1. What are the criteria for admitting this patient, as opposed to managing them as an outpatient? Why would they come to the hospitalist service (compared to a subspecialist or a transition bed)?

Many elderly patients with a syncopal spell are admitted, and without a definite system to examine (ie. arrhythmia in ER or neurological findings) may need a generalist to manage their workup. Their Goals of Care should also be taken into consideration. Many young, healthy patients undergo a syncopal spell which does not necessitate a work up unless it is recurrent. Persistently low BP, low hematocrit suggesting active hemorrhage, exertional syncope, abnormal ECG, family history of sudden death, and significant comorbidities are all signs the patient requires inpatient followup.

The vast majority of patients for whom a cause is found will be cardiac in origin. Those patients with a strong or suggestive history of CV illness may be best served by the Cardiology team. Patients who remain unstable in ER could potentially be admitted under IM.

2. What is your differential diagnosis?

Include at least three most likely, as well as at least one sinister hypothesis.

- orthostatic hypotension
- vasovagal attack (ie. postmicturation, cough, swallow)
- sick sinus / arrhythmia
- valvular disease
- seizure
- carotid sinus syndrome
- falling
- adrenal failure
- hypovolemia / bleed
- medications (TCA / anticholinergics, α/β blockers)
- CAD
- Shy-Drager syndrome
- amyloidosis
- uremia
- spinal cord injury
- paraneoplastic neuropathy
- cataplexy
- vertigo
- diabetic neuropathy
- subclavian steal syndrome
- cerebral aneurysm
- aortic stenosis
- deconditioning
- subarachnoid hemorrhage
- cerebral aneurysm
- heart block
- aortic dissection
- Parkinson’s disease
- stroke / TIA
- pheochromocytoma
- Guillan Barre syndrome
- anxiety
- pulmonary embolism
3. *What investigations will you order? What ongoing follow-up should be done during the admission?*

Laboratory investigations should include cbc with differential, glucose, electrolytes, renal function. Test for pregnancy in the appropriate patient.

Carotid sinus massage may reproduce syncope for those who suggest a history with head turning, shaving, or wearing tight collars.

Cardiovascular testing begins with an ECG and likely telemetric monitoring in ER. Ongoing monitoring on the ward could be either further telemetry or a Holter monitor (longer term testing can be done with an external loop recorder as outpatients). An echocardiogram tells of structural abnormalities for those with abnormal ECG and should be done in patients who tell of exercise-induced symptoms (only 3% yield). An exercise stress test or cardiac perfusion studies can delineate the extent of coronary disease. Intracardiac electrophysiologic studies are indicated when arrhythmia is suspected to be infrequent, and would detect conduction abnormalities.

Tilt table testing is sometimes done and can reproduce changes from orthostatic drop. This would be the investigation of choice to confirm neurally-mediated syncope. In patients with high suspicion (elderly, syncope with valsalva maneuver) this would not be indicated since the diagnosis is evident.

Those with suspicion of neurological event (focal deficits, witnessed limb movement or tongue biting or incontinence during the episode, post-ictal state) should be worked up accordingly. Neurological testing would include a CT of the head, or possibly MRI if this initial scan is normal. An EEG would show seizure activity or metabolic encephalopathy, given an appropriate history (less than 1% yield). Carotid ultrasound would show a source of potential CVA or stenosis for those with suspicious neurological symptoms.

Rare cases result from amyloidosis, which can be sought in bone marrow or buccal mucosa.

4. *What will be the management principles for the most likely condition? Include both pharmacologic and non-pharmacologic management. What contra-indications could exist for these choices? Be ready to discuss these with your preceptor in detail.*

- salt and water supplements can improve orthostatic hypotension, as well as counseling on avoidance of triggering conditions (warm environments, fever, alcohol, large carb meals, prolonged standing, volume depletion). Anemia and hypovolemia need to be corrected.

- medications for orthostatic symptoms include ß blockers (mixed evidence) such as atenolol – for those suspected of having reflex brady after a tachy spell
  - fludrocortisone (mineralocorticoid) is also used, with better effect
  - á agonist midodrine, gradually increased, given throughout the day until 18:00

- exercise programs, sleeping with the bed tilted 10°, and learning to rise slowly upright. Compression stockings may help in patients with clear venous pooling.

- cardiac pacing can benefit patients with documented bradycardia. Patients with congenital prolonged QT syndrome might respond to ß blockers. Radiofrequency ablation prevents supraventricular tachycardia.

- stop exacerbating medications: antihypertensives, antipsychotics, diuretics, antidepressants, and anticholinergics. Narcotics, bromocriptine, and meds for erectile dysfunction can also trigger syncope
5. What complications could arise during this patient’s stay? How could you attempt to prevent these?

Falling is a direct consequence of this illness (and injuries related to falls such as fractures, lacerations, ICH), and many patients should be admitted with instructions for bed rest until proven to be stable. Falls risk monitoring, bed alarms can also be in place. Nurses should be encouraged to assist patients in going to the bathroom or on walks. They can also check for a postural drop in vital signs daily prior to ambulation. This can be a diagnostic tool as well as a method to prevent falls.

Since most patients have a cardiac cause of syncope, any prolonged arrhythmias can result from diseased conduction systems. Maintaining a high suspicion and keeping them on telemetry will alert the physician of such an occurrence quickly. Patients with cardiac syncope are at high risk of cardiac arrest, and risk stratification might be preventative. In some cases, CV surgery or pacemaker insertion will be indicated.

Medication changes that may have been made also need to be reviewed, to ensure that patients do not have complications for holding or adding medications that were though to be related to their syncope (ie. Holding diuretics and heart failure, changing insulin in diabetics and erratic BG, antihypertensive medications to name a few).

Overall, patients admitted with syncope are at risk of adverse morbidity, mortality and cardiovascular outcomes as well as recurrence.

6. What other resources can you enlist to assist you in the management of this patient?

Physiotherapists can be enlisted to show the patients techniques of syncope prevention. Leg crossing, stooping, arising in stages can be demonstrated and practiced. They can perform a test of balance, and give suggestions on walking aids. Isometric leg exercises will promote venous return. The allied health team can also help the patient with home services that may be helpful, such as Lifeline, home care monitoring, etc.

Cardiologists should be consulted with those patients with a cardiac history; even CHF and myocarditis can produce syncope. For those without a prior CV history, only 3% will have a cardiac cause found. Any family history of “sudden death” warrants a consultation with Cardiology. Patients who need electrophysiologic testing (suspicion of heart conduction defect but noninvasive testing does not prove) would also be seen.

Patients without overt neurological signs rarely have syncope attributed to the nervous system. Those who have headache or dizziness on recovery are more likely to have CNS cause. Neurologists are often consulted when this is suspected, and they can often find more subtle neurological signs on examination.

7. How will you know this patient is ready for discharge – what parameters will be your guide and what needs to be in place at their residence?

Patients should have been walking and carrying on their normal routine without any further symptoms. The CV monitoring should not show sustained abnormal rhythms unless definitive treatment has been implemented (ie. pacemaker). Any reversible causes identified have be addressed and reversed if possible, and should be stable, or stable enough for their GP to monitor as an outpatient.

In many situations, the physician should counsel the patient with recurrent syncope to avoid driving. For some patients, the cause will not be determined so definitive therapy not found, and if syncope is substantial and presents without warning then driving would be dangerous.
Helpful review can also be found on Dynamed, “syncope evaluation”

(PDF attached)

Interesting related articles:

· Variable presentation of Brugada syndrome: lessons from three generations with syncope
  
  http://www.bmj.com/content/326/7398/1078

· Neurocardiogenic syncope
  
  http://www.bmj.com/content/329/7461/336

· Syncope and falls due to timolol eye drops
  
  http://www.bmj.com/content/332/7547/960

· An approach to the evaluation and management of syncope in adults
  
  http://www.bmj.com/content/340/bmj.c880