



Hosts: Braedon Paul, Caleb Dusdal

Syncope = a brief loss of consciousness and postural tone that resolves spontaneously with a return to baseline neurological function within seconds or a few minutes.

Presyncope = near LOC. Should be worked up the same as we know it portends a similar risk of downstream badness as syncope. presyncope is "I almost lost consciousness and then recovered" → more of acute thing. The final common pathway of syncope is the same regardless of the underlying cause. In general, 10 seconds of interrupted blood flow to the brain.

Objectives Two, Eight, Twelve, and Thirteen: As part of the assessment of a patient who has lost consciousness, obtain focused history from the patient or witnesses that would include duration, trauma, pre-existing conditions, drugs, toxins, medications and seizure activity.

- **When following up patients who have lost consciousness, assess and advise regarding return to work, sporting, driving and recreational activities to minimize the possibility of injury to self or others in the event of a recurrence.**
- **In patients who have had a loss of consciousness without a clear diagnosis, pursue investigations (e.g., rule out transient arrhythmia, seizure).**

Case

Currently working rurally in Port Alberni on Vancouver island, so set scene there. Late november; working early AM shift, 1 patient in WR

- Triage notes:
 - 17F, fainted during high school. assembly, struck head, LOC ~ 30 s.
 - Chart: Triage vitals normal. No prior visits or charts.
 - Bring into room, Caleb what else you want to know on Hx:

Hx around fainting episode (prodrome, provoking stress or illness)

- Similar in past?
- Any cardiac sx?
- Risk factors DVT/PE? Eg, OCP, prolonged travel.
- Sexual activity / abdo pain / vaginal bleed (thinking ectopic)



- PMHx, Meds, non-Rx drugs
- Fm Hx cardiac conditions, sudden death?
- Collateral? → seizure like activity, tongue biting / incontinence / post ictal? Epilepsy hx?
- Fall itself → struck head → signs of trauma? headache/vomiting/amnesia/disorientation?

Case history:

- Early morning assembly. She skipped breakfast to get there early. Standing for about 30 minutes. Cramped gym. Warm. Started feeling diaphoretic and nauseous and “woozy”. Friends told her she looked pale.
- Next thing she remembers was waking up on the ground. According to her friend, she hit the back of her head on the gym floor. LOC about 15 seconds. Slowly came to, teachers helped get her up and to the nurses office. She had a juicebox and was feeling much better.
- No confusion persisting. No cardiac or respiratory symptoms. No DVT risk factors. No meds. Sexually active with 1 male partner. Uses barrier protection. LMP 1 week ago as expected.
- Feeling well before hand and feeling back to normal now. She does have ongoing minor local headache where she struck her head. No vomiting. No neck pain. No confusion. Otherwise feeling well.
- Has 1 similar episode in the past during her grade 6 vaccinations.
- No PMHx. No meds. No allergies. No family history of sudden death.

[give true overall impression of case → ie, likely vasovagal]

- Still do physical exam (CV/resp + signs of trauma to head /neck), repeat vitals
- Investigations → order ECG, b-hcg, standard bloodwork probably not needed
- Suspected disposition → d/c home

Want to dig into a few things mentioned on history b/c really important → those Qs inform the way I approach syncope and presyncope → which is 3 step approach.

- 1) Decide Syncope versus mimic (pseudosyncope)
- 2) If fits with syncope, what are the causes I need to consider and work-up? Is this benign versus potentially dangerous?
- 3) Disposition → what is this patient’s overall risk, how likely to happen again, are they safe to go home, if so, do they need investigations. And how do I counsel them?

So starting with step 1: syncope vs mimic, Caleb, what’s the big thing to consider here and how might we distinguish?

- BIG MIMIC = Seizure → can be tougher to distinguish than it sounds
- Few things can help distinguish
 - Tongue biting - especially lateral tongue (100% Sp for Sz)
 - Incontinence (urinary or bowel)



- Post ictal state (several minutes)
- obvious seizure like activity
 - 10:20 rule “ patients with witnessed <10 myoclonic jerks after sudden loss of consciousness is more like syncope vs >20 myoclonic jerks is more likely seizure”
 - Great discussion from “syncope simplified” episode from EM cases
- ANOTHER MIMIC IS HEAD TRAUMA → LOC (esp. In older folks, mechanical fall, struck head, THEN lost consciousness from the fall itself).
 - Look for signs of trauma. That’s just generally GOOD PRACTICE for all syncope patients. Especially frail & elderly → Fall from standing can lead to serious trauma.

You’ve decided it’s syncope / presyncope → NOW SECOND BRANCH POINT ⇒ what caused the syncope?

- Classic EM mindset that is also highly relevant to office based FP: rule out the deadly stuff, then consider the common stuff
- COMMON approach = cardiac vs non-cardiac. Braedons’ favoured mnemonic for the syncopal episode (ie RESOLVED LOC):
 - CARDIAC
 - rhythm problem (eg, rate TOO FAST or SLOW → dysrhythmia, rapid runs of afib/flutter or VT or those weird congenital QT syndromes - outside the scope) versus structural problem (classic HYPERTROPHIC OBSTRUCTIVE CARDIOMYOPATHY HOCM → sudden death in a young healthy athlete) or really bad AORTIC STENOSIS. Logical. → BOTH = block blood from getting to brain.
 - CLOT
 - Reminds me to think of PE → can present w/ syncope. Hopefully not an ISOLATED finding, might have associated CP/dyspnea or DVT/PE risk factors. Probably have VITAL DERANGEMENT (TACHY, HYPOXIC).
 - BLEEDS
 - BLEEDS: scary things. Emptying the tank → transient shock-like state due to blood loss.
 - In essence, can be ANYTHING that causes blood loss.
 - AAA, GI bleed, ruptured ectopic are big important examples.
 - Those typically will present with OTHER FEATURES AS WELL. eg, Abdo pain, hematochezia, vaginal bleed or pelvic pain.
 -
- BP



- Ranges from the common ORTHOSTATIC hypotension - commonly OLD folks stood up too quickly - to compensated shock - more commonly YOUNG people.
- Caveat → orthostasis is common but not always benign and could be a symptom of something else causing low blood pressure → don't forget hypotension DDX (ie shock approach)
- BRAIN
 - Reminds me of The most common and thankfully benign cause of syncope → vasovagal (autonomic nervous system) → about 20% ED visits for syncope
 - This has typical prodrome: diaphoretic, nauseous, look pale. Many of us have experienced this.
 - Emotional or stressful trigger, standing in a hot room, getting sutured by a first-year medical student who forgot local anesthetic.
 - Triggered by urination or BMs too → valsalva. Classic for older guy BPH getting up at night to pee → strains → passes out
 - Carotid sinus hypersensitivity → classic = shaving then syncope
 - BRAIN also reminds me once again to make sure this wasn't a seizure. Other intracranial stuff (eg, SAH, TIA) can present with syncope too, but not in isolation, you should see other stuff. Also less likely but psychogenic pseudosyncope

We've talked about DDX, how do we distinguish?

HISTORY IS KING

- Low risk features we already mentioned (classic prodrome, stressful trigger). Often have a history of the same.
- High risk → mnemonic CARDIAC, CLOTS, BLEED, BP, BRAIN → MOST should have associated clinical features that clue you in ("SYNCOPE PLUS" - abdo pain, chest pain, palpitations, etc)
- Important to remember Cardiac - rhythm or structure problems - these are the big killers - the things to rule out
- Few important things that are concerning for CARDIAC
 - Hx → no prodrome OR palpitations/chest pain/dyspnea prodrome, happened during exertion
 - PMHx → known cardiac disease of any kind, ++ CV risk factors, afib/flutter, pacemaker, family hx sudden death (eg, unexplained drownings in young people)
 - Don't forget to ask about Meds (esp antihypertensives) and other drug use for all syncope patients.



- Investigation-wise, every patient who presents after a syncopal or presyncopal episode needs one thing. PAUSE .. ECG. Exception maybe person very clearly vasovagaled, but never wrong to get.
 - Lots of things we're looking for in the ECG - outside scope today
 - Summary: NSR good = everything else ranges from possibly bad to very bad.
 - WEARABLES can be helpful too → I have actually picked up a tachyarrhythmia in a guy who presented with an unprovoked syncopal episode because his Apple watch recorded it. He was NSR in the ED so could have gone missed.
 - Anything else to consider Caleb?
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- Labs → Not always required! Guided by Hx/Px; Typically CBC, lytes, renal function (anemia/infection/electrolyte disturbance)
 - Consider B-hcg for reproductive age female. Not always required if there's a clear trigger. (ruptured ectopic, more benign like miscarriage or pregnancy in general causing hemodynamic changes)
 - Any test you order beyond that is patient specific (eg, cardiac, PE, septic workup, CT head if preceding headache, etc)

For good measure, we've included the syncope aetiology table from Tintinalli's

TABLE 52-1 Causes of Syncope	
Cardiac*	Neural/Reflex Mediated
Structural cardiopulmonary disease	Vasovagal
Valvular heart disease	Situational
Aortic stenosis	Cough
Tricuspid stenosis	Micturition
Mitral stenosis	Defecation
Cardiomyopathy	Swallow
Pulmonary hypertension	Neuralgia
Congenital heart disease	Carotid sinus syndrome
Myxoma	Other
Pericardial disease	Orthostatic hypotension (see text)
Aortic dissection	Psychiatric
Pulmonary embolism	Neurologic
Myocardial ischemia	Transient ischemic attacks
Myocardial infarction	Subclavian steal
Dysrhythmias	Migraine
Bradydysrhythmias	Medications (Table 52-2)
Short or long QT syndromes	Breath holding (children)[†]
Stokes-Adams attack	
Sinus node disease	
Second- or third-degree heart block	
Pacemaker malfunction	
Tachydysrhythmias	
Ventricular tachycardia	
Torsades de pointes	
Supraventricular tachycardia	
Atrial fibrillation or flutter	

For what it's worth The most common causes of syncope identified in the Framingham Heart Study

Were

1. vasovagal (reflex mediated, 21%),
2. cardiac (10%),
3. orthostatic (9%),
4. medication related (7%),
5. neurologic (4%),
6. and unknown (37%)



- This is all to figure out what LED to syncope
- Don't forget about consequences of syncope? What happened when they fell?
- Signs of trauma → especially to head and neck → thorough exam
- This actually makes up TWO of the 11 CCFP objectives, I'll just read them again b/c they explain themselves:
 - In patients with a loss of consciousness and a history of head trauma, rule out PAUSE intracranial bleeding.
 - In patients with a loss of consciousness who are anticoagulated, rule out PAUSE intracranial bleeding.

- Back to case. Exam → vitals normal. CV/Resp N.
- Tender to back of head where she fell, no bleeding/deformity/swelling. No other trauma to face/scalp/neck.
- Invx → ECG NSR 74 bpm.
- She's feeling well and at her baseline
- Ready to send home with a diagnosis of VASOVAGAL syncope.
- How do we counsel?

Objective Nine: When following up patients who have lost consciousness and where there is potential for recurrent episodes, discuss specific preventive and protective measures (e.g., position changes with orthostatic pressure changes).

- Safety counselling:
 - Regardless of setting (ED, urgent care, clinic)
 - VASOVAGAL:
 - trigger recognition + avoidance if possible
 - Symptoms recur? → lie down + elevate legs
 - "Counter pressure maneuver" → tensing your arms with clenched fists, leg pumping, and leg-crossing may stop a vasovagal syncopal episode, or at least delay it long enough that you can lie down with the feet elevated.
 - Will talk about a few other scenarios
 - A) ORTHOSTATIC? →
 - compression stockings, contracting leg muscles before standing, SLOW TO STAND + IN STAGES (lie down → sit at bed → stand)
 - stay hydrated + consider increasing sodium intake if they're a tea-and-toaster or baseline low BP



- What if cause unknown (ie, no trigger)

Objective Eleven and Seven: Advise authorities about appropriate patients with loss of consciousness (e.g., regarding driving status). And When following up patients who have lost consciousness, assess and advise regarding return to work, sporting, driving and recreational activities to minimize the possibility of injury to self or others in the event of a recurrence.

- A few things to think about for these patients:
 - FIRST THING → DISPOSITION: admit on tele vs discharge? Depends on overall risk assessment PLUS likelihood of cardiac or medical cause.
 - HARD TO PREDICT RISK, some scores like Canadian syncope risk score can help determine dispo (looks at things like ECG findings, cardiac history, blood pressure).
 - If discharge → think about Holter, echo, close follow up. Other investigations can be considered if needed.
 - SECOND THING → DRIVING + RISKY activities (eg, swimming, certain sports)
 - Canadian Medical Association Driver's Guide (9th edition; pub 2019) + Canadian Cardiovascular Society have identical guidelines.
 - Hopefully patient adheres to this → if any concern, may have to report to driving authorities
 - Apply to driving specifically but logical to extend this into other high risk activities too
 - Call and response (below);



Predisposition to vasovagal symptoms Triggered by being in a warm crowded place, prolonged standing, fear, emotion, or pain	No 0	Yes -1						
Heart disease history CAD, atrial fibrillation or flutter, CHF, valvular disease	No 0	Yes +1						
sBP <90 or >180 mmHg On any reading	No 0	Yes +2						
Elevated troponin >99th percentile of normal population	No 0	Yes +2						
Abnormal QRS axis <-30° or >100°	No 0	Yes +1						
QRS duration >130 ms	No 0	Yes +1						
Corrected QT interval >480 ms	No 0	Yes +2						
ED diagnosis Based on ED evaluation	<table border="1"> <tr> <td>Vasovagal syncope</td> <td>-2</td> </tr> <tr> <td>Cardiac syncope</td> <td>+2</td> </tr> <tr> <td>Neither</td> <td>0</td> </tr> </table>		Vasovagal syncope	-2	Cardiac syncope	+2	Neither	0
Vasovagal syncope	-2							
Cardiac syncope	+2							
Neither	0							

-2 points
Canadian Syncope Risk Score

Very low risk
0.7% risk of 30-day serious adverse event (death, arrhythmia, MI — full list in Evidence)

Copy Results Next Steps

CALEB QUESTION	BRAEDON ANSWER
Single vasovagal episode	NO RESTRICTION <i>*caveat is if occurs in sitting position or VERY BRIEF prodrome (ie no time to pull over)</i>
Diagnosed and treated cause	Wait 1 week with no recurrence (1 month if commercial)
Reversible cause (eg, hemorrhage)	Can drive once successfully treated.



Situational w/ avoidable trigger (eg, micturition)	Wait 1 week with no recurrence
Single unexplained episode OR recurrent vasovagal episode	Private - wait 1 week Commercial - wait 12 months!!
Recurrent unexplained syncope w/in 12 mo	Private - wait 3 months Commercial - still wait 12 months

Objective Ten: In patients with loss of consciousness following head trauma, treat and follow up according to current [concussion](#) guidelines.

- What about concussion? Objective 10 → treat and f/u per concussion guidelines.
- More applicable to HEAD TRAUMA → LOC as opposed to syncope episode, but can happen other way around too (depending on mechanism, degree of head trauma from episode)
- Concussion = big topic in itself. Interestingly not mentioned anywhere else in 105 Topics. High yield in life, perhaps not exam.
- Very quick TL;DR Concussion in a nutshell
- Define as minor TBI GCS 13 to 15, measured at approximately 30 minutes after the injury
 - Clinical Dx; headache, concentration and emotional impairment “brain fog”, balance/vestibular issues
 - Absence of headache red flags
 - Explain to patients “bruised your brain → takes time to heal, can’t be rushed”
- Important aspects are:
 - **A) Red flag and expected symptom counselling:** discuss @ bedside but just give them a handout. Make your life and their life easier. [Parachute – Preventing Injuries. Saving Lives. \(parachutecanada.org\)](#) is a great resource. A million province / health authority specific. Find one you like.
 - **B) follow up:** Should be following up closely in clinic, ~ 48h after injury then regularly per symptoms
 - Involve allied health & other resources → multidisciplinary concussion management programs may exist.
 - **C) return to activity / work / school** → general idea is graduated stepwise return, each stage 24h before advancing, go back to previous stage x 24h if not tolerated.
 - Traditionally advised few days of rest → then start activity.
 - Recent evidence suggests improved outcomes if light exercise started early (ie, < 2 days post-concussion) AS TOLERATED BY SYMPTOMS



Objectives One, Three and Six: In an unconscious patient, assess ABC's and resuscitate as needed. Examine unconscious patients for localizing and diagnostic signs (e.g., ketone smell, liver flap, focal neurologic signs) and Assess and treat unconscious patients urgently for reversible conditions (e.g., shock, hypoxia, hypoglycemia, hyperglycemia, and narcotic overdose).

Before finishing, briefly highlight the approach to CURRENTLY unconscious patient

- Very different than syncope approach → a bit odd that its grouped together
- Think about this like “altered mental status” not syncope
- 1st objective, “Check ABCs and resuscitate as needed” → fairly straightforward
- A few pearls for the bedside, empiric things for ALL obtunded patients :
 - Start a MOVIE (monitored bed, o2 if needed, vitals, IVs x 2, ECG)
 - ABCs already beat into our brain, D and E less often, so will briefly cover:
 - Disability / Dextrose (reminds me to check blood sugar) → pupils, GCS, blood glucose
 - Exposure → look for evidence of trauma, drug use, pain medication patches, medical alert bracelets, and infection.

Why are they obtunded?

- A million and 1 reasons
- I love DIMES approach, everything you need in it.
- VERY briefly cover a few pearls for each of these

Category	Example → Invx/Tx
Drugs (braedon)	Review patient drug list (?OD, severe SEs) Serum tox (salic, tylenol, etoh) *don't forget opioids → clinical → naloxone Others = benzos, etoh.
Infections (caleb)	Meningitis / encephalitis is big one, but bad sepsis (resp, urine, derm) can alter you. → Think about SIRS + source . → thorough exam for signs of infection → basic b/w, blood culture, urine, +/- CSF, other sepsis labs (eg, lactate)
Metabolic (bradon)	Electrolyte problem?. Big causes: - Na (esp low), - K (esp high),



	<ul style="list-style-type: none"> - Ca (altered). Renal patients! EtOH! Malignancy! Frail elderly. Liver failure? Known liver dx? <ul style="list-style-type: none"> - Tylenol, - viral hepatitis, - hepat. Enceph? Blood glucose problem? Esp too low (ABC Dextrose). Other (thyroid)
Environmental (caleb)	Carbon monoxide? Collateral important. Wood fire heating? Fire? Hypothermia / hyperthermia? Primary psychiatric → Dx of exclusion
Structural (braedon)	Head → stroke/bleed?; Seizure? Encephalopathy? CT head. Heart → MI, arrhythmia → ECG, trop, POCUS Lungs → resp. Failure → Spo2, blood gas Pipes → Cardiogenic, hypovolemic, obstructive, distributive GI/GU → urinary / stool retention

Again for the keeners, we've included the table from Tintinalli's for 'Coma' to drill some of these DDX in your head

TABLE 168-5 Differential Diagnosis of Coma

Coma from causes affecting the brain diffusely

- Encephalopathies
 - Hypoxic encephalopathy
 - Metabolic encephalopathy
 - Hypertensive encephalopathy
- Hypoglycemia
- Hyperosmolar state (e.g., hyperglycemia)
- Electrolyte abnormalities (e.g., hypernatremia or hyponatremia, hypercalcemia)
- Organ system failure
 - Hepatic encephalopathy
 - Uremia/renal failure
- Endocrine (e.g., Addison's disease, hypothyroidism, etc.)
- Hypoxia
- Carbon dioxide narcosis
- Toxins
- Drug reactions (e.g., neuroleptic malignant syndrome)
- Environmental causes—hypothermia, hyperthermia
- Deficiency state—Wernicke's encephalopathy
- Sepsis

Coma from primary CNS disease or trauma

- Direct CNS trauma
 - Diffuse axonal injury
 - Subdural hematoma
 - Epidural hematoma
- Vascular disease
 - Intraparenchymal hemorrhage (hemispheric, basal ganglia, brainstem, cerebellar)
- Subarachnoid hemorrhage
 - Infarction
 - Hemispheric, brainstem
- CNS infections
- Neoplasms
- Seizures
 - Nonconvulsive status epilepticus
 - Postictal state





References:

- Approach to Syncope (EM:RAP CorePendium)
- Approach to Altered Mental Status (EM:RAP CorePendium)
- UpToDate: Approach to the adult patient with syncope in the emergency department
- [CMA Driver's Guide: Determining Medical Fitness to Operate Vehicles \(joulecma.ca\)](http://joulecma.ca) & [3. Driving: Syncope - Société cardiovasculaire du Canada \(ccs.ca\)](http://ccs.ca)
- [Early Exercise is Associated with Faster Concussion Recovery Among Collegiate Athletes: Findings from the NCAA-DoD CARE Consortium - PubMed \(nih.gov\)](http://nih.gov) & [Early Return to Activity Improves Symptoms in Children With Concussion | AAFP](http://aafp.org)
- <https://www.parachutecanada.org/en/>