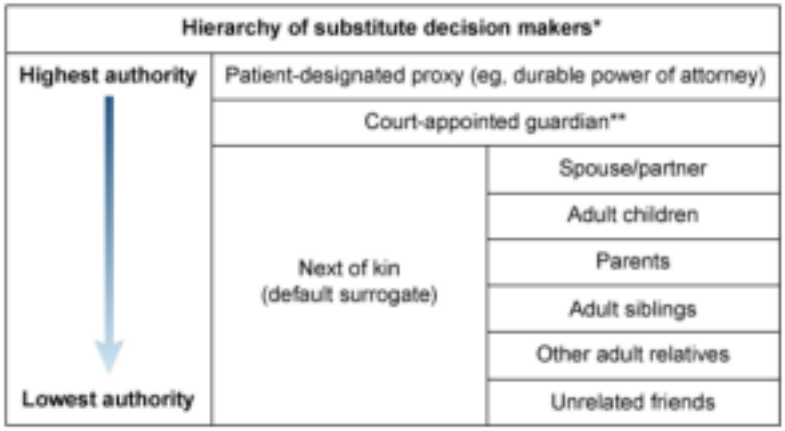
[Pre-test EM]
[Molly's slides]

Common emergencies

- **EMTALA**
  - **Emergency medical treatment and active labor act**
    - Provide screening exams, treat and stabilize, transfer after stabilization
    - cannot turn people away
- **Good Samaritan**
  - Protection for good-faith efforts with or without an established physician-patient relationship
  - Volunteer is not exempt from lawsuits
  - Must stay with patient until transfer to other care occurs
- **Other Laws**
  - **Cruzan v. Director** = right to refuse life-sustaining tx (tube feeds)
  - **Public health service act** = HHS leads federal public health and medical responses
  - **Schloendorff v society of NY hospital** = informed consent ○ **stafford act** = disaster relief and emergency assistance act
  - **Tarasoff v regents** = duty to protect intended victim
- **Surrogate decision maker**



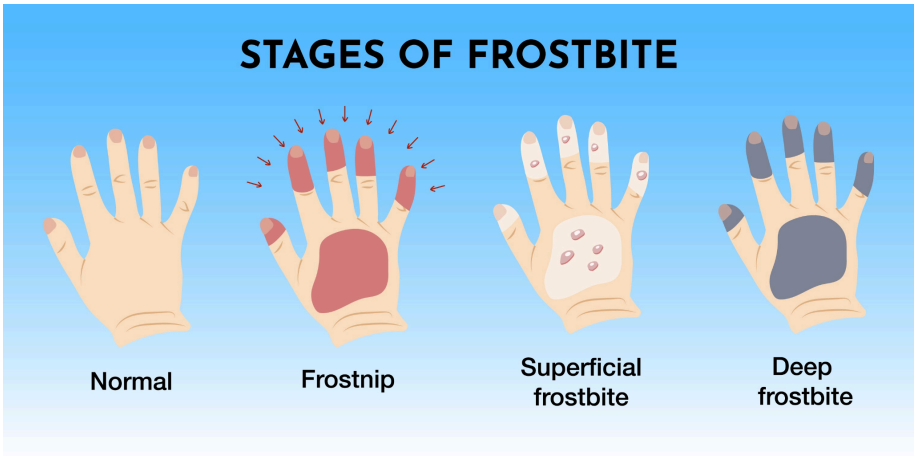
Heat Illnesses

- **Heat cramp**
  - **Pathophysiology**: Dilutional hyponatremia + muscle fatigue during exercise
  - **Presentation**: Intense, involuntary spasms (usually legs/calves) after intense

exertion
    - **Treatment**:
        - Replenish sodium: Oral electrolyte solutions (Gatorade) or IV NS if severe
        - Mechanical: Passive stretching of the affected muscle
- **Heat syncope**
    - Normal, mildly elevated temperature
    - Pathophysiology: Peripheral vasodilation + venous pooling → Decreased venous return → Drop in Cardiac Output (CO) → Cerebral hypoperfusion
    - **Exertional:** Occurs immediately after **cessation** of exercise (loss of skeletal muscle pump)
        - Common in endurance athletes/marathoners
    - **Non-exertional:** Standing for long periods in heat (e.g., elderly, military parade)
    - **Workup:** EKG, Chest X-ray (to rule out cardiogenic causes)
    - **Treatment**:
        - **Supine position** (restore blood flow)
        - **Evaporative Cooling:** Water mist + fans
        - **Cold water compresses**
        - **Caution:** Avoid cold water *immersion* in elderly (shock risk)
- **Heat exhaustion**
    - **Defining Vitals:** Body temp 101°F – 104°F
    - **Pathophysiology:** Inadequate cardiac output due to volume depletion and vasodilation
    - **Presentation:** Dizziness, malaise, nausea, tachycardia
    - **Crucial Negative:** NO neurologic dysfunction (patient is essentially mentally clear)
    - **Treatment:** Move to shade, active cooling, rehydration
- **Heat injury**
    - **Defining Vitals:** Body temp **> 104°F**
    - **Presentation:** Collapse during exercise
    - **Key Feature:** Evidence of **organ damage** due to thermal injury (e.g., AKI, Rhabdomyolysis, Liver injury) *without* the full frank encephalopathy of stroke, though often a precursor
- **Heat stroke**
    - **Defining Vitals:** Body temp **> 104°F**
    - **Key Feature: CNS Dysfunction** is required for diagnosis (Encephalopathy, confusion, ataxia, seizure, coma)
    - **Pathophysiology:** Thermoregulatory failure
    - **Treatment:**
        - **Rapid cooling is a priority** (Target < 102°F within 30 mins)
        - Ice water immersion is gold standard for exertional young patients

Systemic Hypothermia

- **Definition**: Core temperature < 95°F (< 35°C)
- **Etiologies**:
  - Environmental: Prolonged exposure to cold
  - Medical (The "Board Trick" causes):
    - Sepsis: Dysregulation of hypothalamus/vasodilation
    - Hypothyroidism: Myxedema coma (metabolic slowing)
    - Adrenal Insufficiency: Lack of cortisol/catecholamines
- **Management Hierarchy**:
  - Mild (Passive External): Remove wet clothes, warm blankets
  - Moderate (Active External): Heated blankets ("Bair Hugger"), radiant heat
  - Severe/Cardiac Arrest (Active Internal):
    - Warm IV fluids (isotonic)
    - Warm irrigation (bladder, thoracic, peritoneal lavage)
    - ECMO (fastest rewarming)



Condition	Type	Key Features	Treatment/Prognosis
Pernio (Chilblains)	**Non-freezing**	**- Inflammatory lesions on toes/fingers** **- Painful/itchy, swelling patches**	**- Keep warm/dry** **- Resolves in weeks**

Trench Foot (Immersion)	**Non-freezing**	- **Prolonged dampness + cold** - **Pale/wrinkled skin → painful/red upon warming**	**Dry feet, change socks, elevate**
Frostnip	**Superficial Freezing**	- **Numbness, tingling, pain** - **No tissue loss**	- **Passive warming** - **Resolves completely**
Frostbite	**Deep Freezing**	- **Tissue Necrosis** - **Ice crystals form in cells** - **Loss of sensation**	- **Rapid Rewarming (water bath)** - **tPA / Iloprost**

Lab abnormalities

Laboratory abnormalities in hypothermic patients

Abnormality	Mechanism
Metabolic acidosis	Decreased tissue perfusion
Respiratory acidosis	Hypoventilation
Azotemia	Decreased renal perfusion
Hyperkalemia	Cellular lysis
Hyperglycemia*	Loss of insulin effect <30 C (86 F)
Elevated lipase	Cold-induced pancreatitis
Elevated hematocrit	Hemoconcentration
Coagulopathy	Impaired coagulation pathways
Leukopenia, thrombocytopenia	Splenic sequestration

* Hypoglycemia may be seen in a few patients for reasons that are unclear.

Electrical Injuries

- **The "Iceberg Effect"**: Surface burns are often small, but internal damage (muscle/nerve) can be massive
- **Key Complications:**
  - Cardiac Arrhythmias: VFib (AC current/household) or Asystole (DC current/lightning). Telemetry monitoring is mandatory

    - Rhabdomyolysis: Massive muscle necrosis → Myoglobinuria → Acute Kidney Injury (AKI)
    - Neurologic: Loss of consciousness, amnesia, weakness, peripheral neuropathy.
    - Burns: Entry and exit wounds
- **Treatment**: Supportive care, fluid resuscitation (titrated to urine output for rhabdo), and continuous cardiac monitoring

Puncture Wounds & Tetanus

- **Risks:** Deep tissue infection, **Osteomyelitis** (especially if through a sneaker—think *Pseudomonas*), Cellulitis.

Tetanus Prophylaxis Algorithm:

Wound Type	Vaccination History	Action Required
Clean/Minor	< 10 years ago	None
Clean/Minor	> 10 years ago (or unknown)	**Td/Tdap vaccine**
Dirty/Severe	< 5 years ago	None
Dirty/Severe	**> 5 years ago**	**Td/Tdap vaccine**
Dirty/Severe	**Incomplete (<3 doses) or Unknown**	**Td/Tdap + Tetanus Immunoglobulin (TIG)**

Bites (Animal vs. Human)

Microbiology & Antibiotics

- **Animal Bites (Cats/Dogs)**: Pasteurella multocida, Staph, Strep, Anaerobes

- **Human Bites ("Fight Bite")**: Eikenella corrodens, Fusobacterium, Prevotella
- **Antibiotic of Choice:** Amoxicillin-Clavulanate (Augmentin) covers all key organisms (Pasteurella & Eikenella)

Wound Closure Rules

- **Secondary Intention (Left Open)**: generally preferred for bites to reduce infection risk (especially cat bites and human bites)
- **Primary Intention (Sutures)**: Only considered if:
    - < 12 hours old
    - Uninfected
    - Cosmetically important area (Face) or vascular area
    - Note: Human bites to the hand (clenched-fist injuries) are never closed primarily

Rabies Protocol

- **High Risk Vectors**: Bats, Raccoons, Skunks, Foxes (Wild animals)
- **Domestic Animals**: Observe animal for 10 days if healthy; if escaped/stray, treat patient
- **Post-Exposure Prophylaxis (PEP)**:
    - Rabies Immunoglobulin (RIG): Infiltrate around the wound
    - Rabies Vaccine: 4 doses (Day 0, 3, 7, 14)

HAZMAT & Decontamination

- **Priority #1: Decontamination** before treatment (protect the medical team/facility)
- **The Golden Rule:** Removing the patient's clothing removes **~90%** of the chemical/radioactive contaminant
- **Step 2:** Copious water irrigation (unless contraindicated by specific chemical)

TRAUMA: Primary Survey & Resuscitation

1. Primary Survey (ABCDEs)

- **A - Airway: ESTABLISH**
    - **Methods**: Orotracheal intubation (standard) vs. Cricothyrotomy (failed airway)
    - **Indications for Intubation:**
        1. GCS < 8
        2. Inability to protect airway (blood, emesis).
        3. Poor oxygenation/ventilation despite supplemental O2
        4. Expected clinical course (e.g., inhalation burn, expanding neck hematoma)
- **B - Breathing:**
    - **Assess**: Auscultation, O2 sats, chest rise
    - **Tension Pneumothorax:**

1. **Signs**: JVD, absent breath sounds, tracheal deviation, hypotension.
2. **Tx**: Immediate Needle Decompression (do not wait for CXR) → Tube Thoracostomy (Chest Tube)

- **C - Circulation:**
  - **Access**: 2 large-bore peripheral IVs → IO line → Central Line
  - **Shock Assessment**: Skin temp (cool/clammy), pulses, cap refill, BP (late sign)
  - **eFAST Exam**: Look for free fluid in:
    1. Hepatorenal recess (Morison's pouch)
    2. Splenorenal recess
    3. Pelvis
    4. Pericardium
- **D - Disability:**
  - **GCS Calculation** (EVM: Eyes 4, Verbal 5, Motor 6)
  - **Pupils**: Blown pupil = herniation.
  - **Motor/Sensory**: Gross movement check.
- **E - Exposure:**
  - Fully undress patient to find hidden injuries (axilla, perineum, back)
  - Prevent Hypothermia (warm blankets immediately)

2. Resuscitation & Shock Management

Shock Type	Clinical Signs	High-Yield Management
Hemorrhagic	Tachycardia, Hypotension, Flat neck veins	- **1.5L blood loss** triggers protocol - Start IV Crystalloids (NS/LR) - **Massive Transfusion Protocol (MTP):** 1:1:1 ratio (pRBC : FFP : Platelets)
Cardiac Tamponade	**Beck's Triad:** Hypotension, JVD, Muffled Heart Sounds	- **US (FAST):** Pericardial effusion with RV collapse - **Tx:** Pericardiocentesis → Thoracotomy (Pericardial window)
Tension PTX	JVD, Absent breath sounds, Hypotension	- Needle Decompression → Chest Tube

Neurogenic	Hypotension + **Bradycardia** + Warm skin	- Loss of sympathetic tone (T1-L2) - **Tx:** Fluids → Vasopressors
Cardiogenic	Elevated JVP, Pulmonary Edema, Hx of Blunt Cardiac Injury	- **Dx:** ECHO (myocardial contusion) - **Tx:** Inotropes, treat arrhythmias

TRAUMA: Region Specific

1. Neck & Spine Trauma

Decision Rules

- **NEXUS Low-Risk Criteria**: (Clear C-Spine without imaging if ALL met)
    1. No posterior midline cervical tenderness
    2. No intoxication
    3. Normal alertness (GCS 15)
    4. No focal neurologic deficit
    5. No painful distracting injuries

Penetrating Neck Injury

- Violates Platysma: High risk for great vessel/aerodigestive injury
- "Hard Signs" (Unstable): Expanding hematoma, pulsatile bleeding, bruit, shock, air bubbling from wound, massive hemoptysis
    - Next Step: **OR immediately** (Secure airway + Surgery)
- "Soft Signs" (Stable):
    - Next Step: CTA Neck (Angio) to evaluate structures

Spinal Cord Syndromes

- Complete Transection: Loss of ALL sensation/motor below level
    - Sacral Sparing: Check Anal Wink (S4-S5). If present → Incomplete injury (better prognosis)
- Spinal Shock vs. Neurogenic Shock:
    - **Spinal Shock**: Neurologic phenomenon. Temporary loss of all reflexes (flaccid paralysis, areflexia, loss of anal tone) below injury
        - Bulbocavernosus Reflex: Absent in spinal shock. Return of reflex = end of spinal shock phase
    - **Neurogenic Shock**: Hemodynamic phenomenon. Loss of sympathetic tone → Vasodilation (Hypotension) + Unopposed Vagal Tone (Bradycardia)

2. Chest Trauma

- **Emergency Thoracotomy Indications: (Last resort "heroic" effort)**
  - Penetrating trauma with witnessing signs of life (pupils, electrical activity) who arrest in ED
  - Massive Hemothorax output (>1.5L immediately or >200cc/hr)
- **Rib Fractures:**
  - #1 Priority: Pain Control (Nerve blocks, epidural, NSAIDs) to allow deep breaths
  - Complication: Hypoventilation → Atelectasis → Pneumonia
- **Pulmonary Contusion:**
  - **Path: Bruising of lung parenchyma**
  - CXR/CT: Patchy alveolar infiltrates (blossoms over 24-48 hrs)
  - Tx: Aggressive pulmonary hygiene, pain control, O2. Avoid fluid overload
- **Diaphragmatic Rupture:**
  - Signs: Bowel sounds in chest, elevated hemidiaphragm on CXR
  - Dx: CT Chest/Abd
  - Tx: Surgery (Abdominal approach usually)

3. Abdominal & Pelvic Trauma

- **Blunt Abdominal Trauma:**
  - **Hemodynamically Unstable**: FAST Exam
    1. Positive: Laparotomy
    2. Negative: Search for other sources (Pelvis/Chest/Femur)
  - **Hemodynamically Stable**: CT Abdomen/Pelvis with contrast
- **Pelvic Fractures:**
  - **"Open Book" Fracture**: Disruption of pubic symphysis
  - Risk: Massive retroperitoneal hemorrhage (venous plexus)
  - Management:
    1. Pelvic Binder (at level of greater trochanters)
    2. Fluid/Blood resuscitation
    3. FAST negative but unstable? → Angiography (IR embolization) or Pre-peritoneal packing
  - GU Trauma: Blood at meatus/High riding prostate → Retrograde Urethrogram (RUG) before Foley

GI: Abdominal Pain

1. Acute Conditions

- **Aortic Dissection:**
  - Ssx: Sudden onset "tearing" chest/abdominal pain radiating to back. Asymmetric pulses/BP
  - Dx: CT Angiography (CTA)

- Tx: BP control (Beta-blockers first) → Surgery (Type A) or Medical Management (Type B)

- **Acute Pancreatitis:**
  - Causes (GET SMASHED): Gallstones & Alcohol (Most common), Triglycerides, Hypercalcemia, ERCP, Drugs, Scorpion sting
  - Ssx: Epigastric pain radiating to back, N/V. Grey-Turner (flank) or Cullen's (umbilicus) sign = hemorrhagic/necrotizing
  - Tx: Aggressive IV Hydration, NPO, Pain control
- **Peptic Ulcer Disease (PUD):**
  - Causes: H. pylori, NSAIDs
  - Ssx: Gnawing epigastric pain
    - Duodenal: Better with food
    - Gastric: Worse with food
  - Tx: PPI, test/treat H. pylori
  - Complication: Perforation (Free air under diaphragm) → Surgery

2. Benign/Chronic Conditions

- **GERD:**
  - Risk Factors: Obesity, Pregnancy, Hiatal hernia
  - Tx: PPI trial, lifestyle mods (elevate head of bed, weight loss)
  - Red Flags: Dysphagia, weight loss, anemia → EGD
- **Anal Fissures:**
  - Ssx: Tearing pain with defecation, bright red blood on paper. Pts afraid to poop
  - Location: Posterior midline (most common). Lateral = Crohn's/HIV/Syphilis
  - Tx:
    1. Supportive: Fiber, fluids, Sitz baths, stool softeners
    2. Medical: Topical Nitroglycerin or Nifedipine (Vasodilators to relax sphincter)
    3. Refractory: Botox injection or Sphincterotomy (LIS)

Chest pain

- **Next steps**
  - **EKG** → r/o STEMI
  - **CTA** → pulmonary embolism (especially consider if sinus tachycardia and patient complaining of pleuritic chest pain)
  - **Aortic dissection** (acute onset chest pain)→ surgical repair
  - **Acute coronary syndrome** → emergency cardiology consultation
  - **Pulmonary embolism** → heparin infusion, unstable= TPa
  - **Spontaneous PTX** → observe + Oxygen
  - **Tension PTX** → needle, chest tube, pigtail aspiration
  - **Parapneumonic effusion** causing SOB → **thoracentesis**
  - **Bronchoalveolar lavage** → next step after thoracentesis, need to get cells for dx of central mass,

hemoptysis or obstruction

- **Tube thoracostomy** → continuous drainage for PTX, hemothorax, chylothorax, infected effusions, empyema, malignant effusions
- **Cocaine** → young person with SNS stimulation, dilated pupils, racing heart → urine toxicology

- **High yield**
  - **Never miss STEMI, aortic dissection, pulmonary embolism**
  - **Light's criteria**
    - **Transudate:** low protein
    - **Exudate**: high protein
      - Total protein effusion/ serum > 0.5
      - LDH effusion/ serum > 0.5
      - LDH effusion > ⅔ ULN LDH of serum
  - **Aortic dissection**
    - Symptoms and findings consistent with aortic dissection → **CXR** and **ECG** → abnormal serum Cr → Perform **TEE** if renal disease, **CTA** if healthy
  - **ACLS algorithm**
    - **Advanced cardiac life support**
      - Call for help #1
        - Start CPR, apply oxygen, attach monitor/ defibrillator
        - Examine monitor to decide if its shockable
          - Yes SHOCK = V tachy, fibrillation
        - no= PEA, asystole
        - SHOCK → CPR, epinephrine q 3-5 min, amiodarone if refractory
        - No SHOCK → epinephrine q 3-5 min, rhythm checks, treat reversible causes
          - Reversible causes = hypovolemia, hypoxia, MI, tension PTX, PE, hypo/hyperkalemia, acidosis
    - **Atropine**
      - bradycardia
    - **Epinephrine**
      - Pulseless VT, Vfib, PEA
    - **Electrical cardioversion**
      - Unstable sustained monomorphic ventricular tachycardia
      - unsynchronized= V fib/ tachy, PEA
      - **Synchronized** (lower energy)= unstable SVT
    - **Defibrillation**
      - Ventricular fibrillation, pulseless VT
    - **Dopamine**

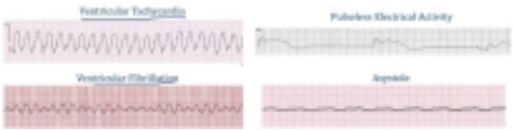
- Septic or cardiogenic shock

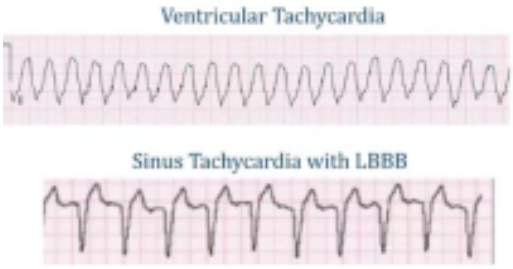
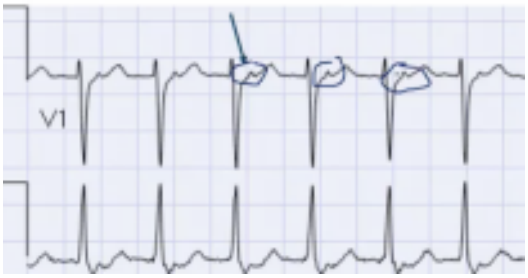
■ **Transcutaneous pacing**

- Symptomatic bradycardia when atropine fails
- 3rd degree heart block —> permanent pacemaker

■ **Transvenous pacing**

- Done if transcutaneous pacing doesn't work

1st degree heart block	nothing
2nd degree heart block	nothing, can give atropine
3rd degree heart block	**Transcutaneous pacing → pacemakers**
A fib	metoprolol
Wide complex tachycardias, stable ventricular tachycardia	**IV amiodarone** (stable) Cardioversion (unstable, unconscious)
Polymorphic ventricular tachycardia	**Due to myocardial infarction** Variable QRS morphology, unstable → cardiac arrest 
Torsades de pointes	**Prolonged QT interval** **Magnesium sulfate (recurrent)** Urgent defibrillation (unstable)
Cardiac arrest - VT, Vfib, asystole, PEA	 Time to resuscitation = survival START CPR **Unsynchronized cardioversion**
Wide complex tachycardia - RBBB/ LBBB, Ventricular tachycardia	Sudden onset/ unstable= SHOCK

- QRS > 120	
Narrow complex tachycardia - Aberrant electrical activity coming from above ventricle - Sinus tachycardia, A fib, A flutter, Atrial tachycardia, AVNRT	Treat underlying cause Sudden onset/ unstable= SHOCK 
SVT	unstable= **synchronized cardioversion**
Paroxysmal SVT - **AVNRT** (AV nodal reentrant) - Regular with abrupt onset - **Palpitations** but rarely syncope - AVNRT common in young women with palpitations, dual AV nodal pathways (retrograde P waves)	Decrease conduction to AV node & break arrhythmia - Carotid massage, vagal maneuvers, adenosine - Valsalva (increased intrathoracic pressures, aortic pressure rises → decrease HR and AV conduction) - Vagal maneuvers: valsalva, breath holding, coughing, deep respirations, gagging, swallowing Chronic tx: beta blockers, verapamil/ diltiazem, surgical ablation 
AVRT - Atrioventri	**procainamide**

cular reentrant tachycardia - Wolf parkinson white (WPW) syndrome	

- **EKG interpretation**
  - **Too fast?**
    - Unstable → Electrical cardioversion, defibrillation
      - Unstable tachyarrhythmia→ cardioversion
      - Unstable fibrillation —> defibrillation
    - A fib/ A flutter → rate control
    - SVT → vagal maneuver, adenosine
      - Monomorphic VT → consult cardiology, pharm cardioversion (amiodarone, procainamide, lidocaine, sotalol)
    - Wide QRS (>120)
      - RBBB/ LBBB, Ventricular tachycardia
  - **Too slow?**
    - unstable= atropine, transcutaneous pacing
  - Regular vs irregular
  - P waves? no= A fib (QRS unchanged)
  - deviation
    - LAFB= 2, 3, Avf negative QRS
  - LBBB or RBBB
  - **Heart attack ?**
    - Peaked T waves
    - **ST elevation**
      - **lateral**= I, AvL, V5 + V6
        - SA node ischemia → bradycardia, heart block
      - **inferior**= II, III, avF
        - Occlusion of RCA → inversion of V2, V3, AvF
        - **Right ventricular infarction**
          - Elevated JVP, hypotension, N, epigastric pain, bradyarrhythmia → right heart failure
          - Work up: right-sided precordial ECG (STE V4R)
          - Tx: IV fluids (increase preload)
          - **NO beta blocker!!**
          - **NO nitrates!**

- **anterior**= V1-V4
    - Occlusion of LAD
        - Cardiogenic shock → hypotension → pulmonary edema → RDS
- Posterior = ST depression (V7-V9)

■ Flattened T waves/ inversions

■ Q waves

- **STEMI**
    - **Next steps:** EKG → medications → **tPA or emergent angioplas**ty ■ Right ventricular MI- can cause increased RV preload → JVD, hypotension
        - Avoid nitrates, diuretics, opioids (further lower preload)
        - **Tx: normal saline**
    - Causes
        - Coronary angiography with stent placement (stent is thrombogenic) and increased risk of
            - Atherosclerotic plaque rupture would occur in a different vessel
    - Treatment
        - EMERGENCY **revascularization treatment ASAP**
            - **Stent < 90 min**, beta blockers and nitrates (decrease O2 demand) ● Thrombolysis: **alteplase, TPA < 30 mi**n (Note tPA should be given for strokes within 4.5 hours or less), aspirin, heparin
            - Clopidogrel
                - ADP receptor blocker, inhibits platelets
            - Eptifibatide
                - IIb/ IIIA receptor blocker
            - Bivalirudin
                - Direct thrombin inhibitor, stops clot formation
    - **Complications** → get transthoracic echocardiogram
        - 1-4 days post MI: **arrhythmia** → sudden cardiac death
        - 5-10 days (necrosis):
            - free wall rupture, tamponade, papillary muscle rupture, septal rupture VSD
            - **Ventricular pseudoaneurysm:** inferior wall, contained in scar tissue
            - Fibrinous pericarditis: extension of MI ischemia/ inflammation. No tx. self-resolving
        - Weeks later: dressler syndrome, aneurysm, LV thrombus, CVA

- dressler's= pericarditis post-MI, immune mediated.
  - Tx: NSAID, steroids
-
  - Weeks- months: anterior infarction → **ventricular aneurysm**

- **Stable angina**
  - **Pain with activity**
  - Normal labs
  - Work up: coronary angiogram
  - **Relieved with nitroglycerin**
- **Unstable angina**
  - **Pain with activity and rest**
  - Normal labs
- **Variant/ prinzmetal angina**
  - Coronary vasospasm
  - ST elevation
- **Myocardial infarction**
  - Hyperacute T wave (rarely see) → ST elevation → Q waves 8-12 hours after STEMI
- **Takotsubo cardiomyopathy**
  - **"Broken heart" and emotional distress (presents like a STEMI, but isn't)** ○ Octopus fishing pot
- **Atrial fibrillation**
  - "Palpitations" can go on for days. SOB, fatigue
  - Tx: rate control- **CCBs** (diltiazem), **metoprolol** to block AV node; rhythm control think of amiodarone or procainimide as options
  - If unstable, cardioversion
- **Acute pericarditis**
  - Viral or idiopathic, SLE, uremia
  - Scratchy heart sounds
  - Chest pain worse with laying down, better with sitting up
  - **ST elevation and PR depression throughout all leads**
  - Tx: high dose NSAID, colchicine
- **Neonate Airway & congenital heart disease**
  - laryngoscope straight, ET tube
  - EKG
  - IV access to umbilical vein
  - continuous capnometry
  - Meds: don't give CCB

Shortness of breath

- **Next steps**

○ **Flexible bronchoscopy**: adults with object induced airway obstruction ○ **Rigid bronchoscopy**: kids with object induced airway obstruction

○ **Bag valve mask ventilation**: unable to maintain > 88% O2 saturation ○ **Endotracheal intubation using video laryngoscope**: if BVM does not work ○ **Surgical cricothyrotomy**: unsuccessful intubation due to airway compromise ○ **BiPAP**

○ **Venous US**: DVT

○ **CTA or VQ scan** → pulmonary embolism

○ **Pulmonary angiography** → gold standard for PE

○ **Emergency intubation** → upper airway edema

○ **Vasopressors** → refractory hypotension despite maximal therapy with epinephrine

○ **Glucocorticoids** →

○ **Venom immunotherapy** → desensitization to bee stings

○ **Repeated epinephrine** → biphasic anaphylaxis

○ **Chest tube** → PTX, hemothorax, empyema, malignant effusion

○ **Needle thoracostomy** → emergency for life-threatening tension PTX ○ **Pericardiocentesis**→ cardiac tamponade

○ **Reposition endotracheal tube** → intubated with absent breath sounds ● **High yield**

○ **PFO** → venous clot to arterial clot → PE, stroke

○ **COPD exacerbation:** cough, sputum, dyspnea (triggered by URI)

● **Pulmonary embolism**

○ Hx of DVT, pregnancy, malignancy, obesity, sedentary/ long trips ○ Prophylaxis: SQ heparin, LMWH, SCDs (compression socks)

○ Arise from LE proximal veins: iliac, femoral, popliteal

■ **DVT**

● leg pain, warm, red, homan's sign (pain with dorsiflexion)

● Risk: cancer, pregnancy, immobility, IVDA in femoral vein

● Work up: DVT, Modified wells score → venous ultrasound

● Causes: factor V leiden (most common)

● Tx: IV heparin, LMWH → transition to oral anticoagulation (dabigatran, apixaban)

● IVC filter in high risk patients

○ b/l wheezing, SOB, pleuritic chest pain

○ V/Q mismatch, increased A-a gradient

■ PAO2= FiO2 x (Patm-Ph20) - (PaCO2/8)

■ Hyperventilation → hypocapnia → low PaO2, low PCO2

■ ABGs performed

○ S1Q3T3 (not helpful), mostly sinus tachycardia

● **Fat embolism**

○ Long bone fracture

- ARDS → mechanical ventilation
- AMS
- Petechiae

- **Amniotic fluid embolism**
  - Shortly after labor → maternal RDS, hypotension, hypoxemia
  - Bleeding, DIC, seizures
- **Pleural effusions**
  - Dx: small effusion → CXR in lateral decubitus
- **Aortic rupture**
  - Fatal
  - Hypotension, flat neck veins
- **Bronchial rupture**
  - Hypotension, JVD
  - Tension PTX, pneumomediastinum, subcutaneous emphysema ● **Lung contusion**
  - **Effusion, bleeding and flat neck veins**
- **Infectious**
  - **Inhalation anthrax**
    - Bacillus anthracis spores → flu symptoms → 24-48 hours septic shock, respiratory failure, mediastinitis
    - Widened mediastinum (hilar LN)
    - Death in 3 days
    - Untreated animal hides, raw wool

Shock & Resuscitation

- **Next steps**
  - **High-dose aspirin, IVIG= kawasaki**
  - Normal saline= low BP
  - Hyperkalemia tx
    - w/ ECG changes= **IV calcium gluconate**
    - **Insulin + glucose**
    - Albuterol
    - **(CIGAR); C**alcium gluconate; **I**nsulin;**G**lucose;**Al**buterol; **Re**sin-binding agents
  - Arterial line → continuous BP monitoring and draw labs
  - Central venous catheter→ done on stable patients
  - Intraosseous cannulation → rapid resuscitation when IV not accessed ○ **NG tube placement →** GI obstruction or dehydration in stable patients ○ Peripheral IV line placement → first to be established
- **High yield**
  - **DIC** → blood oozing from venipuncture sites, consumptive coagulopathy ■ Occurs with trauma, eclampsia, malignancy

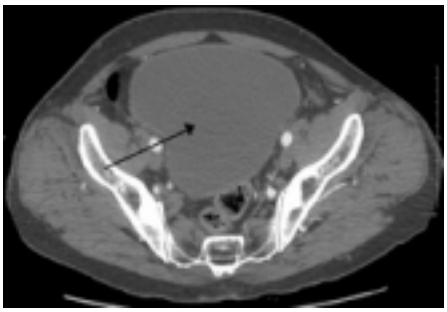
- **Toxic shock syndrome**
    - Local infection (tampon) → staph aureus toxins → negative blood culture ○ Tx: IV fluids → vasopressors, remove object
        - Next is Abx: vancomycin, clindamycin, penicillin
- **congenital adrenal hyperplasia**
    - on neonatal screening, dx before symptomatic
    - presents day 10-14
    - females: virilization, acidosis, hypoglycemia, hyponatremia, hyperkalemia, non-bilious vomiting, lethargy, dehydration
        - tx: hydrocortisone
        - tx of hyponatremia: 1-3 ml/kg titrated (slowly to avoid myelinolysis), D5 ■ don't give ceftriaxone= sequester bilirubin with in 30 days'

Gastrointestinal bleeding

- **Next steps**
    - **Octreotide → variceal bleeding** with EtOH use/ cirrhosis
    - PPI → reduce rebleeding and transfusion need
    - Guiac test and rectal exam
    - **CT abdomen**
- **High yield**
    - **Common causes: gastritis, diverticulitis, hemorrhoids**
- **Upper gastrointestinal bleeding**
    - If patient has altered mental status → prevent and treat complications ■ Aspiration → **endotracheal intubation**
- **Gastritis**
    - Constant, burning, non-radiating
    - NSAID use (diclofenac)
- **Gastroenteritis**
    - **Diarrhea**
        - mucoid/watery= yersinia, campylobacter (pseudoappendicitis)
        - hematochezia-= E coli
        - watery= norovirus
- **Esophageal perforation**
    - Boerhaave syndrome (full thickness tear)
    - Sudden onset chest pain with retching/ vomiting
    - Hematemesis, mediastinitis, air/ crepitus in tissue
- **Esophageal tear**
    - Mallory-weiss syndrome
    - Hematemesis, distal esophagus
    - May resolve on its own

- **Pancreatitis**
    - Alcohol use, gallstones common
    - Acute epigastric pain, lipase >3 uln, imaging abnormalities
    - Livedo reticularis, AKI
    - **Tx: morphine, supportive care and hydration**
- **Acute mesenteric ischemia**
    - **Abdominal pain, n/v, bloody poop**
    - Hx of A fib, CAD → embolus to mesenteric arteries
    - Dx: CT or MRA
    - Labs: anion gap metabolic acidosis
- **Ascites**
    - Tx: spironolactone + furosemide
    - Alcohol abstinence, Na restriction, avoid ACE and ARBSs bc of splanchnic vasodilation in diseased space leading to dependence of RAAS
    - Refractory ascites → large volume paracentesis
- **Splenic rupture**
    - atraumatic= viral, malignancy

Genitourinary

- **Next steps**
    - **Emergency dialysis**
        - **Methanol → hemodialysis**
    - **CT abdomen non contrast → kidney stone**
- **High yield**
    - Kidney stones → discharge home, hydration (if <5mm stone)
    - Big kidney stones > 10 mm or with sepsis→ urology consult (>5 - <10, next step may vary)
    - Ovarian cyst → ovarian torsion
    - postpartum endometritis —> clindamycin, ampicillin, gentamicin
- **Acute urine retention**
    - Causes: amitriptyline, atropine, diphenhydramine, epidural anesthesia, opioids, pelvic surgery
    - "Old person with belly pain, fullness **below umbilicus**"
    - **Tx: intermittent straight cath**
    - 

- **Emergent dialysis**
Indications for Acute Hemodialysis (AEIOU)	
A	**A**cidosis: Severe metabolic acidosis[1]
E	**E**lectrolytes: Severe hyperkalemia[1]
I	**I**ngestion: Toxic alcohols, lithium
O	**O**verload: Refractory fluid overload[1]
U	**U**remia: Uremic pericarditis or encephalopathy

Skin

- **Next steps**
- **High yield**

MSK

- **Next steps**
- **High yield**
- **Compartment syndrome**
  - pain with passive stretch
  - Increased pressure in fascial space → poor tissue perfusion
  - **<u>Dx: needle manometry, delta pressure < 30</u>**
  - **<u>Tx: urgent fasciotomy</u>**
    - Chemical irritation and inflammation → necrosis and edema
- **psoas somatic dysfunction**
  - associated with uterospasm, stones
  - tender point ⅔ ASIS to midline
  - tx: counterstrain
- **fractures**
  - anterior radial head injury
    - FOOSH
    - posterior radial head
    - restricted supination of forearm

Neuro

- **Next steps**
  - Oxygen → cluster headache
  - Epidural blood patch → post LP with worsened HA with sitting or standing ○ LP → perform after CT scan r/o mass, herniation, infection
  - **Subarachnoid hemorrhage** →CT head → get LP (especially if CT normal, but suspicion remains high)

- NSAID → tension headache
- Oxygen → cluster HA
- MRA neck vessels → blunt cerebrovascular injury

- **High yield**
  - **Preeclampsia** → risk of hemorrhagic and ischemic stroke, focal deficits → CT head
  - **Subarachnoid hemorrhage** →get LP
- **Weakness**
  - **Stroke**
    - **Hemorrhagic**
      - Blood pressure control- IV nicardipine
        - Reverse any anticoagulation: Vit K or protamine sulfate
          - Regulate ICP: elevate head, sedation, osmotic therapy (mannitol)
        - Impending herniation: surgical decompression
- **Seizures/ shakes**
  - **Status epilepticus**
    - > 5 minutes of continuous seizures or > 2 seizures events, incomplete recovery of consciousness
    - Common in brain tumors, stroke, metabolic issues, drug withdrawal, epilepsy
    - #1= lorazepam (stop seizures) → phenytoin (prevent seizures) → EEG • **Altered mental status**
  - **Glasgow coma scale**
    - eyes= 4
    - verbal= 5
    - movement=6
- **Brain herniation**
  - **Subfalcine**
    - Contralateral weakness
    - Herniated cingulate gyrus under falx cerebri
  - **Uncal**
    - Uncus under tentorium cerebelli
      - Ipsilateral fixed & dilated pupil, ipsilateral CN III compression, contralateral hemiparesis
  - **Central herniation**
    - Caudal movement of diencephalon and brainstem
    - Ruptured paramedian basilar artery branches
      - Limb posturing (damage to red nucleus (decorticate → decerebrate)
- **Dizziness**
  - **Orthostatic hypotension**
    - Often medication induced: beta blockers, alpha blockers (antipsychotics, TCAs), HTN drugs (PDE inhibitors, ACE/ ARBs, CCBs)

        - Mechanism: sitting (blood pools in legs) → standing → increased sympathetic drive, vasoconstriction to increase PVR, increased HR, CO (blocked by meds) → decreased cerebral perfusion
    - **Vertigo**
        - Ischemia to posterior circulation: limb ataxia, dysmetria, falling to one side (towards lesion), HA (trigeminal)
        - Dx: CT is typically normal
        - Tx: thrombolysis, IV alteplase
    - **Vestibular neuritis**
        - Meclizine, PT
    - **vasovagal/ orthostatic syncope (vasovagal is usually triggered by something and has a prodromal phase)**
        - **Lightheadedness**
        - Dx: tilt table test
    - **BPPV**
        - Canalith repositioning maneuvers
            - Peripheral vertigo worse with head movements, episodic
- **Spinal trauma**
    - **Spinal epidural abscess**
        - immunocompromised= DM, alcohol
        - Neck pain, stiffness, fever
        - triad= radiculopathic pain, neurologic deficits, fever

HEENT

Optic Emergencies

- **Next steps**
    - **Cycloplegics**: parasympatholytic prevent light-induced miosis, pain caused by photophobia
    - Eye patch: corneal abrasion (for contact lens corneal abrasion, use antibiotics) • **Chemical burn → continuous irrigation to normalize pH**
    - Acid burns (protein denaturation)
    - Alkali burns (liquefactive necrosis, membrane dissolution)
- **Keratitis**
    - Inflammatory
        - Punctate keratitis and UV keratitis
        - Abrasion: linear, punctate
        - Ulcer: large uptake (contacts → pseudomonas)
        - Rupture: seidel sign, loop looking
    - Infectious

        - HSV: dendritic
    - **Work-up: fluorescein dye + slit lamp, cultures, Abx, numbing**
- **Preseptal cellulitis**
    - Swelling, tenderness, redness
    - Orbit not affected
    - Common in young kids
    - Tx: drain abscess, MRSA coverage (TMP-SMX, augmentin, clindamycin, cefdinir)
- **Orbital cellulitis**
    - **Decreased ocular motility, pain with eye movements,** decreased visual acuity
    - Complications: seizures, AMS, cranial nerve 3, 4, 5, 6 abnormalities, N/V
    - **Next-step: CT orbit**
    - Tx: IV vancomycin + ceftriaxone
- **Orbital floor fracture**
    - High-force injury
- **Retrobulbar hematoma**
    - Periorbital ecchymosis, hematoma, ophthalmoplegia
    - Decompress the orbit to relieve pressure
    - Due to rupture of infraorbital artery or ethmoidal arteries
- Orbital compartment syndrome: pain, paresthesia, pulseless, paralysis, pallor
- **Acute angle closure glaucoma**
    - Loss of vision due to severely increased ICP
    - Monocular pain (i.e. pain in one eye)/ HA, blurry vision, red eye
    - Work-up: tonopon (15-20 normal)
    - **Tx: timolol; acetazolamide**
- **Central retinal artery occlusion**
    - Rare; **painless loss of vision**, decreased acuity
    - Emboli: atherosclerosis or emboli
    - **Cherry red spot,** retinal pallor, narrow/ attenuated vessels
    - Work up: US
    - **Tx: dislodge the embolus**
- **Central retinal vein occlusion**
    - 2nd most common cause of retinal vascular disease and **PAINLESS vision loss**
    - Swollen, flame shaped hemorrhage, tortuous veins due to thrombosis, cotton wool spots
    - **Dx: fluorescein angiography**
    - Tx of edema: intravitreal injection, VEGF

	CRAO CENTRAL RETINAL ARTERY OCCLUSION "eye stroke"	CRVO CENTRAL RETINAL VEIN OCCLUSION "eye dvt"
CLINICAL	Sudden, profound vision loss Painless Monocular	Variable - blurred vision to sudden vision loss Painless Monocular
ETIOLOGY	Embolism Vasculitis Vasospasm Sickle Cell Trauma Glaucoma	Risk factors include: Typical stroke risk factors Hypercoagulable states Glaucoma Compression of the vein in thyroid or orbital tumors
DIAGNOSIS	Retinal pallor Macular cherry red spot +/- Afferent pupillary defect	Optic disk edema Diffuse retinal hemorrhages ("blood-and-thunder")
TREATMENT	Consult ophtho + neurology Case reports of intra-arterial TPA Limited evidence for treatment: possibly digital massage, lowering intraocular pressure	Consult ophtho + neurology No specific treatment

Psych

- [Mer's psych cheat sheet]

Poisonings/ intoxication

- **Next steps**
    - **Gastric lavage**= immediately after ingestion
    - **bicarbonate**= acidosis
    - **Methanol tox**= hemodialysis
    - **Activated charcoal**= absorb (not useful for cationic drugs- lithium) ○ **Gastric decontamination with ipecac**= induces vomiting
    - **Neutralize alkali with dilute acetic acid**=not useful, can cause acid-base reaction
    - **Upper GI endoscopy**= look for perforation in ingestions
        - Acidic substances= coagulative necrosis
        - Alkaline substances= liquefactive necrosis
    - **Calcium gluconate= hypocalcemia, hyperkalemia**
    - **flumazenil**= benzo (acts as a gaba antagonist)
    - **physostigmine**= anticholinergic poisoning (mad hatter)
    - **glucagon**= beta blocker OD
    - **100% high flow O2**= carbon monoxide poisoning
    - **50% dextrose bolus**= hypoglycemia in unconscious pt
    - **IV lorazepam and phenytoin**= seizures, status epilepticus
    - Atropine (1st); pralidoxime (2nd)=organophosphate poisoning

- **High yield**
    - **Opioid:** hypotension, miosis, reduced respirations
    - Organophosphate: SLUDGE= salivation, lacrimation, urination, defecation, GI distress, emesis (think cholinergic toxicity)
    - **Anticholinergic**: hyperthermia, flushed skin, pupil dilation, urinary retention AMS, anhidrosis
    - **Bee stings**= IM epi 1:1000 → diphenhydramine, H2 antagonist
    - New onset psychosis= get urine toxicology screen
    - **Carbon monoxide**= HA, AMS, **seizures**, arrhythmia
    - Rash around mouth "glue sniffers rash"= inhalants
    - **Ecstasy/ MDMA**= don't combine with SSRIs → hyponatremia, hyperthermia, AMS, seizures
    - **Bath salts**= amphetamine analog, can cause serotonin syndrome, combative, psychosis
    - **amphetamines**= HTN, hyperthermia, tachycardia
    - **Scorpion stings**= fasciculations and jerking, awake, intense pain ○ **strychnine**= rodent killer, uncontrolled muscle contractions, tonic-clonic movement, awake seizures

- **Burns**
    - **Methemoglobin**
        - Fe2→ Fe3+ → left shift oxygen dissociation curve → functional anemia ■ Exposure to oxidizing agents: dapsone, nitrates, topical/ local anesthetics ■ **Cyanosis**
        - Pulse ox that does NOT improve with oxygenation
    - **Cyanide**
        - Burning nitrogen synthetic polymers (foam, cotton, paint, silk)
        - Bright red skin, cardiorespiratory stimulation
        - Causes neurologic and cardiorespiratory stimulation → depression/ arrest, anoxic brain injury and permanent deficits
        - Cyanide is inhibitor of cytochrome oxidase a3 , binds to ferric iron→ reduced oxygen use by tissues
        - Lactic acidosis
            - Person who takes sodium nitroprusside → cyanide toxicity
                - Renal damage (high Cr)
                - metabolic acidosis
                - Neurologic changes (papilledema, confusion)
        - Tx: hydroxocobalamin, sodium thiosulfate
    - **Carbon monoxide poisoning**
        - Smoke inhalation, gas motors, heating
        - HA, malaise, MI, arrhythmias, seizure, coma
        - Elevated venous lactate, elevated troponins
        - Tx: 100% O2

- **Full body burns**
  - If burn on face → intubation due to swelling
  - Transfer to burn center
    - **Superficial burns** (red, painful, intact capillary refill, no blisters or weeping wounds) → discharge with wound care instructions

- **Toxicities**
  - drugs of abuse- dirty medicine
  - **IVDA**
    - Complication:
      - Osteomyelitis
      - Endocarditis
      - Acute lymphangitis
  - **Salicylates**
    - Elevated lactate, anion gap metabolic acidosis
    - Hyperventilation
    - Hyperthermia, tachypnea
    - nausea/ vomiting
    - Tx: activated charcoal (avoid in confused) → IV sodium bicarbonate → hemodialysis
  - **Organophosphate poisoning**
    - DUMBELLS
      - Diarrhea, diaphoresis
      - Urination
      - Miosis
      - Bronchospasms, bradycardia
      - Emesis
      - Lacrimation
      - Salivation
      - Fasciculation, paralysis
    - Tx: irrigate skin, atropine → pralidoxime



Antidotes for Toxicities

Toxicity	Symptoms	EKG findings	Reversal agent
Beta-blockers	↓ Hypotension ↓ Reflexes ↓ Decreased mentation	↓ Sinus bradycardia ↓ Heart blocks	↑ Glucagon ↑ Less effective: atropine
Calcium channel blockers	• Hypotension • Reflexes • Decreased mentation	• Sinus bradycardia • Heart blocks	• Calcium gluconate • Less effective: atropine, glucagon
Tricyclic antidepressants	• Sedation/confusion ↓ Hypotension ↓ Anticholinergic signs*	• Tachycardia • QRS widening ↑ Ventricular arrhythmia	Sodium bicarbonate
Organophosphates	↑ Cholinergic signs* ↓ Hypotension ↓ Decreased mentation	Sinus bradycardia	Atropine
Serotonin syndrome (antidepressants, selective serotonin reuptake inhibitor, serotonin norepinephrine reuptake inhibitor)	• Clonus/hyperreflexia • Tremor • Agitation/delirium • Elevated temperature/blood pressure	Sinus tachycardia	Cyproheptadine
Neuroleptic malignant syndrome (antipsychotics)	↑ Muscle rigidity ↑ Elevated temperature/blood pressure ↓ Delirium	Sinus tachycardia	↑ Bromocriptine ↑ Dantrolene
Opioids	• Hypotension • Pinpoint pupil • Respiratory depression	Sinus bradycardia	Naloxone
Benzodiazepines	• Stupor/coma • Respiratory depression	Usually normal, but may have sinus bradycardia	Flumazenil
Digoxin	↑ GI symptoms ↑ Confusion ↑ Yellow vision discoloration	↑ Multiple premature ventricular contractions ↑ atrial tachycardia/sinus arrhythmia with AV block and bradycardia ↑ Increased PR segments	Digoxin immune fab

Acute drug intoxication

Drug	Class	Clinical features
PCP (phencyclidine)	Hallucinogen	• Violent behavior • Dissociation • Hallucinations • Amnesia • **Nystagmus** (horizontal or vertical) • Ataxia
LSD	Hallucinogen	• **Visual hallucinations** • Euphoria • Dysphoria/panic • Tachycardia/hypertension
Cocaine	Stimulant	• Euphoria • Agitation/psychosis • **Chest pain** • **Seizures** • Tachycardia/hypertension • **Mydriasis**
Methamphetamine	Stimulant	• Violent behavior • Psychosis, diaphoresis • Tachycardia/hypertension • Choreiform movements • Tooth decay
Marijuana (THC, cannabis)	Cannabinoid	• Increased appetite • Euphoria • Dysphoria/panic • Slow reflexes, impaired time perception • Dry mouth • **Conjunctival injection**
Heroin	Opioid	• Euphoria • **Depressed mental status** • **Miosis** • **Respiratory depression** • Constipation

THC = tetrahydrocannabinol.

Trauma

- **Next steps**
    - **Packed RBCs transfusion** → acute GI bleed, Hgb < 7 stable or Hgb < 9 unstable
    - Whole blood transfusion → PRBC + plasma= severe hemorrhage ○ Platelet transfusion → < 10K stable or < 50K active bleeding
- **High yield**
    - Drowning → ARDS, cerebral edema, arrhythmia
- **Electrical injuries**
    - Thermal injury → muscle necrosis = rhabdomyolysis
    - Acute compartment syndrome
    - Acute kidney injury that is heme-pigment induced
    - arrhythmias= ventricular fibrillation
- **Snake bikes**
    - **Envenomation (swelling)**
        - Immobilize affected limb
        - Coagulation studies repeated frequently
        - Administer antivenom when indicated
            - Crotalidae Fab: cottonmouth, copperhead, rattlesnake
            - Use if unstable, abnormal labs, changes in skin
        - Observe 12-24 hours, delayed toxicity
- Animal bites
    - cat bites —> oral amoxicillin clavulanate —> mocifloxacin if penicillin allergy ○ +/- tetanus
    - due to pasteurella multocida
- **Sexual assault**
    - 