A Patient with Altered Mental Status

A 72 year old male is found unresponsive in his home in midwinter. According to the daughter, the patient lived alone and had last been seen well 2 days prior. He was found on the bathroom tile floor. His past medical history includes hypertension, diabetes, COPD, hypothyroidism and coronary stent placement two years prior. You arrive on the scent to find an unresponsive elderly male who is breathing erratically. Blood pressure is 104/52, heart rate 55 and respirations 22. He is cold, has no obvious sign of trauma, has equal pupils and is unresponsive to painful stimulation. The lungs reveal scattered rhonchi and faint wheezes bilaterally. Monitor reveals bradycardic junctional type rhythm. Pulse oximetry is difficult to determine due to cold extremities. You attempt an IV and are unsuccessful. You provide high flow oxygen. Your partner asks if you want to check waveform capnography—but you decline. It is a 20 minute ride to the nearest emergency department, and you decide to transport the patient, rather than spend more time at the scene.

The emergency department is packed. The nurse directs you to the critical care room.

“Did you check a glucose?” she asks.

“No”, you reply. “Couldn’t get any blood or an IV on him.”

“Amanda, get Dr. Evans in here, and call respiratory therapy stat,” the nurse orders.

Dr. Evans, a locum tenens physician, is new to this emergency department. He rushes into the room. He looks frazzled, and appears upset. He quickly examines the patient.

“He needs to be intubated. Do you have a line started?”

“He’s got no veins,” the nurse replies, attempting a third stick on the patient’s forearm.

“Damn it, was anything done for this patient?” Evans yells, as he slams the chart onto a nearby cart.

You exit the room and head back to your station.

“I think we blew it on this one,” you tell your partner.

A few days later, your chief calls you and your partner into the office to discuss a complaint registered by Dr. Evans regarding the pre-hospital care of the patient.

“Dr. Evans says that the patient had a blood sugar of 33, a temperature of 92 degrees F and was in respiratory distress with a subdural bleed. He says nothing was done for the patient, not even an IV or IO,” the chief says, reviewing the complaint letter. The chief looks over his glasses at you and asks: “What the hell happened?”
Altered Expectations

This case has been presented for two reasons:

- To discuss the some general principles regarding EMS care in this evolved and highly complex modern health care system
- To discuss the differential diagnosis and treatment of the patient with “Altered Mental Status”

*No one who is involved with EMS will argue that the profession has changed dramatically in the past decade.* EMTs are diagnosing and treating acute STEMI in the fly. They are expected to diagnose and stabilize critical patients with asthma, COPD, anaphylaxis, sepsis and stroke. EMT’s are doing more procedures (IO, CPAP, rapid sequence intubations) and passing more medications than could be imagined just a couple of decades ago. EMTs are expected to utilize the differential diagnostic approach to the patient with acute medical or traumatic insults. The entire concept of “EMT” has evolved. In my opinion, EMTs are essentially ‘physician extenders’ —and as such, the expectations for performance in the field have skyrocketed.

These changes with regard to EMT have not occurred by accident. The entire health care system is overburdened and overstressed. Emergency departments with up to 25,000 annual visits are staffed by only one physician and a physician assistant. Emergency physicians and nurses are expected to *safely* diagnose and treat multiple complex and critical patients simultaneously, while dealing with thousands of complex decisions, distractions, and menial tasks such as computer order entry. The emergency team must deal with families and patients demanding to be seen faster, and demanding more time at the bedside. With the ever-increasing demands and pressures on the ED team, the natural off load for some of the pressure is EMS. *After all, where else in the health care system do we have one or two healthcare providers (EMTs in the field) for one patient?* It doesn’t happen on the general medical wards, it doesn’t happen in the ICU and it sure as hell doesn’t happen in the ED, where we often find one physician caring for 20 patients at a time!

So the health care system turns to EMS for solutions. If EMTs are trained to diagnose and treat complex medical problems and initiate appropriate critical actions in the field, this will help the patient and help the ED team. This thinking has led to the evolution in EMS training and continuing education—and the creation of the modern day paramedic, a highly trained and skilled medical professional who is able to think, make quick decisions and initiate critical actions regarding management of complex medical cases.

With the higher level training and increased responsibilities come the increased expectations for performance, from the general public and from the emergency department physicians and nurses. It is expected that a complex critical patient will have an EKG done and interpreted by
EMS. It is expected that a complex medical patient will have IO access if the intravenous line cannot be established. It is also expected that the EMTs will aggressively manage the airway (non-invasively or invasively) and provide respiratory support and treatment with nebulizers and steroids. It is also expected that waveform capnography is monitored and a glucose level is checked on every patient with mental status change. Like it or not, these are the expectations, so it behooves the EMT to utilize every resource and educational activity available to enhance his/her diagnostic acumen and clinical skills.

ACUTE ALTERATION OF MENTAL STATUS

I am a strong proponent of EMTs grasping the significance of, and utilizing on every shift, the differential diagnostic approach to the acutely ill or injured patient. I have worked as an emergency physician for nearly 32 years and have seen the dramatic changes in health care. Patients are living longer, are on more medications, have more complicated biomedical devices (joint hardware, brain shunts, pacemakers, defibrillators, indwelling catheters and intravenous devices, transplanted organs, vascular stents, etc) and have a wider array of coexisting medical problems than in prior decades. It is not uncommon to care for a patient with co-existent cancer, coronary artery disease, congestive heart failure, emphysema, hypertension, hyperlipidemia, diabetes, and prior surgical history of partial colectomy, artificial hip, and coronary artery bypass. Such a patient might have 14 prescription medications! If this patient experiences acute onset of shortness of breath with chest discomfort, the differential diagnoses are numerous and in fact, more than one significant acute issue may require immediate intervention. The patient may be experiencing congestive heart failure with ischemic myocardium, acute renal insufficiency, hyperglycemia and blood loss anemia—concurrently!! The nursing home patient with acute illness is another example of a complicated medical patient—often presenting with multiple nonspecific symptoms disguised as SEPSIS. My point is this: many of our emergency patients are very complicated, and have co-existing acute pathology—all of which require diagnosis and treatment. We should all be aware of the differential diagnoses of the most serious and life threatening diagnostic conditions represented by the presenting symptoms of each and every patient. I realize that for many conditions, the differential diagnostic list is extensive (for example, Acute Mental Status Change has dozens of potential causes). I do not expect, nor do I adhere to, memorization of all diagnostic possibilities. We should know the main categories of the most serious diagnoses, and be able to access others quickly. I suggest the use of reference material (cell phone applications, flip charts, index cards, and pocket sized books) to assist the emergency provider. For example, I expect all EMTs, nurses and emergency physicians to know the most lethal conditions causing “Chest Pain” (Acute MI, Acute Pulmonary Embolism, Acute Aortic Dissection, Pneumothorax, Ruptured Esophagus). We deal with “Chest Pain” and “Shortness of Breath” on a daily basis so we should be very familiar with the differential diagnoses. We all should be aware of the most serious causes of “Sudden Headache” (Intracranial bleeds). We may not remember, however, all
the most serious causes of “Syncope”, acute weakness, or abdominal pain. In these cases, handy reference material is a necessity.

**Airline pilots are required to use a standardized check list prior to take off.** These pilots **do not rely on memory** as they go through their pre-flight routines. **I could never understand why EMTs and physicians were expected to memorize ACLS algorithms.** Frankly, I think it is foolish and dangerous to rely on memory for many things we do in emergency medicine. I **can guarantee that the mental capacity and acuity in any physician can be compromised by lack of food, water, and rest—especially at 4am after a grueling 10 hours of non-stop work.** I know from personal experience that I am sharper at the beginning of a busy shift than at the end. Therefore, I am a firm believer in checklists and written algorithms to assist the EMT or physician during cardio-pulmonary resuscitation.

That being said, with regard to Acute Alteration of Mental Status, I expect the EMT to be aware of the **general categories** of causes. Metabolic derangements, trauma, toxins, CNS structural lesions and infections are probably the most important ones to remember. Mnemonics are sometimes useful to help remember the etiologies of mental status change. One commonly used mnemonic is “AEIOU – TIPS”:

- **Alcohol, ingested toxins**
- **Epilepsy, Endocrine, Exocrine, Electrolytes**
- **Infection, Insulin**
- **Overdose, Opiates, oxygen deprived (Hypoxia, Hypercarbia)**
- **Uremia (renal failure)**
- **Trauma, Temperature**
- **Insulin, infection**
- **Psychosis**
- **Stroke, Shock, Space occupying lesions**

This list is an *oversimplification* and is intended to provide a *general framework* for differential diagnosis. For example, the “Endocrine” category has several subsets of potential diagnoses for acute mental status change (hyperglycemia, hypoglycemia, Thyroid Storm, Myxedema Coma, and Adrenal Insufficiency). The same is true for “ingested toxins”—there are several dozen common toxins that cause acute mental status change. I stress to you that I do not expect you to memorize all causes of Acute Alteration of Mental Status—but I do expect you to
be able to have an intelligent discussion with physicians and nurses regarding the most common causes and expect you to have a ready reference source for accessing information you have not memorized.

In our hypothetical patient, the astute EMT would have considered the above-mentioned list of differential diagnoses and would have recognized the urgency of the situation. The patient was a diabetic, so every attempt should have been made to obtain a glucose level. The patient had history of COPD and was wheezing, so the airway/breathing should have been more aggressively managed (nebulizers, Solu-Medrol, possible intubation in the field). Intraosseous access should have been secured in the field—since an IV was not possible. Waveform capnography should have been obtained in the field. Capnography provides vital information and insight into metabolism, perfusion and ventilation -- it is the standard of care now for EMS. An EKG should be a standard checklist item for every acutely ill patient in the field. Acute myocardial infarction can co-exist with any of the causes for mental status change. Often these patients do not have typical symptoms. These interventions not only improve the patient’s chance for survival, they help the emergency department team by providing more efficient and time-saving procedures and provide extremely useful information (How did the patient respond to interventions? What diagnoses have been ruled in or ruled out by the EMT’s thoughtful assessment and critical actions?). The patient had hypothermia and efforts to warm the patient should have been initiated in the field—perhaps external warming and warm IV saline boluses.

Although the patient had no obvious external sign of trauma, the EMT should have considered head trauma and brain bleed in the differential diagnosis and should have immobilized the cervical spine. Cervical spine fractures are found in approximately 20% of patients with severe head injury. Patients with chronic liver disease tend to bleed easily due to problems with vitamin K metabolism. Also, patients on medications such as Plavix (as in our hypothetical patient) and Coumadin are prone to bleeding complications. Alcoholics are notoriously susceptible to sub-dural hematomas from relatively “minor” head injuries. The patient had fallen onto a tile floor—a mechanism of injury likely to cause head injury and brain bleed.

SUMMARY

- EMS has experienced a significant evolution in the past two decades
- The modern day EMT is a “physician extender” and must train and educate him/herself accordingly
- The EMT should be familiar with, or have access to, differential diagnoses of all presenting symptoms
- Acute Alteration of Mental Status had many causes and sub-categories
- The EMT should be familiar with the most common causes of Acute Altered Mental Status.
- It is expected that the EMT will consider (or have access to) the differential diagnoses of Acute Alteration of Mental Status and perform the necessary physical examination, diagnostic testing and critical actions in the field.

ag/jt2012