ED Reports 2022

Renal/ Pelvic Trauma

- Renal Trauma
    - Acute kidney injury; decreased efficacy
    - Blunt trauma; contusion
    - Penetrating trauma; laceration
    - Foley catheter contraindications;
        - Blood at the urethral meatus
        - Penile or perineal hematoma
        - Displacement of the prostate
        - Severe anterior pelvic fracture
- Types of pelvic injuries
    - Relates to stability of fracture and client's hemodynamic stability
        - Grade 1 through 4
            - Anterior/posterior compression fracture
            - Lateral compression fracture
            - Vertical shear fracture
            - Combined mechanism fracture
- Stabilization of pelvic injury
- Stabilize pelvis using either a pelvic binder or sheet
    - Reduces the risk of hemorrhage
        - Reduces pelvic volume
        - Supports pelvic fragments

Hypertensive Crisis

Hypertensive urgency:

- Severe asymptomatic HTN. BP >180/110
- No evidence of target organ damage.
- Outpatient Tx with oral antihypertensive drug therapy. (captopril, clonidine, labetalol, amlodipine)
- Tx should occur within 24-48h

Hypertensive emergency:

- An acute, marked elevation in blood
- Evidence of target-organ damage. (pulmonary edema, cardiac ischemia, neurologic deficits, acute renal failure, aortic dissection, and eclampsia.)
- Presents as hypertensive encephalopathy
- Requires hospitalization
- Prompt Tx with IV antihypertensives within 1-2h.

Hypertensive encephalopathy:

- A sudden rise in blood pressure associated with a HA, N/V, seizures, confusion, and coma.
- On retinal exam- exudates, hemorrhages, and/or papilledema are found.
- Manifestations are due to increased cerebral capillary permeability, which can lead to cerebral edema and disruption in cerebral function.

Causes:

- Previous Hx of HTN
- Nonadherence to antihypertensive regimen
- Illicit drug use
- Head injury
- stroke
- Preeclampsia/eclampsia
- Renal disease

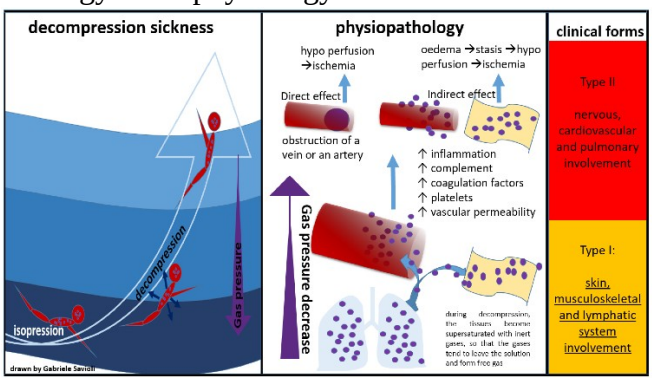
Treatment of hypertensive emergencies:

- lower MAP by 10-15% in the first hour and no more than 25% in the first 24hrs.
- Lowering BP too quickly may decrease cerebral, coronary, and renal perfusion. A rapid decrease could cause a stroke, MI, or renal failure.
- Vasodilators that can be titrated (sodium nitroprusside is most effective), adrenergic inhibitors (labetalol, esmolol), calcium channel blocker (clevidipine)
- Nicardipine and labetalol are preferred for hypertensive encephalopathy.

	Etiology/Pathophysiology	On-Scene TX	ED TX	Role of ED RN	Discharge/Prevention
Black Widow 	-**Loc**: all states except Alaska -**Habitat**: dark crevices (trash piles, garages, outhouses) -**Appearance**: black with red hourglass on ventral side -**Nephrotoxic rxn:** large presynaptic discharge of neurotransmitters, lymphatic and hematogenous spread -**S/Sx of bite:** small sting to severe pain, N/V, ABD pain, tachycardia at first, then bradycardia, hypertonia, leukocytosis, hyperglycemia, oliguria, anuria, increased secretions, psychosis, bronchoconstriction, ARDS	-apply ice pack for 10 minutes/hr for 3 hrs -call 911/seek emergent transportation to hospital	-**O2** therapy -**Meds**: narcotic analgesics, muscle relaxants -**grade 1**: cold packs, PO NSAIDS -**grade 2 &** 3: IV opioids and benzos -**black widow antivenom**	-maintain airway -IV access -follow anaphylactic protocol -administer NSAIDs, narcotic analgesics, benzos -pre-tx for anaphylactic shock before giving antivenom -watch for signs of myocarditis -ice, meticulous wound care -educate on prevention	-check corners and cracks -check piles of clothes, trashcans, garages -avoid playing or agitating spiders -educate to seek med. tx as soon as s/sx arise -refer to cardiologist, neurologist -follow-up with PCP
Brown Recluse 	-**Loc**: Southeastern, Southcentral US -**Habitat**: dark unagitated areas (attics, closets, clothes/old wood piles) -**Appearance**: brown, w/ dark brown violin on back -**Cytotoxic rxn**: Sphingomyelinase D: destruction of neutrophils, release of lytic enzymes, begins with pustule→bull's eye type lesion→ large, depressed ulcer Hyaluronidase: advances the venom into the tissues -**S/Sx**: Cutaneous loxoscelism: classic triad-erythema, ring of pallor, blue/gray macule; Systemic loxoscelism: hemolysis, thrombocytopenia, rhabdomyolysis, AKF, DIC, shock	-capture spider cautiously to identify cause of injury -immediate evaluation by MD recommended	-**identification** of brown recluse by bringing in actual spider specimen -**ELISA:** aspirated tissue probable lesion to detect brown recluse venom (not common) -**Meds**: analgesics, antihistamines -**other txs**: ice, compression, elevation, surgical debridement, HBOT	-diligent wound care: imperative for loxoscelism -early debridement -administer analgesics and/or antihistamines -ensure proper use of ice, compression, elevation -educate on option to use HBOT if available -educate on prevention -closely monitor VS, esp. with CVD	-counseling -check clothing and skin for spiders after long periods outside -avoid disturbing old wood piles and sort through old clothing or boxes cautiously -educate on seeking medical tx as soon as s/sx arise -referral to wound care -follow up with PCP

Decompression Sickness

- Decompression sickness (DCS) is a result of nitrogen gas coming out of solution in tissues during decompression.
- Lungs play a primary role in gas uptake and elimination
    - Increased pressure underwater→gas in the lungs being compressed.
- Etiology/Pathophysiology:



- Musculoskeletal pain is one of the most common signs and symptoms of DCS with the diver often complaining of joint pain.
- Type 2 DCS affects the spinal cord and is more severe and debilitating.
- On-scene evaluation will include symptom management with 100% O2 administration being the #1 intervention followed by rapid transportation.
- Hyperbaric Oxygen therapy (HBOT) is the gold standard of care used to treat DCS. Initiation should be prompted by ED and the ED nurse.
    - Big contraindication includes a pneumothorax.
- Avoid flying or driving to a high altitude within 24 hours of recent dive
- Do not dive until symptoms are completely resolved
- Caution Honeymooners on importance of slow ascent

Poisonous Plants

Poison ivy, oak, sumac

The plants fruit, leaves, stem, and roots are all poisonous. When urushiol oil is burned it becomes stable and released into the air. Pediatric population at the highest risk is 5-15 years old and treatment and prevention is similar to adults

S/Sx: erythematous rash and pruritus with weeping lesions that appear in a linear configuration and maybe papules, vesicles, and bullae. Hyperpigmentation can occur in dark skin types

Prevention: wear protective clothing, wash hands in soap and water within 15 minutes if suspected contact and all clothing including shoes, do not scratch or rub skin, and do not burn poison ivy.

Foxglove

The whole plant is poisonous but the leaves are more likely to be ingested. Pediatric population at highest risk are those less than 5 years old and treatment and prevention is similar to adults

S/Sx: epigastric pain, nausea, vomiting, hypotension, weakness, bradycardia, and cardiac dysrhythmias

Prevention: remove foxglove from the garden safely, educate the appearance of foxglove to client and family, seek mental health therapy if intentional overdose

Inhalation injury

Inhalation exposure can occur from breathing, through the mouth or nose, in contaminated vapors or aerosols from indoor or outdoor activities. This can cause respiratory tract injury, bronchoconstriction, persistent cough, ulcers, edema, tachypnea, diminished breath sounds, pulmonary shunting and an increased risk of infection.

Injected Poisons: Hymenoptera stings & Anaphylaxis

- Uncomplicated local reaction
  - occurs at the site of the sting is develops within minutes and resolves within a few hours
    - Redness
    - Swelling (1-5cm diameter)
    - Pain
    - Itching
    - Less than 5cm in diameter
- Large Local reaction
  - occurs at the injection site and increase in size for 24-48hr the swelling is more than 10 cm in diameters
  - Exaggerated redness response and swelling at the site
  - Enlargers over 1-2 days
  - Peak about 48hrs and resolve over 5-10 days
- Systemic/ anaphylaxis
  - Can be cutaneous or anaphylaxis
  - Cutaneous
    - Limited to the skin
      - Urticaria, angioedema, itching, flushing
  - Anaphylaxis (involvement of at least 2 organ system)
    - Bronchospasm
    - Upper airway obstruction (swelling of tongue, throat, laryngeal edema)
    - Cardiac (arrhythmia, coronary artery spasms)
    - Hypotension & shock
    - GI issues (nausea, vomiting, diarrhea, abd pain)
    - Neurologic (seizures)

On-scene treatment

- If uncomplicated/large local reaction

  - Remove the stinger
  - Clean the injection site
  - Ice
  - Elevate
  - Oral analgesic
  - Oral/ antihistamine
    - Benadryl
  - Topical steroids
    - Hydrocortisone
  - Immobilize affect part
- Determine if anaphylaxis (whole body allergic reaction)
  - Keep patient in a comfortable sitting position
  - Maintain airway
  - Provide epinephrine
    - How to use an Epi pen
      - Remove blue cap
      - Orange/red tip to outer portion of thigh (vastus lateralis)
      - Push down hard until a click is heard or for 3 seconds
      - Do not inject Epi into hands or finger-tips; hypoxia, necrosis
      - Do not use more than 2 consecutive doses (5-15 minute apart)
      - How to store Epi-Pen
      - Stored in 20-25 C (69-77 F)
      - Cool dark place
      - Do not refrigerate
  - IV fluids
- How to remove a stinger
  - REMOVE AS SOON AS POSSIBLE
  - Can use to scrape off stinger
    - Finger nail
    - Credit card edge
    - Knife blade edge
    - Soda can top
    - Back of the keys
    - DO NOT USE FORCEPS OR TWEEZERS
    - DO NOT PINCH OR SQUEEZE VENOM SAC
      - Can further inject more venom into injection site
  - Removed within 15second decreases the severity of the reaction
  - Honeybees are the only ones that leave their stinger in site of injection
    - It is barbed
    - Will continue to release venom for up to 1 min

Drug OD Club Drugs & Cocaine

Ecstasy/ MDMA – molly
S/S: hyperthermia, tachycardia, HTN, jaw pressure, seizures, increased tactile sensations, vomiting, inability to sweat
Dangers: cut with other substances, dehydration and overheating
Tx: symptomatic!! temp, fluids, seizure precautions.

Rohypnol – roofies
S/S: drowsy, amnesia, slurred speech, bradycardia, bradypnea, stumbling. *resp arrest!!!
Dangers: can be mistaken as alcohol intoxication.
Reversal agent: flumazenil

Methamphetamines – crystal meth
S/S: increased attention, euphoria, tachypnea, hyperthermia, irritable, thin appearance, intense scratching
OD: death, seizures, sympathetic overdrive, cardiogenic shock
Tx: benzos

Cocaine –
S/S: HTN, tachycardia, tachypnea, hyperthermia, stroke, MI, accelerated atherosclerosis, chest pain, nosebleeds, dilated pupils
OD: Cardiovascular complaints, decreased neuro status
Tx: benzos, antipsychotics, vasodilators, antihypertensives

On-Scene Tx – ABC!! Resp fx, cardiac fx, neuro status
ED detection / Tx – detection: urine / Tx: benzos, antipyretics. IV fluids, EKG, NG tube, intubate
Role of ED nurse – neuro status, orientation, fluids, pt safety, calm environment, CPR
Discharge & Prevention – acute vs long term. Look out for friends, don't leave drinks unattended

Animal/ Human Bites & Rabies

Types of bites

- Dog
  - 90% of animal bites
  - Treated with medication, dressings, and sutures

- Cat
  - Tend to penetrate deeply with higher risk for infection
  - Treatment
    - Antibiotics
      - Only if bite/scratch broke skin
      - May go away in a few weeks without treatment
- Human
  - More likely to get bitten in physical altercation involving drugs/ alcohol
  - Antibiotic prophylactically for all bites that break skin
  - Greatest risk for infection
    - Saliva can contain Staph. Aureus and streptococci

- Rabies

    - **Prodromal period-** 2-10 days, chills, fever, headache, photophobia, nausea, vomiting, diarrhea, sore throat, cough, and muscle pain. May also have sensation around the bite; itching, burning, numbness, or paresthesia.
    - **Acute neurologic phase**: nervous system dysfunction: anxiety, agitation, dysphagia, hypersalivation, paralysis, delirium.
    - Eventually leads to coma and death.

- Post exposure treatment
    - Human Rabies Immunoglobulin
        - Only to previously unvaccinated individual
    - PEP vaccine
        - HRIG and rabies vaccine
        - Given at exposure, day; 0, 3, 7, and 14
    - If animal test negative then discontinue PEP
    - 100% mortality when s/sx appear, no cure
- Care of animal
    - Animal must undergo 10 day quarantine
    - If infected animal will die in 10 days, test brain for rabies
    - Stray or unwanted dogs/ cats are euthanized immediately and brain tested
    - No testing on living animals

Alcohol Overdose and Withdrawal

- **At-Risk – Males>Females; Ages 30-64; Hx of personality disorders/mental illness**
- **Si/Sx of Alcohol Overdose (MUST HELP) - M**ental confusion; **U**nresponsive; **S**noring/gasping for air; **T**hrowing up; **H**ypothermic; **E**rratic breathing; **L**oss of consciousness; **P**ale
- **Overdose On Scene Treatment** – Establish safety for care team and patient at all times
    - ABC's; clean/maintain airway, resuscitate if needed, provide emotional support
- **Role of ED Nurse in Overdose** - Obtain Blood Alcohol Count (excess of 350mg/mL can be fatal), LOC q 1hr, ongoing cardiac and UO monitoring, blood glucose (give D5 or D10 if indicated), serum electrolytes, ABGs; provide "Banana Bag; prevent complications; evaluate effectiveness of tx.
- **Acute Alcohol Withdrawal Syndrome** - episodes last 4-5 days post excessive binge
    - Signs: elevated VS, diaphoresis, GI upset, h/a, hand tremors, trembling, jerky movement, ataxia, irritability, seizures
- **Most Serious Complication of Withdrawal** - Delirium Tremens
    - 48-96 hrs post cessation; can last 5 days or more
    - Initial/early signs: anxiety, insomnia, tachycardia, diaphoresis, GI distress
    - Late signs: Seizures, hallucinations, delirium
- **ED Care for Alcohol Withdrawal - CIWA Scoring Protocol** for administration of lorazepam (Gold Standard medication) IM or IVP; 8mg bolus, titrate PRN according to score
    - >8 = minimal to mild withdrawal
    - 8-15 = moderate withdrawal

- >15 indicate severe withdrawal and imminent Delirium Tremens
  - Continuous cardiac monitoring and pulse oximetry, ongoing VS q15
  - Decrease stimuli and protect pt., staff, self
  - Fall/seizure precautions
  - Semi-Fowler's; NPO; Suction PRN
  - CIWA repeated per agency protocol until score of < 8-10 for at least 24 hours

- **Discharge Teaching**
  - Determine access to resources; utilize hospital resources
  - Develop support network (AA; Faith-Based Groups)
  - Medications to promote abstinence (oral naltrexone, acamprosate calcium, or disulfiram); Multivitamins (thiamine, folate, B6)
  - Follow-up visits (labs for serum electrolyte levels, amylase, ammonia, LFTS such as aspartate aminotransferase and gamma-glutamyl aminotransferase levels)

Penetrating Neck Injuries

- **Etiology/Pathophysiology**
  - Categorized by anatomic zones:
    - Zone I, Zone II, Zone III
  - Clinical manifestations
    - Airway injury, vascular injury (Hard signs vs Soft), digestive tract injury, and Zone 1 injures
  - **Impaled objects should not be removed in the field**
  - Primary survey: A, B, C, D
- **Emergency Department Treatment**
  - Airway, Breathing, Circulation, Disability
  - Thoracotomy
  - Stable vs. unstable clients
  - Types of Dx. and CBC, H&H, and ABGs
- **Role of the Emergency Department Nurse**
  - Airway management
  - Breathing management: Obtain emergent surgical consultation and prepare for operating room transfer
  - Circulation management: Blood transfusion, tranexamic acid, large bore needles, IV fluids
  - Neurological management
  - ALWAYS: Prepare for the unexpected
  - Treatment
    - Cool humidified oxygen
    - Anti-reflux medications, systemic corticosteroids
    - Non-opioid analgesics, antibiotics
- **Discharge**
  - Follow up care with primary health care provider
  - Medication management, prevent infection, and therapy or group support
  - Educate for any potential complications
  - Follow up with wound care and speech therapy

- Avoid activities that put stress on the neck and rest when needed

❖ **Prevention**
- Keep firearms locked up
- Never take out the penetrating object until proper treatment is initiated in the emergency room
- Educate family and client on safety

Submersion Injuries (Near Drowning)

Submersion
- Air hunger and hypoxia occur leading to aspiration of water

Drowning
- Respiratory impairment after submersion
- Wet drowning vs. Dry drowning
  - Water enters the lungs through inhalation or aspiration
  - Laryngospasm occurs, water is swallowed rather than aspirated
- Cold water drowning
  - Greater chance of survival r/t mammalian diving reflex
    - Shunts blood to the heart and lungs, slows the HR and metabolic rate, decreased O2 demand, prolongs submersion toleration w/o CNS damage
- Fresh water → fluid is pulled into the alveoli causing <u>hypervolemia</u>
- Salt water → fluid accumulated in the interstitial spaces causing <u>hypovolemia</u>

Signs & Symptoms
- Pulmonary edema: pink froth from the mouth and nose, can lead to ARDS
- Crackles, dyspnea, dysrhythmia, hypotension, tachycardia, confusion, hypothermia
- Cerebral hypoxia is the cause of death

On-Scene Treatment → apneic and unresponsive or responsive and coughing
- Remove from water, ABC assessment, CPR, remove wet clothing, rewarm with blankets, C-spin precautions → stabilize, backboard, log roll technique

ED Treatment
- Respiratory support using CPAP and PEEP, 100% O2 via nonrebreather, fluid resuscitation with warm fluids, rewarm until core temperature reaches 32 to 35°C

Discharge/Prevention
- Teach water safety, no risk-taking behavior, learn CPR, supervision at all times

<u>Puncture Wounds and Tetanus</u>

Puncture Wound: A penetrating injury caused by a sharp/pointed object

- **Contamination**
  - Object is nonsterile and deposits foreign matter/infective organisms into the tissue
- **Removal of the object**
  - If the object is impaled: DO NOT REMOVE… stabilize
    - Physician will remove at the hospital
  - If a retained foreign body is present
    - Physician may use US at bedside to remove or remove in the OR
- **Wound Irrigation Procedure**
  - Irrigate wound using copious amounts of normal saline solution in a 20mL syringe. Wash in and around wound until debris are no longer visible. Cleanse with iodine solution.
- **Treatment**
  - Leave wound open to allow for passage of debris and exudate

        - Pack or dress wound according to provider order
    - For a retained foreign body: start on prophylactic abx until cultures return

Tetanus: A systemic infection caused by C. Tetani: produces potent neurotoxins (Tetanolysin + Tetanospasmin)

- **S/Sx of Tetanus**
    - Classic initial presenting symptom: **Lockjaw**
    - **Muscle cramps**
    - Stiffness of neck, myalgias, spasms of the face, nuchal rigidity
    - Irritability, weakness, diaphoresis
    - As the disease progresses: Uncontrollable/violent muscle spasms
        - Can cause ventilatory failure
    - Major cause of death: Autonomic Dysfunction
        - Tachycardia, Hypertension, Hyperpyrexia, Dysrhythmias, Diaphoresis, Seizures
- **Tetanus Prophylaxis**
    - Immunization Protocols
        - 2-18 months old: First 4 doses of DTaP
        - 4-6 years old: DTaP booster
        - 11-18 years old: TDaP booster
        - Over 18 every 2 years: TDaP booster
- **Treatment**
    - Immunization
        - < 3 doses + wound is clean/minor: **TDaP 0.5mL IM**
        - < 3 doses + wound is dirty/extensive: **Tdap 0.5mL IM + TIG 250IU IM**
        - 3 doses in last 5yrs OR 10yrs with a clean/minor wound: **No Vaccination**
        - 3 doses in last 5-10yrs + wound is dirty/extensive: **TDaP 0.5mL IM**
        - Last date of 3 doses >10yrs ago: **TDaP 0.5mL IM**
    - Wound Care
        - Wash wound with soap and water for 10 min. Then irrigate the wound with NS. Debride, lightly pack, and cover with a dry dressing.
    - Antibiotics
        - Penicillin or Metronidazole
            - Kills tetanus bacilli, preventing the creation of more tetanoplasmin
    - Severe Spasms and Autonomic Instability
        - Aggressive sedation, neuromuscular blocking agents, clonidine, and beta blockers
        - Goal: Protect airway and maintain circulation

Crush Injuries

● Crush Injury → Compression of extremities or other parts of the body that causes muscle swelling and/or neurological disturbances. May progress to rhabdomyolysis and compartment syndrome of the affected extremity.
● **On-scene treatment for rhabdomyolysis:**
○ Observe signs and symptoms → "Classic triad" includes muscle pain, muscle weakness and darkened tea-colored urine.
○ Aggressive fluid resuscitation is performed prior to extrication of crushing object → Normal Saline up to 1500 ml/hr.
○ Correct metabolic acidosis → Sodium bicarbonate (50 mEq).
○ Prevent AKI → Mannitol (10g).
● **On-scene treatment for compartment syndrome:**
○ Observe signs and symptoms → Pain out of proportion to that expected for the degree of injury, altered/absent sensation of extremity, pulselessness, pallor, and

paralysis.
○ Avoid/remove splints and assess distal perfusion continuously.
○ Maintain extremity at level of heart and neurovascular checks.
● **Major complications:**
○ Compartment syndrome:
■ Unrelieved pressures of 30 mm Hg or less on manometry screening will require emergent decompressive fasciotomy procedure.
○ Rhabdomyolysis:
■ Hemodialysis → If fluid resuscitation is unsuccessful.
■ Intubation, mechanical ventilation, and supportive care → If unresolved metabolic acidosis and severe tissue ischemia.

Drug Overdose: Opioids & Prescription Drugs

Signs and symptoms of mild-moderate overdose: lethargy, pinpoint pupils, blood pressure decreased, pulse rate decreased, bowel sounds are diminished, and the muscles are flaccid
Signs and symptoms of severe overdose: coma accompanied by respiratory depression, apnea, and non-cardiogenic pulmonary edema may occur after resuscitation.
Treatment: 1.) Act quickly and do a focused assessment to determine the presenting problem of opioid overdose, **2.)** Once opioid overdose is indicated respiratory support via bag-valve-mask should be started immediately, **3.)** Naloxone should be administered intranasally during ventilation or quickly after support is established, additional doses of Naloxone may be administered if no response, **4.)** Once stabilized, the patient should be taken to an acute care facility for further treatment.
Reversal medication: NALOXONE
- Intranasal: 4-8mg per nare every 2-3 minutes alternating each time or 1mg per nare and repeat every 3-5 minutes if respiratory depression persists
- IV: Initial 0.02 - 0.2mg, dosage/hour is based on the effective dose used and duration of adequate response or use ⅔ of the initial effective naloxone bolus on an hourly basis. ½ of the initial bolus dose should be readministered in 15 minutes.
Waves of opioid OD deaths: 1.) The first wave began in the 1990s due to the increase of opioids being prescribed, **2.)** The second wave took place in 2010 which was primarily related to the semi-synthetic drug heroin, **3.)** The third wave began in 2013 with a significant increase in overdose deaths which included synthetic opioids, more specifically, illicitly manufactured fentanyl.
Importance of respiratory support: Opioids reduce ventilation by diminishing the sensitivity of the medullary chemoreceptors to hypercapnia, along with depressing the ventilatory response to hypoxia; apnea then occurs. Large doses decrease tidal volume and respiratory rate causing respiratory acidosis. **Primary cause of death.** Several minutes to hours, patients can develop hypoxemia and crackles. Negative intrathoracic pressure generated by attempted inspiration against a closed glottis creates a large pressure gradient across the alveolar membrane and draws fluid into the alveolar space. Glottic laxity also prevents adequate air entry during inspiration. This effect is important at the time of naloxone administration, in which case breathing will reinstitute before the return of adequate upper airway function.
Opioid OD induces pulmonary edema by histamine release, hypoxia, and acidosis; leading to permeability of the pulmonary vasculature

Inhaled poisons: Carbon monoxide & Chlorine

- **Difference between carbon monoxide & Chlorine**
    - Carbon monoxide is an odorless, colorless & tasteless gas making it very difficult to detect, whereas chlorine is a thick yellow to green gas with an irritating odor allowing it to be suspected easier.
- **Exposure & S/Sx:**
    - Carbon monoxide poisoning can happen from fires, inhaling fire smoke, exhaust from cars or leaks from appliances in the home. S/Sx: minimal exposure causes HA, dizziness, nausea. Severe exposure causes syncope, coma, convulsions, dysrhythmias, or death.
    - Chlorine poisoning can happen from cleaning in the home with bleach or mixing cleaning products or inhaling pool water. S/Sx: minimal exposure causes burning and irritation in the eyes, nose and throat which cause wheezing/coughing. Severe exposure can cause the airway to swell leading to obstruction.
    - The pulse oximetry will show **false** normal readings and is unreliable.
- **Treatment**:
    - Carbon monoxide: immediately provide oxygen at the highest concentration available (100%) via a non-rebreather.
    - Chlorine: immediately provide supplemental humidified oxygen and bronchodilators if wheezing is present
    - Oxygen should be given to the patient **regardless** of what the pulse oximetry reading is.
- **Prevention**:
    - If exposure to each is suspected, call 911 immediately or call poison control!
    - **Carbon monoxide**: Ensure smoke detectors in the house are on and working, don't leave cars running in closed spaces such as the garage, ensure appliances are routinely checked for gas leaks and, possible therapist/mental health eval. if suicide was attempted.
    - **Chlorine**: know to exit the area of exposure, don’t mix cleaning products, use one at a time and, be careful when in or around swimming pools.

INHALANT ABUSE

- **Inhalant Poisons**
    - Toluene, Butane, Solvents: Invisible, volatile substance found in over 1000 household and industrial products.
    - Spray paint, thinners, aerosols, glue, inks, varnishes, gasoline, permanent markers, and cigarette lighters.
- **Epidemiology**
    - Teenagers are the highest group for potential abuse.
    - Equal between males and females with rural areas with highest rates.
    - Mental health increases potential for abuse.

- **Mechanism of Action**
    - Respiratory: displaces oxygen from alveoli
    - CNS: slurred speech, disorientation, seizures, loss of brain mass, and dysfunction.
    - ***Sudden Sniffing Death Syndrome (SSDS):*** Collapse of cardiovascular system from heart failure and oxygen displacement. Occurs with first time users, rare, and unpredictable.
    - Body-wide effects: nausea, vomiting, metabolic acidosis, leukemia, burns, muscle weakness.
- **Terminology**
    - Huffing, Bagging, and Sniffing. Sniffing can cause SSDS.
- **On-scene Treatment**
    - Remove victim from source. Activate 911 EMS system
- **Emergency Department Treatment**
    - Respiratory depression, Cardiac arrythmias, and electrolyte imbalances.
- **Role of Emergency Nurse**
    - Screen for inhalant abuse – chemical odors on skin, clothing, or breath. Stains on face, hands, or clothing (Huffer's rash). Slurred speech, drunk or disoriented appearance.
    - EKG, labs, urine drug screen, pulse oximetry, and cardiac monitoring.
    - Safe environment for staff, patient, and visitors.
    - Initiate psychiatric and supportive services
    - Provide discharge education along with follow-up care.
- **Discharge and Prevention**
    - Schools: faculty education and monitoring of supplies available for abuse.
    - Parents: Education on household products available for abuse along with signs and symptoms of abuse.
    - Symptoms of abuse: Chemical odor on skin, clothing, or breath. Stains on face, hands, or clothing (Huffer's rash). Slurred speech, drunk or disoriented appearance. Hidden empty spray paint or solvent containers.

Gunshot Wounds and Preserving Evidence

- High Velocity – Bullet travels >3000 ft per second
    - Cavitation – wound size will be 30 – 40 times bigger than the original bullet size
- Low Velocity – Bullet travels <1200 ft per second
    - Cavitation – wound size will be 3 – 6 times bigger than the original bullet diameter
- Yaw – Deviation of the nose of the bullet from a straight path
- Tumbling – Change in rotation of the bullet and causes it somersault into the body
- Cavitation – Bullet is penetrating the body or target and creates a permanent cavity. Energy is then transferred simultaneously, and a temporary cavity is created
- Safety first!

- ABC's, stabilize GSW, manage and anticipate fast transport to ED
- Put patient hands in paper bags
- When cutting off clothes cut around bullet wounds
- Label all items
- Keep chain of custody short when possible
- Huge infection risk!
- Can potentially knick vital organs and or vessels
- No swimming or hot tubs
- May need medications – abx, pain meds, and tetanus shot

Injected Poisons – Jellyfish

- Jellyfish Sting Pathophysiology
    - Jellyfish common to the Delaware area include the Lion's mane jellyfish, Atlantic Sea Nettle jellyfish, Sea Walnut Jellyfish, and Moon Jellyfish
        - Most dangerous out of all jellyfish listed is the Lion's Mane
    - Other dangerous jellyfish around the world include Box Jellyfish, Portuguese-man-o-war Jellyfish, and Australian Irukandji Jellyfish
    - The specialized stinging structures that are on jellyfish are called nematocysts
        - Can be located on the body of the jellyfish or tentacles
        - They can continue to function even when the jellyfish is dead or not on the jellyfish
- Severity of jellyfish stings depends on number of nematocysts discharged, the toxicity of jellyfish involved, amount of skin involved, patient age, and patient health
- Clinical Manifestations:
    - Most jellyfish venom causes local pain, erythema, and mild blistering without systemic effects
    - Immediate pain is the most common symptom
    - Less common symptoms include nausea, vomiting, paresthesia, headaches, and chills
- On Scene Treatment/First Aid
    - Assess the scene for safety – does the person need assistance getting out of the water? Do they need CPR first?
    - Remove nematocysts with protective gear (gloves, clothing, towels) if tentacles are present
    - Wash the affected area with salt water, no fresh water
    - If available, apply topical lidocaine for pain relief
    - Instruct the person involved to avoid touching the site
- Emergency care after a jellyfish sting should be sought if person experiences cardiovascular collapse, skin necrosis, pulmonary edema, or if the victim is very old or very young for observation
- Emergency Department treatment will mainly be focused around removal of nematocysts with pain relief measures

- Role of the Emergency Department Nurse
    - Assessment – When did this occur? Has it occurred before?
    - Administered ordered medications – lidocaine, IV fluids (0.9% sodium chloride), analgesics
    - Implementing ordered treatments – removal of nematocysts, heat application
- Jellyfish Sting Prevention
    - Heed posted warning notices on beaches if jellyfish are present
    - Wear a wet suit
    - Beach/ocean stringer nets to provide a physical barrier
    - Provide teaching to coastal areas affected by painful stings

Abdominal Trauma

Organs Affected

- Peritoneal Cavity – spleen, liver, gallbladder, stomach, colon, small intestine, & female reproductive organs.
- Retroperitoneal Cavity – Kidneys, ureters, Inferior Vena Cava, Abdominal Aorta, Pancreas, Duodenum, Ascending and descending colon, and rectum.

On scene treatment if abdominal contents are protruding from wound

- Evisceration: Abdominal Organs protruding though an open wound and are outside of the abdominal cavity.
- What NOT to do: Attempt to place organs back into the abdominal cavity
- What to DO: Place a sterile or clean dressing gently on top and saturate with NS or water. Once organs dry out cell death will start to occur. Keep the dressings moist.

Role of the ED Nurse

- ABC!
- Obtain H&P, MOI, VS
- Start two large bore IV sites and administer fluids
- Administer broad spectrum antibiotics, pain medications
- Prepare to transmit to the OR

FAST (Focused assessment with sonography in trauma)

- Involves the 4P's: peri-cardial, peri-hepatic, peri-splenic, and pelvic views of the abdomen to see if there is any blood or fluid in the peritoneal cavity and helps the provider determine the next steps of treatment

Diagnostic Peritoneal Lavage

- Rapid and Invasive procedure that can be performed at bedside
- Contraindications: Hemodynamically unstable, prior abdominal operations, coagulopathy, advanced cirrhosis, morbid obesity
- >10mL of fluid aspirated than lavage is not needed
- <10mL of fluid aspirated insert 1L of NS to run into abdomen. Once the Liter is mostly done flip it so fluid from abdomen can drain back into bag

Cullen's Sign – Ecchymosis around the umbilicus**.**

- Often delayed and may not be seen for the first few hours after injury

Kehr's sign – Referred left shoulder pain due to diaphragmatic irritation from bleeding in abdominal cavity

- Usually seen when patients are in a supine position or HOB is lower

Seat belt syndrome – Ecchymosis or abrasion across the abdomen and chest from seatbelt compressing on the abdominal wall

- Shows significant force was applied to the abdominal wall from sudden deceleration
- Bowel and supporting mesentery are the main organs affected

Prevention/discharge instructions

Follow up with PCP, GI, and possibly wound care **Compliance with medications – take full Abx to term**	**Education:** **Do not mess with incision sites,** **Educate on vehicle safety** **DVT prophylaxis**

Ingested Poisons – Corrosives and Hydrocarbons Key Points

- Ingested Poison Injuries can be caused by corrosives (acids, alkalis – lye) or hydrocarbons (petroleum).
- High risk: children ages 1-3 years, unsupervised children < 6 years, attempted suicide by intentional ingestion, risky behaviors in adolescents, occupational accidents, intellectually disabled or geriatric populations, accidental poisonings (adolescents, adults, geriatric populations)
- Corrosives (strong acids, alkalis) generally at a pH below 3, hydrogen ions desiccate epithelial cells, eschar forms limiting further damage and pattern of coagulation necrosis.
- Acidic corrosives include common household cleaners (drain, toilet, or oven cleaners), dish detergent (liquid, higher pH, more hazardous than granular), bleach, mildew remover, batteries, denture cleaners
    - Lye (alkaline chemical) -- Sodium hydroxide, known for caustic nature, proton acceptor, causes injury when pH is above 11
    - Sodium hydroxide (form, flakes, crystals) made from burned wood ash, often used to make soaps and dissolve fats from animal hides, drain cleaners, paint strippers, silver polishes, homemade biodiesel
- Signs/Symptoms – initially drooling, and dysphagia within first 24 hours of ingestion
- Severe cases - vomiting, pain, and often bleeding in the mouth (swollen, erythematous tissue visible), throat, chest, or abdomen; airway burns can cause coughing, tachypnea, or stridor
- Hydrocarbons
    - Petroleum – organic compound primarily of carbon and hydrogen atoms
        - (ex. Gasoline, kerosene, mineral oil, lamp oil, furniture polish paint thinners); minor injuries caused by lubricants (paraffins, petroleum jelly, or asphalt)
    - Signs/Symptoms – Choking, coughing, hyperventilation, burning throat and stomach, nausea, vomiting, pain, dysphagia, weakness, altered level of consciousness dyspnea, (tachypnea, retractions, and grunting commonly seen in children).

On-Scene Treatment

Corrosives (acid, alkali -lye) – Patient airway is priority!

- Assess the patient (airway, respiratory rate, carotid and radial pulses, LOC, and ability to swallow)
- Remove all clothing and cover with blanket
- DO NOT INDUCE VOMMITING
- Identify age, weight, condition, agent ingested (volume, concentration)
- CALL POISION CONTROL (1-800-222-1222)
- Transport as quickly as possible

Hydrocarbons (Petroleum)

- Assess the patient (airway, respiratory rate, carotid and radial pulses, LOC, and ability to swallow)
- Assist to uncontaminated area, remove clothing and wash exposed area with soap and water
- Identify age, weight, condition, agent ingested (volume, concentration)
- CALL POISON CONTROL CENTER (1-800-222-1222)
- DO NOT INDUCE VOMITING

- Transport as quickly as possible

- Activated charcoal, syrup of ipecac, gastric lavage often contraindicated
  - High risk of aspiration or vomiting

ED Treatment

- Continuous monitoring after treatment
- Maintain HOB > 30° to prevent aspiration
- Frequent assessments and vital signs
- Maintain patent IV
- Monitor intake/output, electrolytes, ABG's, LOC
- EKG monitoring – heart rate and rhythm
- Educate on procedures and prepare patient for any invasive procedures

Patient/Parent Teaching

- ALWAYS call Poison Control Center (800-222-1222) immediately for medical advice if ingestion of poison
- Ages 1-3 years and intellectually disabled (HIGHEST RISK)
- Clearly mark and label all containers
- Store all poisonous containers in locked cabinet out of reach from children

Massive Transfusion protocol and TXA

What is TXA?

It is a drug given to patients with bleeding disorders. It will help control/prevent bleeding complications. It can also reduce mortality with minimal adverse effects

Identify the mechanism of action

Classified as a competitive inhibitor. It inhibits the conversion of plasminogen into plasmin. Also, it will inhibit the enzyme breakdown of fibrin

Describe the use in trauma patients with hemorrhage

Used to prevent blood loss, Decreases the need for more blood, Hung while blood is infusing

Administration and monitoring

Available in IV and Oral formulas o Intravenous TXA for hemorrhagic shock, including postpartum hemorrhage and trauma patients. One gram bolus in 100 mL of normal saline over 10 minutes. May repeat a 1-gram dose over the next 8 hours, but do not exceed a total of 2 grams

Monitor hemodynamics and watch for thromboembolic events

S/E- Seizures, H/A, Abdominal Pain, DVT, **PE (Biggest risk)**, and Fatigue

Contraindications

Hypersensitivity to TXA, Subarachnoid hemorrhage, Active intravascular clotting disorder, Known Defective color vision

Describe Massive Transfusion Protocol (reference Beebe's policy)

Facilitates rapid restoration of blood and circulating volume, for patients who had major blood loss. By definition, massive blood loss is when 8-10 units of blood are given in 24 hours, or 4-5 units of RBCs in 1 hour

Identify adverse effects that can occur

Hemolytic reactions, Febrile Reaction, Circulatory overload, Hypocalcemia, Air embolism, and Hypothermia

When would this be used?

When 30% of blood volume needs to be replaced

Administration and monitoring

During administration, you will be using a rapid transfuser to ensure the blood is being pushed quickly but safely Belmont Rapid Infuser (Inline warming to help prevent hypothermia)

May receive uncrossed blood to begin the transfusion (within 7 minutes of the request, uncrossed blood will be sent), and then after you type and screen you will receive a specific blood type

The blood bank will discontinue serologic compatibility once the patient has been transfused with 10 units of RBC

Traumatic Wounds: Control of Bleeding

- ASSESSMENT OF THE WOUND
  - Baseline – number of locations, location, type/classification, duration, treatment aim, and reassessment due
  - Wound size (length, depth, width), tunneling, wound bed tissue (type and amount), description of edges, color/condition of the surrounding skin
  - Pain (pqrst), exudate (amount, type, consistency, color, odor), s/sx of infection
- To stop bleeding:
  - Apply direct pressure
  - Pack the wound
    - If the dressing becomes saturated:
      - ∴ do not remove the dressing
      - ∴ place a second one ON TOP OF the original and keep both in place
  - Elevate if pressure does not stop bleeding
  - If pressure and elevation are not enough, place a tourniquet above the site of injury
    - Wrap around extremity, wind to tighten, secure, and write the time applied
    - Tighten until the bleeding stops
    - ***DO NOT*** release the tourniquet or lighten amount of pressure applied to the site
    - ***DO NOT*** remove impaled objects
    - **IT'S GOING TO HURT!!!**
- HEMOSTATIC DRESSING
  - Brand examples: QuikClot, Celox gauze, and Combat gauze
  - Agents are placed in gauze or as a powder and packed into the wound to aid in clot formation within shorter duration
  - Useful for extremity and junctional area (groin, shoulder, armpit)
  - *Contraindicated* in head, chest, abdomen wounds
  - Should be applied with 3+ minutes of direct pressure
  - If it fails, remove, and apply the same or a different type
  - Check distal pulse when used with tourniquet
- Steps for brachial pressure points (slap, slide, squeeze)
  - Elbow bent at 90°, hold the upper arm away from the body
  - Gently "slap" the inside of the bicep with fingers halfway between the shoulder and elbow (this pushes the bicep out of the way)
  - "slide" your fingers up to push the bicep away
  - "squeeze" your hand down on the humerus
    - You'll feel the pulse as you press down

    *Do not hesitate to lean into the pressure point
- Steps for femoral pressure points
  - Patient supine and kneel next to their hips, facing their head – on the outside of the bleeding extremity
  - Find the pelvis and place the little finger of your hand that is closest to the injured leg along the anterior crest on the injured side
  - Rotate your hand down firmly into the groin between the genitals and the pelvic bone – this compresses the femoral artery
  - If the bleeding does not slow immediately, reposition your hand and try again

KEY TERMS

VENOM = enzymes + proteins → damage to tissue/organ systems
HEMOLYTIC: toxins destroy RBCs, disrupt clotting, tissue and/or organ degeneration
NEUROTOXIC: inhibits neurotransmitter signals → disrupts neuro fx
"DRY BITE": can see puncture. No swelling/no systemic effects
ENVENOMATION: bite with venom injected
INITIAL CONTROL: control of envenomation syndrome, s/sx injury progression under control, resolution of systemic s/sx, labs improving or normalizing (PT/fibrinogen/platelets)

Injected Poisons: Snakebite

Etiology / Pathophysiology

- MOST COMMON BITE SITES: feet, toes, lower extremities, then hands, arms, fingers, face
- 8,000/year in US (envenomation)
- ~45% envenomation bites → ICU
- 19 snake species in DE, but only one 1 is venomous: EASTERN COPPERHEAD
- **ELAPIDAE** – coral snakes (not the focus, only 2% of bites)
- ID: short fangs, "red touches yellow = deadly fellow"
- *Neurotoxic* venom → Paresthesia, localized weakness turns to generalized weakness, vision changes, diaphoresis, diminished reflexes, respiratory depression, paralysis
- **CROTALIDAE** – vipers, pit vipers (includes rattlesnakes, copperheads, cottonmouths) **98% of bites**
- ID: blocky head, thick body, dark facial band – hollow, retractable fangs
- *Hemolytic* venom → Tachycardia, edema, petechia, confusion, vomiting, DIC, ARF, shock, hypotension, NVD, abd pain, SOB, ARDS, metallic taste, tissue necrosis, pain, bruising, blistering, bullae, oozing
- Labs: ↓ fibrin, platelets, RBC / ↑ BUN, creatinine
- Levels of severity: mild/moderate/severe – severe is life-threatening, any mild bite can progress to severe
- FIRST 24 HR = progressive s/sx …24-36 HR = plateau…>36 HR = recovery begins (weeks – months)

On Scene Treatment

- **Do not ever apply tourniquet** – localizes venom, increased r/f necrosis and damage
- Never cut/squeeze/suck, never apply ice, NO NSAIDS
- SAFETY – get away from snake, 911, REMOVE RESTRICTIVE CLOTHING & JEWELRY!! Remain calm.
  - immobilize victim, ABCs, ED ASAP (CALL ED ON WAY!)
- Mark leading edge q15min, photos of injury, photo of snake if possible and safe to do so

ED Treatment

- **#1 tx = ANTIVENOM**. Start ASAP (w/in 4 hours ideal) – Top 3: CroFab, Anavip, Antivenin
  - Most common delay is cost $. Longer wait = ↑ r/f disability/injury
  - Disadvantage: cost, takes LONG time to reconstitute → call ED ahead of time to give pharmacy time to prepare! *(*CroFab initial dose: 6 vials x 7 min reconstitution per vial = 42 min for 1 DOSE)
  - Start antivenom at 25-50 mL/hr for 10 min, if no rxn, increase to 250 mL/hr
- Other ED tx: supportive care, pain mgmt (opioids), IVF bolus (500-1000 mL LR or NS), IV benzos/propofol, intubate, tetanus booster, EKG, transfuse blood, NO central line, usually no abx

Role of ED Nurse

- **Call pharmacy STAT, poison control, anticipate labs (baseline pre-admin antivenom), ABCD**
- **Focused or full assessment? FULL!** Why? Bc there are many systemic effects, must check all systems, not just the bite
- **Allergies:** papaya, pineapple, horse serum, sheep serum (elements of antivenom) – have epi/diphenhydramine on hand
- Medical hx, meds (beta blockers, blood thinners), position neutral, elevate extremity once antivenom on board
- Keep the patient calm – they are scared and in pain, let them know antivenom is extremely effective, very few deaths
- Carefully irrigate bite, frequently assess / inspect, recheck labs q1-3h, COMMUNICATE – how are they feeling? Changes?

Discharge/Prevention Instructions

- Awareness & common sense, avoid getting bitten in the first place. Know where snakes are in your area / traveling

- If you see a snake, DON'T GO NEAR IT. Give it room to get away, or walk away and leave it alone
- Protective gear (shoes, gloves), no pet food/bird seed outdoors, rodents = snake snacks, keep yard mowed, clear debris
- D/C
  - Take it easy! No intense exercise or contact sports for > 2 weeks, r/f bleeding
  - Importance of wound care, r/f infx
  - Immediately report: new fever, rash, increased pain, swelling
  - Will need to follow up w/ HCP, repeat labs for several weeks

COLD

Hypothermia:

Core temperature of <35℃ causing decreased metabolism, ventilation, & neural activity.

Frostbite:

Localized cell death & tissue ischemia due to severe cold exposure.

EXPOSURE

MILD HYPOTHERMIA: 32-35°C	Tachypnea, tachycardia, AMS.
MODERATE HYPOTHERMIA: 28-32°C	CNS depression, hypoventilation, loss of shivering.
SEVERE HYPOTHERMIA: <28°C	Hypotension, bradycardia, ventricular arrythmias, mimics death presentation.

HOW- ON SCENE:

Active or passive external rewarmin (blankets, fluids, warm environment).

HOW- IN ED:

Active internal rewarming (endovascular rewarm or peritoneal irrigation).

SUPERFICIAL FROSTBITE

- 1st & 2nd degree's
- Can progress further
- Top 2 layers of skin

DEEP FROSTBITE

- 3rd & 4th degree's
- Can lead to tissue loss
- All layers of skin

Risk
Arryth

…ootherm…
…art is irr…
…stimulu…
…sceptib…
…ntricular…
…ythmias.

Prevention of arrythmias through careful handling & immobilization.

Rewarming can increase the clotting response if done too fast.

…ver Dead
… Warm &
…Dead"

…hermia can …t similarly …th.

…ndicators of death are unreliable.

Resuscitate until temperature >35℃.

TRAUMATIC AMPUTATION:

- Severing of an extremity completely/partially, in relation to an unexpected injury
- **Amputation divided into two categories**

- Complete amputation: total loss of an extremity (muscles, ligaments, tissues, and blood vessels) → ↓ bleeding
- Incomplete amputation: soft tissues connecting the extremity to the bod remain intact below the injury → ↑ bleeding

- Proper preservation of the amputated part = greater chance of successful reimplantation
  - On-scene care of amputated part:
    - Rinse body part with NS/LR, wrap entire extremity in NS/LR moistened gauze pads, placed into a sealed container/bag, placed directly into separate container on ice "labeled")

*** ↓ of the metabolic rate = preservation up to 12-24 hrs ***

- **Factors inhibiting successful reimplantation:**
  - Crush- type amputation (soft- tissue trauma) and Avulsion- type amputation (tearing/ stretching force to tissues) has less of chance compared to Guillotine amputation (well- defined wound edges)
  - Prolonged warm ischemia/ tourniquet applied >2hrs
  - Incorrect preservation of the amputated part
  - Comorbidities: HTN, DM, Hx of smoking, inflammatory diseases

- **Never push back time of transportation due to the inability of locating the amputated extremity**

- **Role of ED Nurse/ ED treatment:**
  - ABCDE
    - Maintain a patent airway, eliminate airway obstruction
    - Maintain spo2 >95%, respirations, & ventilation
    - Immediate control of bleeding!!!
    - Neuro exam & exam of entire body/ amputated part
  - Obtain report of accident & Pt. info (movement of object, direction of force, speed of injury, area involved, medical/social hx, religion, advanced directive)
  - Prevent/ treat shock
  - Emotional support!!!

- **Discharge:**
  - Educate possible complications: Infection, DVT, contractures, stump hematoma, phantom limb pain
  - Request consults/ referrals
  - Important to follow up with HCP

Heat Exposure

Heat Exhaustion

- Core temperature of 40 degrees Celsius (104 F)
- Occurs during periods of constant exercise in high environmental temperature
- Failure to maintain fluid intake = losses experienced through perspiration and respiration

- Signs and Symptoms: Diaphoresis, pallor, hypotension, tachycardia, reduced UO, NV, thirst
- On-scene treatment: remove from heat stress, loosen or remove excess clothing, spray or pour cold water on the patient's skin and vigorously fan, hydrate orally with fluids
- ED treatment/Role of Nurse: Manage and maintain ABC's, monitor for dysrhythmias, IV fluid administration of normal saline, monitor serum sodium and potassium

Heat Stroke

- Core temperature > 40.5 degrees Celsius (105 F)
- Life threatening
- Interaction between the effects of heat and a range or inflammatory and coagulopathic responses
- Signs and Symptoms: Always associated with altered mental status, cardiovascular collapse, liver and kidney damage
- On-scene treatment: Remove from heat stress, remove all clothing, cool the patient – DO NOT DELAY, stop cooling when mental status improves
- ED treatment/Role of Nurse: Manage and maintain ABC's, high flow oxygen nonrebreather, continuous ECG, fluid replacement with normal saline, rapidly cool the patient, apply ice packs, peritoneal dialysis and cardiopulmonary bypass (severe cases), control shivering, monitor urine for rhabdomyolsis

Discharge/Prevention

- Drink adequate fluids, wear light weight/loose fitted clothing, avoid the sun during 11am-3pm, wear a hat, sunglass, sunscreen, frequently hydrate when you're outside

Tick	**Black Legged "Deer" Tick** (ixodes scapularis)		**Lone Star Tick** (amblyomma americanum)		**American Dog Tick** (dermacentor variabilis)	
Disease	***Lyme disease***	***Powassan Virus***	***Tularemia***	***Ehrlichiosis***	***Rocky Mountain Spotted Fever***	***Tick Paralysis***
S/sx	- Erythema migrans (bulls eye rash) - Malaise, H/A, fever, myalgia, arthralgia	- Headache, fever, vomiting, weakness - Meningo encephalitis: altered mental status, seizures, aphasia, paresis, cranial nerve paralysis	- Depends on route of inoculation - Fever, chills, headache, malaise, anorexia, myalgia, CP, cough, sore throat, vomiting, diarrhea, abdominal pain	- Fever, chills, H/A, malaise, muscle pain, N/V/D, anorexia, altered mental status, rash	- Classic triad: fever, rash, hx tick bite - Early: fever, H/A, malaise, myalgia, periorbital edema, swollen hands, N/V/anorexia - Late: altered mental status, coma, cerebral edema, PE, ARDs, necrosis, MOSF	- Acute ataxia: symmetric flaccid paralysis nearly identical to Guillain-Barre - Can lead to respiratory failure & death if untreated
Dx	- IgM or IgG 2-step testing, antibody titer - Clinical specimen organism - PCR, serologic testing - IHC staining					
ED Tx	- Doxycycline - Cefuroxime - Amoxicillin - Ceftriaxone or PCN for 10-21 days	No specific treatment available; Supportive care	- Streptomycin - Gentamicin - Ciprofloxacin - Doxycycline for 10-21 days	- Doxycycline - Rifampin	- Doxycycline	- Tick removal & supportive care
ED Nurse	- Detailed history: recreational, occupational, pets, travel, etc. - Recognize & document signs & symptoms (consider differential diagnoses) - Obtain blood work for diagnostic evaluations - Heat to toe assessment: observe for bite area, rash, etc.					

Removal	Discharge Instructions & Prevention	Considerations/Comments
- ASAP/"on-scene" - Fine tip tweezers → grasp tick as close to skin surface as possible → pull upward with steady even pressure - If mouth parts break off, attempt to remove them but if you can't leave it & let the skin heal - Clean bite area & hands with rubbing alcohol, iodine scrub or soap & water - Flush tick down toilet or keep in airtight container to bring to HCP - Nail polish, petroleum jelly, & heat DO NOT WORK	- Abx therapy - Insect repellents containing DEET, picaridin, lemon eucalyptus oil, para-mentathan-diol - Wear clothing treated with permethrin - Check for ticks daily, especially between legs, around waist, in hairline, scalp, & skin folds - Shower shortly after being outdoors - Tumble dry clothing on high heat - Abx prophylaxis is possible for Lyme Disease	- ↑ # of cases in males, Native Americans, elderly, frequent exposure to dogs or wooded areas - ↑ mortality if delay in tx - Children may have GI s/sx (i.e. N/V) - Many people present w/ flu like sx - If it is a bacterial infection → antibiotic tx (i.e. doxycycline or streptomycin)

ACTIVE SHOOTER – KEY POINTS

BE ALERT FOR WARNING SIGNS:

Angry, agitated, desperate, distressed individual, likely male.

RUN, HIDE, FIGHT:

RUN → First response, if possible
HIDE → Turn off lights, silence equipment, barricade doors
FIGHT → Only as last resort
(Remain Calm!)

WHAT TO DO WHEN LAW ENFORCEMENT ARRIVES:

Officers will move past injured persons towards site of attacker.
Keep hands up in the air, fingers spread.
No sudden movements, no screaming, no pointing.
Listen to all instructions given by law enforcement.

TREATMENT AFTER INCIDENT:

STOP-THE-BLEED → Control bleeding with direct pressure, or tourniquet if needed. ABCs → C comes first in cases of uncontrolled hemorrhage! Anticipate Other Needs: obstructed airway, impaired ventilation, cardiac arrest, etc

Fishhook Injuries

- Most hooks pierce through the dermis or subcutaneous layers of the skin
- Types of fishhooks:
  - **Single barbed**: has only one barb proximal to the tip of the hook
  - **Multi-barbed**: may contain two, three, or four barbs to increase the chance of catching a fish
    - **Treble**: three separate barbed hooks
  - Barbless: catch and release with less trauma
- Removal techniques:
  - **Retrograde/back-out**: barbless fishhooks and for **superficial** hooks
    - Downward pressure applied to shank, grasped w/hemostat and backed out of wound along the path of entry
  - **Push-through (1)**: most effective when point is near **skin surface**
    - Grasp shank w/hemostat, advance hook until barb is seen, cut barb and back out of wound
  - **Push-through (2)**: **multi-barb**

        - End of shaft is removed w/wire cutter, hook pushed through and taken out distal from where it entered originally
    - **String-pull**: small & med. hooks as well as **deeply embedded**
        - DO NOT perform on movable parts (earlobe)
        - Wrap string around the bend of hook, push down on shank, pressing the fishhook against skin. Firmly & quickly pull on string while applying pressure to shank
    - **Needle**: large hooks w/**single barbs**, & when point of hook is **superficial**
        - 18-gauge needle w/bevel pointing toward barb, advance hook to disengage barb. Pull & twist hook so the point enters the lumen, remove all at once
    - **Cut-it-out**: when all other methods have failed
        - Make an incision with an 11-blade, dissect to visualize barb & disengage

Acetaminophen and Aspirin Overdose

Signs and Symptoms of Overdose:

Acetaminophen: may initially be asymptomatic with emesis and right upper abdominal quadrant pain being the first symptoms. Hepatotoxicity can occur within 72 hours and progress to acute liver failure, coma, and death.

Aspirin: initial symptoms appear 3-8 hours post ingestion, being nausea, vomiting, abdominal pain, tachypnea, headache, and tinnitus. Neurological symptoms like confusion, slurred speech, and hallucinations arise between 6-18 hours for moderate to severe overdoses. Seizures, hypoventilation, hypotension, and dysrhythmias arise in severe overdoses between 12-24 hours.

Effect of Acetaminophen Overdose (Liver failure):

When excess acetaminophen is ingested, the normal metabolic pathways within the liver are oversaturated. Excess acetaminophen is converted to N-acetyl-p-benzoquinone imine (NAPQI). NAPQI is hepatotoxic and binds to liver proteins, causing hepatocyte death and liver necrosis which can lead to acute liver failure.

Treatment:

Administer activated charcoal for gastric decontamination if there is drug suspected in the GI tract. Gastric lavage is indicated for extended-release aspirin only.

Acetaminophen: use oral or IV (preferred) N-acetylcysteine and continue past 72 hours if there is hepatic failure until patient receives liver transplant, recovers, or expires.

Aspirin: Maintain hydration and electrolyte balance. Use D5 w 3 amps of sodium bicarbonate and infuse with electrolytes as needed (especially potassium). Goal urinary output: 2-3ml/kg/hr.

Mechanical ventilation may be necessary to support the airway and hemodialysis to remove serum aspirin or acetaminophen to reduce effects and extent of toxicity.

Complications:

Acetaminophen toxicity can cause in pancreatitis, acute tubular necrosis and subsequent renal failure, gastroenteritis, peptic ulcer disease, coma, and death. Acetaminophen can also result in acute liver failure, which may only be treated with an emergent liver transplant.

Aspirin toxicity can result in severe acidosis and respiratory arrest, apnea, and dysrhythmias. Severe toxicity can cause end-organ damage signified by seizures, rhabdomyolysis, pulmonary and cerebral edema, and renal failure.

Ongoing Care:

Schedule a follow up appointment for labs (LFTs, Chem-7, PT/INR, CBC, and magnesium), as well mental health follow ups if indicated.