should present the case for admission to the admitting ICU Attending in a meaningful way.

8. If the resident does not know how to manage Digitalis Toxicity in detail, she or he can consult Toxicology and/or Cardiology for assistance.

9. The resident should speak to the patient’s daughter in a compassionate way regarding the patient’s diagnosis, prognosis and disposition.

10. The resident must indicate that the patient should continue to be closely monitored in the Ed while waiting to be admitted to the ICU.

**Handout**

**Altered Mental Status in the Elderly**

Acute Altered Mental Status (AMS) is a common and important problem in the elderly, especially because many life threatening disorders can present in elderly patients as AMS.

Definitions: Altered Mental Status is a change in the baseline mental functioning of the patient. Often in the elderly this change may be subtle and easily missed with potential dire consequences, if not looked for.

Consciousness is how an individual relates to the environment and external stimuli. Consciousness can be divided into two major categories: Level of Consciousness, also referred to as alertness and awareness and Content of Consciousness, also referred to as cognition. The elderly not uncommonly may have a problem with cognition. They may be confused and disoriented. Short term memory loss is often the first sign of a cognitive...
problem. When they become disoriented because of an underlying organic problem, they first become disoriented to time then place and then person. This cognitive problem often interferes with the ability of the clinician to obtain a good history in elderly patients and often the clinician must rely on care givers to get a meaningful history. Obtaining a good history is very important in these patients and must be actively pursued.

Delirium is an acute fluctuating change and impairment of consciousness, cognition and attention. There may be hallucinations and/or delusions, which are usually visual and poorly formed. Vital signs are often abnormal and may indicate an underlying dangerous etiology, such as sepsis.

Dementia is a chronic impairment of cognition, but the level of consciousness is usually normal. However, it must be noted that elderly patients with dementia are at high risk to develop dementia. An elderly patient with a history of dementia, who presents with a history of an acute change in mental status, must be considered to have delirium, on top of their dementia, due to an underlying acute potentially life threatening medical problem, until proven otherwise.

Incidence: Altered Mental Status is very common in elderly patients who present to the ED. Some studies have shown that as many as 25% of geriatric patients have some type of AMS when they come to the ED. Other studies have shown that as many as 10% of older patients, who present to the ED acutely ill may have Delirium, although often initially it may be subtle and mild and may be missed if not carefully looked for by doing a good Mental Status exam.

Pathophysiology: AMS may be due to Toxic-Metabolic causes, which are more common in the elderly, or Structural (Intracranial) causes. AMS may be due to disruption in the function of the Cerebral Cortices or the Reticular Activating System. AMS due to abnormal functioning of the Cortices is more likely due to Toxic-Metabolic causes which cause diffuse dysfunction of both cortices and usually does not show focal neurological findings. AMS due to problems in the RAS is more likely due to a structural problem, such as a stroke, bleed or mass with increasing Intra-Cerebral Pressure and usually presents with focal neurological findings.

Toxic–Metabolic causes of AMS are treated Medically and Structural causes of AMS may have to be treated Neuro-Surgically.

Etiology and Differential Diagnosis: As noted above, Acute AMS may be due to Toxic-Metabolic or Structural causes. A very useful Mnemonic for etiologies of Acute AMS is: AEIOU (the vowels) and TIPS:
A-Alcohol Intoxication or Withdrawal; Adverse Drug Reactions
E-Encephalopathy (Hepatic, Hypertensive); Electrolyte and Fluid Problems (Dehydration, Hypo and Hypernatremia, Hyper and Hypocalcemia); Endocrine (Hyper and Hypothyroidism, Adrenal Insufficiency)
I-Insulin Disorders (Hypo and Hyperglycemia); Ischemia (Cerebral or Cardiac)
O-Oxygen lack; Opiate and Other Overdoses
U-Uremia
T-Toxins; Trauma (Brain or Severe Multiple); Temperature (Hypo and Hyperthermia);
In the elderly, the 5 most common causes of acute AMS are: Infections, Intracranial disorders, Cardiovascular disorders, Adverse Drug Reactions and Dehydration/Electrolyte problems. It should be noted that often in the elderly patient, more than one etiology contributes to the delirium.

Our simulated geriatric patient presented with AMS and was very ill and had deteriorated fairly rapidly. She had delirium due to several etiologies: Urinary Tract Infection, Adverse Drug Reactions caused by Digitalis and Furosemide, and Dehydration with Hypokalemia.

Her clinical presentation demonstrates several important principles of Geriatric Emergency Medicine:
1. Multiple Co-Morbidities and functional impairments make diagnosis and management more complicated in the elderly.
2. Diseases often present atypically in the elderly, commonly presenting as acute AMS or impairment of function, making diagnosis more difficult.
3. The elderly, especially the frail elderly, do not tolerate acute diseases, such as infections, well and often may decompensate rapidly.
4. The elderly have a much higher risk of Adverse Drug Reactions. They are on more medications (average 4.5 prescription and 2 OTC drugs) and do not tolerate, metabolize or excrete medications as well as younger patients. Some medications that commonly cause Delirium in the elderly are Digitalis, Diuretics, Anti-Cholinergics, Neuroleptics, Sedative-Hypnotics, Quinolones and Anti-Hypertensives.

Clinical Evaluation: Because of the fact that patients with acute AMS may have underlying life threatening illnesses, it is imperative that these patients have the ABC’s evaluated and appropriately stabilized as needed STAT. Special Attention must be given to Airway and Breathing. These patients should have a Pulse Oximeter, Cardiac Monitor and BP Monitor attached.

D(Disability), a quick Neurological Examination that evaluates Level of Consciousness, Pupils and Gross Motor Function should be done. (Any patient who has decreased consciousness and evidence of focality or herniation will need a CT SCAN and possibly Neuro-Surgical consultation. It should be noted that elderly patients may have large Sub-Dural Hematomas (because of their brain atrophy) without any history of Significant trauma).

Also, right after evaluating for and stabilizing the ABC’s, the patient should be evaluated for and treated with DONT therapy(also called the Coma Cocktail- DON’T forget to think about it.)

D-Dextrose: Always check a Finger Stick Glucose and give 50% Dextrose if low. Remember that Hypoglycemia can mask as almost any Neurological or Psychiatric Condition, including a stroke with hemiplegia.
Oxygen: Check O2 Sat. with a Pulse Ox and give sufficient Oxygen
Naloxone: Patients who are obtunded or in coma should be given Narcan
Thiamine: Patients who are malnourished or alcoholics should be given IV Thiamine.

Once the patient is stabilized, an AMPLE history should be done. A-Allergies; M-Medications; P-Past Medical History; L-Last Meal; Last Menses; E-Event meaning a thorough History Of Present Illness; Environment-meaning the Home Environment including a Social History. This is very important to assess in the elderly and is one of the Principles of Geriatric Emergency Medicine. to do so.

A complete Physical Examination should be done, including complete Vital Signs (including a Rectal Temp.) and a thorough Neuro Exam, looking for clues that point to a possible etiology. An elderly patient should have a work-up that includes a minimum of a CBC, BMP, U/A, EKG and Chest X-ray. Other tests should be ordered based on the clinical evaluation and suspicion. A CT Scan should be done if there are any signs of trauma, any focal neurological findings or if after the initial evaluation, no apparent toxic-metabolic cause was found. An LP should be done if Meningitis or SAH is suspected, but in the elderly a CT should be done first, and if Meningitis or Sepsis is suspected the antibiotics should be started prior to the patient going to CT.

Management: In addition to stabilizing the ABC’s and DONT therapy, specific therapy should be given to treat any specific diagnoses found or strongly suspected. In our case, the patient should be treated with an IV Antibiotic (IV Ceftriaxone or Ciprofloxacin but not a Penicillin) for her Uro-Sepsis. She needs aggressive rehydration, but with close monitoring because of her CHF history. She needs IV potassium replacement. Obviously her Digoxin, Lasix and Aspirin should be stopped. Because of her Digitalis Toxicity, Hypokalemia and PVC’s, she needs to be monitored in an ICU setting for potentially fatal dysrhythmias. If they occur, she is best treated with Digibind, which should be readily available. Digitalis Toxicity is discussed below.

Disposition and Prognosis: Patients with acute AMS in general (with the possible exception of an acute intoxication or mild hypoglycemia due to a short acting Insulin, that clears up while the patient is being observed in the ED) should be admitted and this is especially true for the elderly. There is a significant association between Delirium and mortality. There is an especially high mortality rate if the diagnosis is missed in the ED.

Digitalis Intoxication

Elderly patients are very prone to have Digitalis Toxicity, especially Chronic toxicity. It is a potentially life threatening ADR.

Clinical Manifestations: Patients may present with chronic or acute Digitalis Toxicity. Symptoms of toxicity include fatigue, blurred vision, disturbed color perception, anorexia, vomiting, diarrhea, abdominal pain, headache, confusion, delirium and hallucinations.
However, it is the cardiac arrhythmias that are responsible for mortality in Digitalis Toxicity. Digitalis Toxicity can produce any dysrhythmia, except Fast Atrial Fibrillation or Flutter. The earliest sign of toxicity is usually PVC’s. Both Bradycardias and Tachycardias can occur, although Bradycardias are much more common. Common dysrhythmias seen with Digitalis Toxicity are: Ventricular Arrhythmias (including VTach and VFib), AV Junctional Rhythms, Sinus Bradycardia, Sinoatrial Block, Bradycardia with AV Block, Atrial Fibrillation or Flutter with a Slow Ventricular Rate and Atrial Tachycardia with Block.

Whenever a patient taking a Digitalis Preparation develops a new arrhythmia or changes his/her rhythm, one must assume that the patient has Digitalis Toxicity until proven otherwise.

Acute Digitalis Toxicity usually causes Hyperkalemia; however Hypokalemia is much more commonly seen in elderly patients with Chronic Toxicity, especially if the patient is also on a Diuretic, as our patient was. Hypokalemia and Hypomagnesemia worsen Digitalis Toxicity.

Our patient’s clinical picture strongly pointed to the diagnosis of Digitalis Toxicity. She was on a relatively high dose (0.25 mg daily, whereas frail elderly patients should usually be on no more than 0.125 mg daily) of Digoxin. She had AMS, GI symptoms, and an arrhythmia (PVC’s), as well as Hypokalemia.

Making the diagnosis can be aided with a Plasma Digoxin Level (normal is 0.8-2ng/ml); however, some elderly patients can be toxic with a therapeutic level, especially if they are frail, Hypokalemic, Hypomagnesemic, or Hypoxic.

Management: The ABC’s should always be evaluated for and the patient resuscitated as needed. The patient must be closely monitored for life threatening dysrhythmias.

In acute overdoses, Activated Charcoal should be given and can be repeated to adsorb active metabolites, as they are excreted by the biliary tract.

In Chronic Overdoses, Hypokalemia and Hypomagnesemia should be aggressively corrected, as should dehydration. The patient’s daily Digoxin dose should be stopped. Hyperkalemia, which is usually seen in acute overdoses, should be treated the usual way, but with the Caveat that Calcium should not be given as it worsens Digitalis Toxicity and may precipitate Cardiac Arrest. If it is felt that it needs to be given (for example to treat a concomitant Calcium Channel Blocker Overdose), then it can be given after giving Digibind. For symptomatic Bradycardia, Atropine should be tried, although it is often not effective. Transvenous pacing and Beta-Agonists should be avoided. Synchronized Cardioversion should usually be avoided, but Defibrillation should be done for VFib/Pulseless VTach.

Digoxin-Specific Antibody Fab Fragments (Digibind) should be used to treat Life Threatening Arrhythmias. In any patient with hemodynamic instability, it should be given ASAP. It is very effective if given early and appropriately. In acute overdoses, it should be given if the potassium level is above 5, as it will effectively lower potassium and prevent dangerous arrhythmias. Regardless of clinical status, if the Digoxin level is above 10 or if an adult patient ingested more than 10 mg or a child more than 4 mg then it should be given.
Side effects are exacerbation of CHF, increased heart rate in patients with A Fib and Hypokalemia. Allergic reactions are rare. Once Digibind is given, Digoxin levels can no longer be followed and re-dosing has to be based on the clinical response. The dosing regimen: \# of Vials=\[\text{Digoxin Level(ng/ml)} \times \text{Mass(Kg)}\] divided by 100. When unsure how much to give start with 5-10 vials and repeat the dose as needed based on the clinical response.

Patients with Digitalis toxicity should be admitted to a monitored setting. Because our patient did not have a Life Threatening Arrhythmia, when we evaluated her initially and because her potassium level was so low, I was worried that Digibind might further lower it and possibly worsen the dysrhythmia, I actually ordered the Digibind to be available in the ED if needed, but did not give it. Instead, I closely monitored her while I gave her IV potassium and fluids and her dysrhythmia improved.

Summary

In elderly patients, acute Altered Mental Status is a common presentation. These patients must be aggressively evaluated and treated, because if undiagnosed or inappropriately managed, there is a very high incidence of Morbidity and Mortality. The causes of AMS in the geriatric population are myriad and many of them are potentially life threatening, such as Infections, Adverse Drug Reactions, Dehydration and Electrolyte Disorders, Intracranial and Cardiovascular Emergencies.

Digitalis is a common and dangerous ADR in the elderly. It can present with AMS, GI complaints and life threatening arrhythmias, for which Digibind is an effective therapy.

References:
1. For Geriatric Emergencies, I strongly recommend:
   The whole issue is on Geriatric Emergencies. The chapters on Altered Mental Status, Pharmacologic Issues, Geriatric Infections and Trends in Geriatric Emergency are very relevant to this case. A. Mattu is the editor for this issue.
2. For Digitalis Toxicity, I strongly recommend:
   Nuhad I. Digitalis (Cardiac Glycoside) Intoxication. Up To Date January 2008