

Module E

Emergency Management & Burns

NUR 203

Special Nursing Teams

Forensic Nurse Examiner – educated to obtain patient histories, collect evidence, and offer counseling and follow-up care for victims of rape, child abuse, and domestic violence.

Psychiatric Crisis Nurse Team – interacts w/patients and families in crisis, such as following the sudden illness, serious injury, or death of a loved one, or those with psychiatric complaints, and facilitates follow-up w/an appropriate facility.

Other Interdisciplinary Team Members/Collaboration

Prehospital Care Provider – typically the 1st caregivers encountered by the patient before transport to the ED. They include Emergency Medical Technicians and Paramedics.

Physicians and Other Health Care Providers include:

Emergency Medicine Physicians – receive specialized education and training in emergency patient management.

Emergency Nurse

Support Staff – functions in support roles such as radiology and ultrasound technicians, respiratory therapists, laboratory technicians, and social workers.

Inpatient Unit Staff – communication ensures continuity and provides a comprehensive report of the ED experience for the *hand-off communication* process and patient safety.

Staff and Patient Safety Considerations

Staff Safety – disease transmission; aggressive, agitated, or violent patients or visitors.

Patient Safety – ID, Falls, Skin Breakdown in vulnerable populations, and high risk for medical errors or adverse events.

- **Older adults** – side rails up and bed/stretcher in lowest position w/access to call light and communication system.
- To reduce error potential, the ED nurse makes every attempt to obtain medical history information from the patient, family, or reliable significant others.
- When dealing with patients who arrive w/AMS, a quick survey to determine whether the individual is wearing a medical alert bracelet or necklace is important.

Scope of ED Nursing Practice

Core Competencies Include: Assessment, Setting priorities, Multitasking, Communication

Training & Certification: BLS and ACLS through American Heart Association are necessary. ACLS builds on BLS in that it encompasses advanced concepts like cardiac monitoring, invasive airway management skills, pharmacologic, and electrical therapies, IV access techniques, special resuscitation situations, and post-resuscitation management considerations. Also, PALS and CEN.

Emergency Nursing Principles/Concept of ED

Triage – French word meaning “to sort.” A triage system identifies and categorizes patients so that the most critical are treated 1st. The process is based on the premise that patients who have a threat *to life, vision, or limb* should be treated before other patients.

Three-Level Triage Model categorizes patients as Emergent, Urgent, or Nonurgent.

- **Emergent** – immediate intervention is required to sustain life or limb (example: cardiac arrest or multiple trauma)
- **Urgent** – care is required within 1 to 2 hours to prevent deterioration of condition (example: compound fractures, persistent vomiting, and diarrhea)
- **Non-urgent** – care may be delayed without risk of permanent sequelae (example: contusions, minor sprains, and simple fractures, rash, colds, strains/sprains)

Trauma Centers and Trauma Systems

Trauma Centers are categorized based on their resource capabilities.

- **Level I** (UAB, Huntsville Hospital)
 - Regional Resource Trauma Center capable of providing leadership and total care for every aspect of injury, from prevention through rehabilitation.
 - Cardiac surgery, Hand surgery, Microvascular surgery (reattachment of limbs), In-house general surgeon, Nuclear scanning (CT, MRI, MRA), Cardiopulmonary bypass and hemodialysis.
- **Level II** (Decatur General, Marshall Medical North)

- Generally reside in community hospitals and are capable of providing care to the vast majority of injured patients.
- Play significant role in injury management, education, prevention, and preparedness planning.
- **Level III** (St. Vincent's, Princeton, Marshall Medical South, Gadsden Regional, Cullman Regional, Crestwood, Athens Limestone)
 - Located in smaller communities and serve as critical links to higher capability trauma centers. The primary focus is injury stabilization and patient transfer.
 - Have general and orthopedic surgeons available.
 - Transport patients by ALS ambulance or helicopter.

- **Level IV**

- Offer ALS care in rural or remote settings, such as a ski resort, that do not have ready access to a higher level trauma center.
- Stabilize patients to the best degree possible w/available MD, nurse, PA, and paramedics

Trauma System – an integrated approach to trauma care assuring that all critical elements of trauma care delivery are aligned to meet the injured patient's needs including communication technology, prehospital care, rapid transport to a trauma center, early provision of rehabilitation, and injury prevention, research, and education initiatives.

Mechanism of Injury (MOI)

The term used to describe the manner in which the patient sustained injury. **Examples:** Blunt Trauma, Blast Effect, Acceleration/Deceleration, Penetrating Trauma, High-Speed MVA, A Fall from a Height, or a GSW. The **two most common MOI** are Penetrating Trauma and Blunt Trauma.

Primary Survey (The Initial Assessment)

Organizes the approach so that immediate threats are rapidly identified and effectively managed, reviewing **A**irway, **B**reathing, **C**irculation, **D**isability (neuro; remember AVPU or GCS for LOC), **E**xposure.

Secondary Survey (& Resuscitation Interventions)

The performance of a more complicated head-to-toe assessment to identify other injuries or medical issues that need to be managed or that might impact the course of treatment. NG tube insertion, Foley Cath insertion, Lab, Diagnostics, Comprehensive head-to-toe assessment.

Disposition – immediate transport to the operating room or interventional radiology or admission to trauma critical care, step-down, or inpatient unit for continued medical management and nursing care.

- Where does the client go?
- Interdisciplinary team collaboration.
- Don't forget the family members.

Heat Exhaustion

Patho: syndrome primarily caused by dehydration (heavy sweating and/or inadequate fluid intake).

S/S: flu-like symptoms with H/A, weakness, nausea, and/or vomiting.

Treatment: immediately stop activity, move to a cooler place, and use cooling measures.

Heat Stroke

Patho: true medical emergency in which heat regulatory mechanisms fail and body temperature may exceed 104° and result in death if not treated immediately and aggressively.

- **Exertional** – sudden onset; often result of strenuous physical activity in hot, humid conditions.
- **Classic (*non-exertional*)** – occurs over a period of time; result of chronic exposure to a hot, humid environment. It generally affects ill and older adults.

S/S: Body temperature > 104° F; hot/dry skin; may or may not sweat; mental status changes, such as: confusion, bizarre behavior, anxiety, loss of coordination, hallucinations, agitation, seizures, or even coma; VS changes: hypotension, tachycardia, tachypnea (↑ RR); electrolyte imbalances, especially sodium and potassium; ↓ renal function (oliguria); coagulopathy (abnormal clotting); pulmonary edema (crackles).

Treatment: 1st priority is ABC's; provide high-concentration O2 therapy, start several IV lines w/0.9% NS, and insert urinary catheter; rapid cooling is the 1st priority of care after ensuring ABC's; continue aggressive interventions to cool the patient until rectal temperature is 100° F (37.8°C). If shivering occurs, give benzo such as diazepam or chlorpromazine.

Snake Bites

2 Families of Snakes in the US are:

- **Crotalidae**
 - “Pit Vipers” – rattlesnakes, copperheads, cottonmouths
 - Majority of poisonous bites in US

- Triangular-shaped head, retractable fangs, and elliptical pupils; nonpoisonous snakes do not have these features.
- **Patho:** tissue necrosis, massive tissue swelling, intravascular fluid shifts and hypovolemic shock, pulmonary edema, renal failure, hemorrhagic complications from DIC, and death.
- **S/S** of venom release: severe pain, swelling, and redness or ecchymosis (bruising) in area around bite; minty, rubbery, or metallic taste in mouth and tingling or paresthesia of scalp, face, and lips; muscle fasciculation (twitching) and weakness; N/V; hypotension; seizures; and coagulopathy (clotting abnormalities); or DIC.
- **First Aid:** Move to safe place, immobilize affected extremity in position of function w/a splint helps limit spread of venom. Maintain extremity at level of heart. Keep person warm, and

provide calm reassurance. NO alcohol because it can cause venom to spread through vasodilation. DO NOT incise or suck the wound, apply ice to it, or use a tourniquet.

- **Hospital Care:** O2, two large-bore IV lines, infusion of NS or RL solution (Crystalloid solutions), opioids for pain, tetanus prophylaxis, wound care, BP and cardiac monitoring. Give CroFab (Crotalidae Polyvalent Immune Fab derived from sheep ovine if bite warrants. Not everyone receives. CroFab consists of specific antibody fragments of IgG that bind, neutralize, and redistribute toxins in pit viper venom so they may be removed from the patient's body. CroFab is contraindicated unless the benefits outweigh the risks. Risk includes bromelain (pineapple) allergy, pregnancy, sensitivity to mercury-containing products.
- Grade of "Pit Viper" Envenomation

Envenomation	Characteristics
None	Fang marks, but no local or systemic reactions
Minimal	Fang marks, local swelling and pain, no systemic reaction
Moderate	Fang marks and swelling progressing beyond the site of the bite; systemic S/S such as N/V, paresthesia, and hypotension
Severe	Fang marks present w/ marked swelling of extremity; SC ecchymosis, severe S/S, including manifestations of coagulopathy

- **Elapidae**

- **Coral Snakes** – found from North Carolina to Texas and in Gulf States through Texas and SW US.
- Have red and black rings separated by yellow or cream rings. “Red on Yellow will kill a fellow,” “Red and black, venom lack.”

- **Patho:** Highly neurotoxic venom (a nerve agent and a muscle agent)., but ability to inject venom is less efficient than that of the pit vipers.
- **S/S:** ascending paralysis; reduced perception of pain; and ultimately respiratory paralysis. Pain is mild at site instead of severe like with pit vipers. Venom is spread through lymphatic system, but NO swelling; Fang marks may be difficult to find d/t small fangs of these snakes. S/S may be delayed for up to 12 to 18 hours, but then progress to rapid deterioration. Early S/S are: N/V; H/A; pallor, and abdominal pain. Assess for neurologic manifestations, such as paresthesia (painful tingling); numbness; and AMS as well as cranial nerve and peripheral nerve deficits. Total flaccid paralysis may occur later, and the patient may have

difficulty speaking, swallowing, and breathing. NO Clotting changes. Despite all these symptoms, death is rare.

- **First Aid:** Because coral snake venom does not destroy tissue, the field treatment to limit the spread of venom includes the use of pressure immobilization techniques. The affected extremity is encircled snugly with an elastic bandage or roller gauze dressing to impede lymphatic flow and then splinted.
- **Hospital Care:** Antivenom is available, but only in limited supply d/t no longer in production.

Arthropod Bites and Stings

Brown Recluse Spider

Patho: Violin on back. Most people never know when they are bit until eschar forms at site.

Assessment: tissue necrosis referred to as red, white, and blue sign; other systemic reactions include rash, fever, chills, nausea, vomiting, malaise, and joint pain. Death can occur, but is rare.

First Aid: Apply ice intermittently for 1st 4 days to decrease enzyme activity; NO ice; elevate affected extremity, local wound care, and rest.

Hospital Care: Sometimes debridement of wound, monitor for complications; tetanus prophylactic.

Black Widow Spider

Patho: Found in every state except Alaska, have venom that produces a syndrome known as latrodectism, from neurotransmitter release from nerve terminals. Female has shiny black color with red hourglass pattern on her abdomen. Males are smaller and lighter in color with white and gray markings. The hourglass is still faintly visible. Pain can be mild or severe and severe pain seems out of proportion to the lesion. Many times the symptoms do not extend beyond bite site, but if they do, it is usually within 1 hour and involves the neuromuscular system.

Assessment: Severe abdominal pain, muscle rigidity and spasm, HTN, N/V are all common. Severe abdominal pain mimics peritonitis. Other problems include facial edema, ptosis (eyelid drooping), diaphoresis,

weakness, increased salivation, respiratory difficulty from excessive secretions, fasciculation's (twitching), and paresthesia.

First Aid: Priority is to apply ice to decrease the action of the neurotoxin. Monitor for systemic toxicity.

Hospital Care: Antivenom is available for severe bite reactions.

Scorpion Bites

Patho: Inject venom from stinging apparatus on tail.

S/S: Gentle tapping at the potential sting site causing increased pain is associated with bark scorpion sting. Symptoms usually begin immediately and reach crisis levels in 12 hours. Recovery is gradual.

Treatment: Priority is VS assessment and continuous monitoring for several hours. Apply ice pack to site.

Bees and Wasps

Patho: venomous arthropods. Bumblebees, hornets, and wasps are capable of stinging repeatedly when disturbed. Africanized or “killer bees” attack in groups. People should try to outrun them and keep mouth and eyes protected from the swarm. Never go in water because the bees will attack when the person comes up for air.

Assessment: Urticaria, anaphylaxis

First Aid: remove stinger if possible by using tweezers or scrape with a credit card; apply ice

Hospital: IV of NS, Epi, etc.

Lightning Injuries

Patho: causes CNS and Cardiovascular complications, as well as skin burns. A classic finding is an immediate but temporary paralysis that affects the lower limbs to a greater extent than the upper limbs. Cardiac arrest is the most lethal initial effect. Apnea results in hypoxia-induced ventricular fibrillation.

- **High-Voltage** – greater than 1,000 volts; lightning can be greater than a million; flashover is reason for low mortality rate.
- **Step-Voltage** – strike travels through the ground and then affects the client

Assessment: most damage on cardiovascular system; additionally immediate, but temporary paralysis of LE is a factor.

Treatment: spinal immobilization with priority to ABC's. Client does not have electrical charge and pose no danger to rescuer.

Hypothermia

Patho: Core body temperature ↓ 95° F, or 35° C. An environmental temperature below 82° F or 28° C can produce hypothermia in any susceptible person.

S/S:

- Three Categories Include (**IMPORTANT**):
 - **Mild** – shivering, dysarthria (slurred speech), muscular incoordination, impaired cognitive abilities (mental slowness), and cold diuresis.

- **Moderate** – Coagulopathy (abnormal clotting) or cardiac failure can occur. Muscle weakness, acute confusion, apathy, incoherence, possible stupor, decreased clotting
- **Severe** – bradycardia, severe hypotension, decreased respiratory rate, cardiac dysrhythmias, including possible ventricular fibrillation, or asystole, decreased neurologic reflexes, decreased pain responsiveness, acid-base imbalance.

Treatment: Priority is warming; avoid alcohol. Core rewarming methods for moderate hypothermia include administration of warm IV heated fluids, heated O₂, or inspired gas, heated peritoneal, pleural, gastric, or bladder lavage. The patient who is severely hypothermic is at high risk of

cardiac arrest. TOC is extracorporeal rewarming methods such as cardiopulmonary bypass, hemodialysis, or continuous arteriovenous rewarming. General Management for moderate and severe: protect patients from further heat loss and handle them gently to prevent ventricular fibrillation; position in supine position to prevent orthostatic changes in blood pressure from cardiovascular instability; follow standard resuscitation efforts.

Frostbite

Patho: inadequate insulation against cold weather and like burns, frostbite injuries can be superficial, partial, or full thickness. Frostbite can be mild (frostnip) to serious (fourth degree). Body tissue freezes and causes damage.

S/S: Frostnip can produce initial pain, numbness, and pallor of the affected area, but is easily remedied with application of warmth and does not induce tissue damage.

Degree of Frostbite	Manifestations
1 st Degree	Least severe, involves hyperemia (increased blood flow) of involved area and edema formation.
2 nd Degree	Large fluid-filled blisters develop w/partial-thickness skin necrosis
3 rd Degree	Appears as small blisters that contain dark fluid and an affected body part that is cool, numb, blue, or red and does not blanch. Full-thickness and SC tissue necrosis occur and require debridement
4 th Degree	The most severe, there are no blisters or edema, the part is numb, cold, and bloodless. Full-thickness necrosis extends into the muscle and bone. At this stage, gangrene develops, which may require amputation of affected part.

Treatment: Rapid rewarming in a water bath at a temperature range of 104 to 108 to thaw the frozen part. If not available, use hot towels. It is extremely painful. DO NOT use dry heat or massage the area.

Altitude-Related Illnesses

Patho: high altitude, especially an elevation above 5000 feet, can produce a range of physiologic responses in the body and can be fatal, primarily due to hypoxia. But millions of people worldwide who ascend to or live at altitudes above 2500 feet are at risk for acute and chronic mountain sickness. As altitude increases, atmospheric pressure decreases decreasing O₂ causing hypoxia. Climbers should ascend slowly. Ascending too rapidly is the primary cause of this illness.

- **AMS** – acute mountain sickness
- **HACE** – high altitude cerebral edema
- **HAPE** – high altitude pulmonary edema

S/S: AMS – throbbing H/A, anorexia, N/V, feeling chilled, irritable, and apathetic. Similar to alcohol induced hangover. Exertional dyspnea is expected, but dyspnea at rest may signal onset of HAPE. HACE – cannot perform ADL's and has extreme apathy. Key sign is ataxia (defective muscular coordination), impaired judgement and confusion. Cranial nerve dysfunction and seizures can occur, as well as death from ICP. HAPE – most common cause of death; poor exercise tolerance, prolonged recovery time after exertion, fatigue, weakness, Key signs = persistent dry cough and cyanosis of lips and nail beds. Tachycardia and tachypnea occur at

rest; crackles may be auscultated in one or both lungs; pink, frothy sputum is a late sign of HAPE.

Treatment: Priority is descent to lower altitude. Acetazolamide is used to prevent and treat AMS. Decadron can also be used. For **HACE** – dexamethasone is used. For **HAPE** – tadalafil (Cialis) and sildenafil (Viagra) are used d/t pulmonary vaso-dilatory effects.

Drowning

Patho: leading cause of accidental death in US. Suffocation occurs as a result of aspiration of fresh or salt water into the lungs or from laryngospasm w/subsequent glottis closure followed by asphyxiation.

Assessment: a patient who has been submersed in water is at risk for pulmonary infection, ARDS, and CNS impairment.

- **Fresh Water** – causes surfactant to wash out of lungs. Loss of surfactant from fresh water aspiration destabilizes the alveoli and leads to increased airway resistance.
- **Salt Water** – a hypertonic fluid, creates an osmotic gradient that draws protein rich fluid from the vascular space into the alveoli. Pulmonary edema results.
- Water contaminants can cause worse problems and lung infections.
- The duration and severity of hypoxia are the 2 most important factors that determine outcomes for victims.

- The cause also needs to be determined in case there was a medical condition or injury that caused the drowning.

Treatment: Priority is Safe Rescue of patient. Airway and cardiopulmonary support interventions should begin, O2 administration, endotracheal intubation if necessary, and CPR if necessary. Gastric decompression or orogastric tube may be necessary to prevent aspiration of gastric contents and improve ventilator function.

Disaster

Patho: an event in which illness or injuries exceed resource capabilities of a community or medical facility d/t destruction and devastation.

Internal Disaster – any event inside a health care facility or campus that could endanger patients or staff and creates a need for evacuation or relocation.

- Often requires extra personnel and the activation of the facility's emergency preparedness and response plan.
- Examples of potential internal disasters include fire, explosion, and violence.

External Disaster – any event outside the health care facility or campus, somewhere in the community, which requires the activation of the facility's emergency management plan.

- The number of facility staff is not adequate for the incoming patients.
- Can be either natural, such as a hurricane, or technological, such as a biological terror attack.

Multi-Casualty Event – can be managed by a hospital using local resources

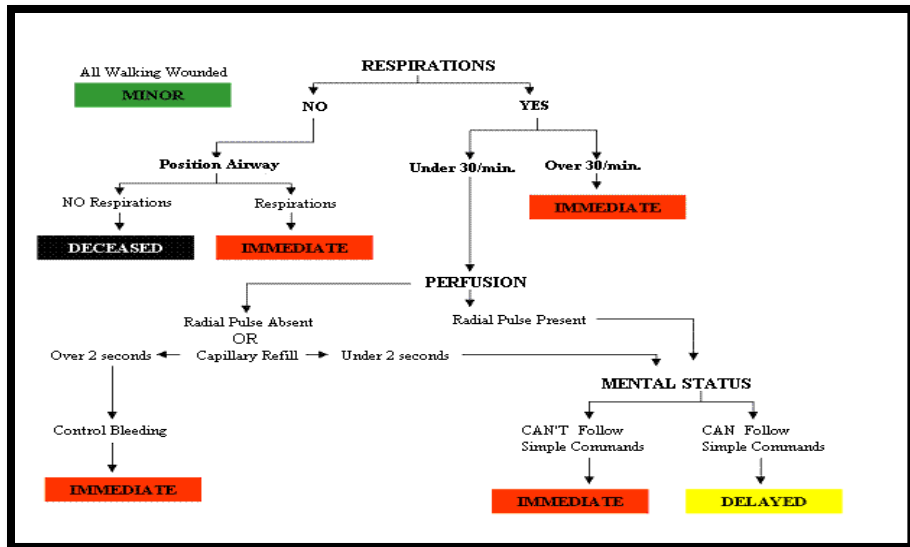
Mass-Casualty Event – overwhelms local medical capabilities and may require the collaboration of multiple agencies and health care facilities to handle the crisis.

Mass-Casualty Triage

Process: Rapidly sort ill or injured patients into priority categories based on their acuity and survival potential.

Triage Method:

Class	Tag Color	Type of Injury
Class I – Emergent	Red	Immediate threat to life
Class II – Urgent, but can wait short time	Yellow	Major injuries that need treatment within 30 min to 2 hours
Class III – Non-urgent or “walking wounded”	Green	Minor injuries that can be managed in a delayed fashion, generally more than 2 hours
Class IV – Expectant	Black	Patients who are expected to die or are dead



Hospital Emergency Preparedness Personnel Roles and Responsibilities

Hospital Incident Command System – roles are formally structured under the hospital or long-term care facility incident commander with clear lines of authority and accountability for specific resources.

Personnel Role	Personnel Function
Hospital Incident Commander	Physician or administrator who assumes overall leadership for implementing the emergency plan
Medical Command Physician	Physician who decides the #, acuity, and resource needs of patients
Triage Officer	Physician or nurse who rapidly evaluates each patient to determine priorities for treatment
Community Relations or Public Information Officer	Person who serves as a liaison between the health care facility and the media

Event Resolution and Debriefing

- When the last major casualties have been treated and no more are expected to arrive, the incident commander considers “standing down” or deactivating the emergency response plan.
- A vital consideration in event resolution is staff and supply availability to meet ongoing operational needs.
- Severe shortages of supplies and the need to clean and restock the ED may pose a threat to normal operations at the conclusion of an incident.
- **Two Types of Debriefing** Occur following a Mass Casualty event or period:

- **CISD or CISM** – addresses pre-crisis through post-crisis interventions for small to large groups, including communities. The team leader typically has background in a mental health/behavioral health field.
- **Administrative Review** – directed at analyzing the hospital or agency response to an event soon afterwards. The goal is to evaluate the implementation of the emergency preparedness plan so that changes can be made. Representatives come together for discussion.

Poisoning and Overdoses

Alabama Poison Control: 1-800-222-1222

Poisoning can be accidental, occupational, recreational, or intentional

Severity of poisoning depends on type, concentration, and route of exposure

Management of toxins involves decreasing absorption, enhancing elimination, and implementation of toxin-specific intervention

Decreasing Absorption

Emesis, gastric lavage, activated charcoal, dermal cleansing, and eye irrigation

Use of Ipecac is rare

Gastric lavage used to irrigate with large amounts of saline

Most effective intervention is administration of activated charcoal

Skin and eye decontamination involves removal of toxins using copious amounts of water or saline

Enhancing Elimination

Cathartics, Whole-bowel irrigation, Hemodialysis

Toxic-Specific Interventions

acetaminophen antidote = Mucomyst

cyanide treatment = amyl nitrate (nasally) and (IV) sodium nitrate

Overdose

Overdose is an emergency situation and management is based on the type of substance involved; Overdose can be accidental or intentional; First priority is ABC's; Continuous monitoring of neurologic status: LOC, respiratory and cardiovascular function, vital signs, and intake and output

Pharmacologic Agents

naloxone and flumazenil may be administered when a depressant effect is present but the ingested drug is unknown

naloxone reverses the effects of **opioids**

flumazenil reverses the effects of **benzodiazepines**

naloxone and flumazenil have a short half-life and may require redosing

Overdose on Non-Benzodiazepines = gastric lavage and activated charcoal if drug taken orally within 4 to 6 hours. Hemodialysis to decrease drug level and prevent irreversible CNS depressant effects and death.

Crystal Meth Overdose = tachycardia, hypertension, fever, convulsions, and coma. Death can result from stroke or heart failure

Burns

Definitions

- **Tissue integrity** is the state of structurally intact and physiologically functioning epithelial tissues such as the integument (including the skin and subcutaneous tissue) and mucous membranes.
- **Burns** are complex injuries with loss of tissue integrity caused by heat, chemicals, electricity, the sun or friction.

Review of Skin and Mucous Membrane Anatomy and Physiology

- **Epidermis**- outer most layer, very thin

- **Dermis**- middle layer, thicker than epidermis, contains blood vessels, hair follicles, and nerve endings
- **Subcutaneous**- bottom layer, fat or adipose tissue

Functions of Skin

Protection from Trauma, Protection from Microbial invasion, Fluid Balance, Thermoregulation, Sensation, Physical Identity

Mechanisms of Burn Injury

- **Dry Heat** – caused by open flame. Most common occur in house fires and explosions.

- **Scald (Moist Heat)** – caused by contact with hot liquids or steam. More common among older adults. Hot liquid spills usually involve upper, front areas of the body. Immersion scald injuries usually involve the lower body.
- **Contact** – occur when hot metal, tar, or grease contacts the skin, often leading to a full-thickness injury. Hot metal injuries such as space heater or iron. They can also occur from molten metals. Tar and asphalt temperatures usually are greater than 400.
- **Chemical** – (Alkali) bleach, oven cleaners, fertilizers, drain cleaners, and heavy industrial cleaners. Acids found in bathroom cleaners, rust removers, chemicals for swimming pools. The severity depends on the duration of contact, the concentration of

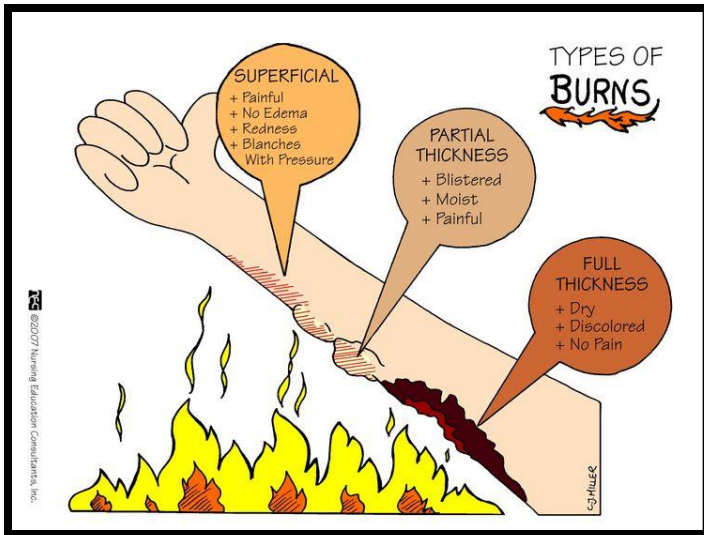
chemicals, the amount of tissue exposed, and the action of the chemical.

- **Electrical** – occurring when an electrical current enters the body. Injury depends on type of current, pathway of flow, local tissue resistance, and duration of contact.

Depth of Burn Injury

- Often too difficult to assess initially
- Determines required wound care
- Determines need for grafting
- Determines functional and cosmetic outcomes
- Differences in skin thickness in various parts of the body a factor

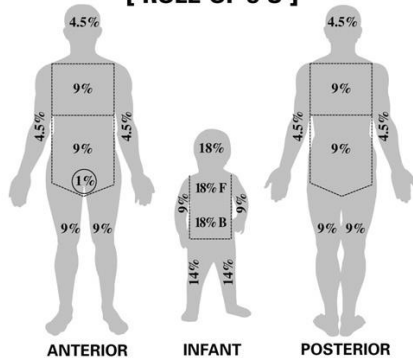
Degree of Burn		Depth/Color of Burn		Characteristics	
Superficial (1st Degree)		Epidermis; Pink/Red		NO Blisters or raw areas; Can be painful; Desquamation (peeling) of dead skin in 2-3 days; EX: Sunburn	
Partial (2nd Degree)		Superficial	Deep	Superficial	Deep
Superficial	Deep	Epidermis/Partial dermis; Pink/Red	Epidermis/Deep Dermis; Red/White	Min. edema; YES Blister; PAIN; heals 10-21 days; Blanch; NO Scar; EX: Brief Hot	Mod. Edema; NO blister; ↓ PAIN; heals 3-6 wks.; Slow/NO Blanch; YES Scar; EX: Long Hot
Full (3rd Degree)		Epidermis, Dermis, SC Tissue, Nerves; White, Brown, Deep Red, Yellow, Leathery, Black, Charred, Eschar		Skin does NOT regrow; NO edema; May/May not have PAIN; EX: Fire, Tar, Grease, Electric, Chemicals	



Rule of 9's

- Most reliable for adult burn patients
- Divides body into segments that are approximately 9%
- Considers anterior and posterior of patient
 - 9% each arm
 - 18% each leg
 - 9% head
 - 18% front torso
 - 18% back torso
 - 1% perineum
 - **=100%**

[RULE OF 9'S]



**PALMAR
METHOD**

(Patient's palm)



1%

Practice Problem

Patient enters ER with burns to anterior torso (**18**), circumferential left arm (**18**), 50% perineal area (**0.5**) and anterior portion of thigh (**4.5**). What TBSA % should be documented?

A. 32

B. 54

C. 15

D. 64

Resuscitation/Early Phase of Burn Injury

- Begins at onset of injury and continues for about 24 to 48 hours – until diuresis occurs
- Assessment of body systems
- Goals of management:
 - Secure airway
 - Support circulation – fluid replacement
 - Prevent infection
 - Maintain body temperature
 - Provide emotional support

Treatment – ABC's

Injuries to the Respiratory System

- Direct airway injury
- Carbon monoxide poisoning
- Thermal injury
- Smoke poisoning
- Pulmonary fluid overload
- External factors
- Facial edema

Airway

- Burns to face, neck, or inhalation injury can lead to edema
- Edema may become so severe that occludes airway

- Edema will be gone by 48-72 hrs. afterward
- Rapidly progressing edema may make intubation IMPOSSIBLE, better to intubate EARLY than miss your chance
- Check carboxyhemoglobin
 - Higher affinity for hemoglobin than oxygen
 - Present with “cherry red” lips, PaO₂ normal, Pulse Ox 92%
 - ABG for Carboxyhemoglobin
 - 0-10 = Normal
 - 11-20 = H/A
 - 20-40 = Confused
 - 40-60 = Coma
 - ↑ 60 = Dead
 - TX = 100% O₂

Pulmonary Fluid Overload

- Occurs even when lung tissues have not been damaged directly
- Histamine, other inflammatory mediators cause capillaries to leak fluid into pulmonary tissue space
- Accurate fluid resuscitation critical here

Fluid Resuscitation

- Proper fluid management is critical to the survival of burn patients
- Fluid resuscitations goal is to provide optimal support for organ perfusion with the least amount of fluid necessary
 - **Under resuscitation:** decreases perfusion, acute renal failure and death

- **Over resuscitation:** increased edema, elevated compartmental pressures. ARDS, and multiple organ dysfunction
- Generally resuscitation initiated for burns > 20% TBSA
- **Parkland Formula**
 - $4\text{ml} \times \% \text{TBSA} \times \text{pts weight in kg} = 24\text{hr requirements}$
 - $\frac{1}{2}$ amount should be given in first 8 hrs. POST BURN and next $\frac{1}{2}$ given over remaining 16 hrs.
- Consensus Formula, Modified Consensus also used
- Resuscitation fluid formulas are a guide, fluid rate should be adjusted to patient response determined by hourly urine output.
Goal is 0.5ml/kg urine output.

Parkland Formula

Volume of Lactated Ringers solution:

$$4\text{ml} \times \text{BSA}(\%) \times \text{weight}(\text{kg})$$

Give half of the
solution for the
first 8 hours

Give the other half
of the solution for the
next 16 hours

Parkland Formula Practice

A patient was admitted with 25% TBSA to a burn unit at 0800. The burn occurred at 0600. The patient weighs 64kg. What rate should you set his fluids at? When should you adjust his fluids and to what rate?

A patient has burns to her circumferential head, posterior torso, and posterior arms. She was burned 4 hrs. previously and weighs 42kg. In route the patient received 1L of LR. What rate should you set her fluids at? When should you adjust her fluids and to what rate?

A patient weighing 66kg had 25ml in the last hour in his indwelling Foley catheter bag. Should his IV fluid rate of 65ml/hr. be increased or decreased and why?

Type of Burn	Minor	Moderate	Major
Criteria	<p>Deep partial-thickness ↓ 15% TBSA; Full-thickness burns ↓ 2% TBSA; No burns of eyes, ears, face, hands, feet, or perineum; No electrical burns; No inhalation injury; Younger than 60 w/no chronic cardiac, pulmonary, or endocrine disorder</p>	<p>Deep partial-thickness 15%-25% TBSA; Full-thickness burns 2%-10% TBSA; No burns to eyes, ears, face, hands, feet, or perineum; No electrical burns; No inhalation injury; ↓ 60 w/no chronic cardiac, pulmonary, or endocrine disorder</p>	<p>Partial-thickness burns ↑ 25% TBSA; Full-thickness burns ↑ 10%; Any burn involving the eyes, ears, face, hands, feet, perineum; Electrical or Inhalation injury; ↑ 60; Burn complicated w/other injuries; Has cardiac, pulmonary, or other chronic issue</p>
Disposition	Outpatient	Special Hospital Admissions or Burn Center	Burn Center Referral ASAP

Vascular Changes Resulting from Burn Injuries

- **Fluid shift:** Third spacing or capillary leak syndrome, usually occurs in first 12 hr., can continue 24 to 36 hr. Boluses contraindicated d/t causing ↑ capillary leak/edema. NO diuretics d/t ↓ in circulating blood volume ↑ risk of hypovolemic shock
- Profound imbalance of fluid, electrolyte, acid-base; hyperkalemia and hyponatremia levels; hemoconcentration
- Fluid remobilization after 24 hr., diuretic stage begins 48 to 72 hr. after injury, hyponatremia and hypokalemia

Circulation

- **Goal:** Support tissue perfusion and organ function while avoiding complications of inadequate or excessive fluid therapy
- Scheduled neurovascular checks

- Circumferential burns
- Escharotomy/Fasciotomy

Cardiovascular Assessment

- **Hypovolemic shock** – Common cause of death in early phase in patients with serious injuries
- **Vital signs** – 1st: ↑ BP, ↑ HR; Then: ↓ BP, ↑ HR, Keep Temp ↑
- Cardiac rhythm, especially in cases of electrical burn injuries

Kidney/Urinary Assessment

- Changes related to cellular debris, decreased kidney blood flow
- Myoglobin released from damaged muscle, circulates to kidney
- Measure urine frequently to maintain 0.5mg/kg/hr.

Gastrointestinal Assessment

- Changes in GI function expected
- Decreased blood flow and sympathetic stimulation during early phase cause reduced GI motility, paralytic ileus
- GI bleeding
- Curling's ulcer – d/t stress; Give pantoprazole (Protonix) prophylactically

Metabolic Assessment

- Increased secretions of catecholamine, antidiuretic hormone, aldosterone, cortisol; SNS ↑, PNS ↓
- Increased core body temperature as response to temperature regulation by hypothalamus

Nonsurgical Management

- IV fluids
- Monitoring patient response to fluid therapy
- Drug therapy
 - Opioid analgesics
 - Non-opioid analgesics
 - IV preferred route, IM contraindicated due to fluid shifting
 - Diuretics contraindicated in burns except electrical due to myoglobin release
- Complementary and alternative medicine (CAM) therapies
- Environmental changes
- **Auto-Contamination** – own normal flora overgrows and invades other body areas, especially the GI tract.
- **Cross-Contamination** – organisms from other people or environments are transferred to the patient.

Acute Phase of Burn Injury

- Begins about 36 to 48 hr. after injury; lasts until wound closure is completed
- Care directed toward:
 - Continued assessment and maintenance of CV, respiratory systems
 - Continued assessment and maintenance of GI and nutritional status
 - Burn wound care
 - Pain control
 - Psychosocial interventions

Nonsurgical Management Acute Phase

- Mechanical débridement
 - Hydrotherapy
- Enzymatic débridement
 - Autolysis – disintegration of tissue by action of own cellular enzymes.
 - Collagenase (*Santyl*) – rapid wound debridement.

Dressing the Burn Wound

- Standard wound dressings
- Biologic dressings – temp. wound cover and closure. Expensive.
 - **Homograft** – Human skin

- **Heterograft** – Skin from other species (PIG)
- Cultured skin
- Artificial skin
- Biosynthetic dressings
- Synthetic dressings
- Topical medications and medicated dressings
 - Chart 26-5

Surgical Management

- Surgical excision
- Wound covering
 - Skin graft

Nutrition & Mobility

- Nutrition consult
- **↑ calorie/↑ protein** – 5,000 + calories/3 x norm protein; Start NG tube in 4 hrs.
- **Positioning** – neutral position w/minimal flexion, elevate extremities, neck side to side, etc.
- Compression dressings

Rehabilitative Phase of Burn Injury

- Begins with wound closure, ends when patient returns to highest possible level of functioning

- Emphasis on psychosocial adjustment, prevention of scars and contractures, resumption of preburn activity
- This phase may last years or even a lifetime if patient needs to adjust to permanent limitations

Abuse

- Burn injuries sometimes used to cover markings from other types of abuse
 - Stocking pattern
 - Water lines
 - Other healing injuries (previous burn, fractures, bruising)
 - Sparing

- Unusual burn patterns
- Medical Conditions that are sometimes mistaken for burns
 - Cutaneous skin infections
 - Scaled staph syndrome
 - Impetigo
- Hypersensitivity reactions
- Cultural practices/ folk remedies

Prevention

- Assess how hot the water is before bathing, showering or immersing a body part in it
- Hot water tanks should be set below 140 F
- Use potholders when removing hot pans from oven

- Never add a flammable substance to an open flame
- Use sunscreen and protective clothing
- Never smoke in bed
- Keep pot handles facing inside of stove, not hanging off edge
- Always test water before bathing infant
- Never leave child alone in bathtub
- Keep matches and lighters away from those cognitively impaired
- Keep clothing, bedding and flammable objects away from space heaters
- Place screens in front of fireplaces
- Do not smoke or allow flames near home oxygen
- Use smoke detectors and carbon monoxide monitors in home
- Develop planned escape route in case of fire
- Teach stop, DROP, and roll!

Question 1

The nurse is caring for a patient who is admitted to the ED with burns to the lower legs and hands. During the initial management, what is the priority nursing care?

- A. Assess and treat pain.
- B. Evaluate airway and circulation.**
- C. Place two IV catheters and initiate fluid resuscitation.
- D. Use the rule of nines to estimate percent of body surface area burned.

Question 2

It has been 12 hours since a patient has been admitted for burns to the face and neck with associated inhalation injuries. The patient had been wheezing audibly and the wheezing has now stopped. What nursing action is appropriate?

- A. Check the patient's Spo2 level.
- B. Notify the physician immediately.**
- C. Re-assess breathing in 1 hour.
- D. Document improvement in patient's condition

Question 3

A patient has been receiving dressing changes with silver sulfadiazine (Silvadene) for burn injuries over both lower arms. The nurse notices that the patient's white blood cell count has dropped significantly over the past 4 days. How does the nurse interpret this finding?

- A. Electrolyte imbalance
- B. Infection is improving
- C. Impending kidney disease
- D. Possible allergic reaction to silver sulfadiazine (Silvadene)**