

Burn Injuries & Its Management

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BURNS

Wounds caused by exposure to:

1. excessive heat
2. Chemicals
3. fire/steam
4. radiation
5. electricity

BURNS

- Results in 10-20 thousand deaths annually
- Survival best at ages 15-45
- Children, elderly, and diabetics
- Survival best burns cover less than 20% of TBA

TYPES OF BURNS

- **Thermal**
exposure to flame or a hot object
- **Chemical**
exposure to acid, alkali or organic substances
- **Electrical**
result from the conversion of electrical energy into heat. Extent of injury depends on the type of current, the pathway of flow, local tissue resistance, and duration of contact
- **Radiation**
result from radiant energy being transferred to the body resulting in production of cellular toxins

Chemical Burn



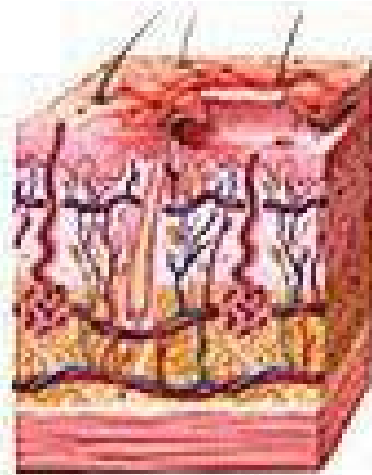
BURN WOUND ASSESSMENT

- Classified according to depth of injury and extent of body surface area involved
- Burn wounds differentiated depending on the level of dermis and subcutaneous tissue involved
 1. superficial (first-degree)
 2. deep (second-degree)
 3. full thickness (third and fourth degree)

Epidermis

Dermis

Hypodermis



First degree
burn



Second degree
burn



Third degree
burn



SUPERFICIAL BURNS (FIRST DEGREE)

- Epidermal tissue only affected
- Erythema, blanching on pressure, mild swelling
no vesicles or blister initially
- Not serious unless large areas involved
- i.e. sunburn



DEEP (SECOND DEGREE)

*Involves the epidermis and deep layer of the dermis

Fluid-filled vesicles –red, shiny, wet, severe pain

Hospitalization required if over 10-15% of body surface involved

FULL THICKNESS (THIRD/FOURTH DEGREE)

- Destruction of all skin layers
- Requires immediate hospitalization
- Dry, waxy white, leathery, or hard skin, no pain
- Exposure to flames, electricity or chemicals can cause 3rd degree burns





Calculation of Burned Body Surface Area

- **Calculation of Burned Body Surface Area**

TOTAL BODY SURFACE AREA (TBSA)

- Superficial burns are not involved in the calculation
- Lund and Browder Chart is the most accurate because it adjusts for age
- Rule of nines divides the body – adequate for initial assessment for adult burns

Lund Browder Chart used for determining BSA

Lund-Browder Chart									
Area	0-1 Years	1-4 Years	5-9 Years	10-14 Years	15 Years	Adult	% 2nd	% 3rd	% TOTAL
Head	19	17	13	11	9	7			
Neck	2	2	2	2	2	2			
Ant. Trunk	13	13	13	13	13	13			
Post. Trunk	13	13	13	13	13	13			
R. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
L. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
Genitalia	1	1	1	1	1	1			
R.U. Arm	4	4	4	4	4	4			
L.U. Arm	4	4	4	4	4	4			
R.L. Arm	3	3	3	3	3	3			
L.L. Arm	3	3	3	3	3	3			
R. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
L. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
R. Thigh	5.5	6.5	8	8.5	9	9.5			
L. Thigh	5.5	6.5	8	8.5	9	9.5			
R.L. Leg	5	5	5.5	6	6.5	7			
L.L. Leg	5	5	5.5	6	6.5	7			
R. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
L. Foot	3.5	3.5	3.5	3.5	3.5	3.5			

From the Medical University of South Carolina Children's Hospital Pediatric Burn Intake Form. (Charleston, SC)

RULES OF NINES

- Head & Neck = 9%
- Each upper extremity (Arms) = 9%
- Each lower extremity (Legs) = 18%
- Anterior trunk = 18%
- Posterior trunk = 18%
- Genitalia (perineum) = 1%



FLUID SHIFT

- Occurs after initial vasoconstriction, then dilation
- Blood vessels dilate and leak fluid into the interstitial space
- Known as third spacing or capillary leak syndrome
- Causes decreased blood volume and blood pressure
- Occurs within the first 12 hours after the burn and can continue to up to 36 hours



FLUID IMBALANCES

- Occur as a result of fluid shift and cell damage
- Hypovolemia
- Metabolic acidosis
- Hyperkalemia
- Hyponatremia
- Hemoconcentration (elevated blood osmolarity, hematocrit/hemoglobin) due to dehydration

FLUID REMOBILIZATION

- Occurs after 24 hours
- Capillary leak stops
- See diuretic stage where edema fluid shifts from the interstitial spaces into the vascular space
- Blood volume increases leading to increased renal blood flow and diuresis
- Body weight returns to normal



CURLING'S ULCER

- Acute ulcerative gastro duodenal disease
- Occur within 24 hours after burn
- Due to reduced GI blood flow and mucosal damage
- Treat clients with H₂ blockers, mucoprotectants, and early enteral nutrition
- Watch for sudden drop in hemoglobin

PHASES OF BURN INJURIES

- Emergent (24-48 hrs)
- Acute
- Rehabilitative





EMERGENT PHASE


*Immediate problem is fluid loss, edema, reduced blood flow (fluid and electrolyte shifts)

- Goals:

1. secure airway
2. support circulation by fluid replacement
3. keep the client comfortable with analgesics
4. prevent infection through wound care
5. maintain body temperature
6. provide emotional support

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- **Outpatient Management of Minor Burns**
 - **A patient with 1st- and 2nd-degree burns of <10% of BSA may be treated on an outpatient basis unless family support is judged inadequate or there are issues of child neglect or abuse. These outpatients do not require a tetanus booster (unless not truly immunized) or prophylactic penicillin therapy. Blisters should be left intact and dressed with bacitracin or silver sulfadiazine cream (Silvadene).**


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- **Dressings should be changed once daily, after the wound is washed with lukewarm water to remove any cream left from the previous application. Very small wounds, especially those on the face, may be treated with bacitracin ointment and left open**



Burns to the palm with large blisters should receive close follow-up on an outpatient basis. The great majority of superficial burns heal in 10-20 days. Deep 2nd-degree burns take longer to heal and may benefit from enzymatic debridement ointment application (collagenase ointment) applied daily on the wound, which aids in the removal of the dead tissue. These ointments should not be applied to the face to avoid the risk of getting them into the eyes.

CLINICAL MANIFESTATIONS IN THE EMERGENT PHASE

- Clients with major burn injuries and with inhalation injury are at risk for respiratory problems
- Inhalation injuries are present in 20% to 50% of the clients admitted to burn centers
- Assess the respiratory system by inspecting the mouth, nose, and pharynx
- Burns of the lips, face, ears, neck, eyelids, eyebrows, and eyelashes are strong indicators that an inhalation injury may be present
- Change in respiratory pattern may indicate a pulmonary injury.

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- The client may: become progressively hoarse, develop a brassy cough, drool or have difficulty swallowing, produce expiratory sounds that include audible wheezes, crowing, and stridor
 - Upper airway edema and inhalation injury are most common in the trachea and main bronchi
 - Auscultate these areas for wheezes
 - If wheezes disappear, this indicates impending airway obstruction and demands immediate intubation

CLINICAL MANIFESTATIONS


- Cardiovascular will begin immediately which can include shock (Shock is a common cause of death in the emergent phase in clients with serious injuries)
- Obtain a baseline EKG
- Monitor for edema, measure central and peripheral pulses, blood pressure, capillary refill and pulse oximetry

CLINICAL MANIFESTATIONS

- Changes in renal function are related to decreased renal blood flow
- Urine is usually highly concentrated and has a high specific gravity
- Urine output is decreased during the first 24 hours of the emergent phase
- Fluid resuscitation is provided at the rate needed to maintain children urine output at 1 mL/kg/hr.
- Measure BUN, creatinin

IV FLUID THERAPY

- Infusion of IV fluids is needed to maintain sufficient blood volume for normal CO
- Clients with burns involving 15% to 20% of the TBSA require IV fluid
- Purpose is to prevent shock by maintaining adequate circulating blood fluid volume
- Severe burn requires large fluid loads in a short time to maintain blood flow to vital organs
- Fluid replacement formulas are calculated from the time of injury and not from the time of arrival at the hospital
- Diuretics should not be given to increase urine output.

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- **Fluid Resuscitation**
 - **The first day :For most children, the Parkland formula is an appropriate starting guideline for fluid resuscitation (4 mL lactated Ringer solution /kg/% BSA burned).**
 - **The 2nd 24h: lactated Ringer solution in 5% dextrose**
 - **Venous accesses :** with burns of 30% of BSA = large venous access . with burns of >60% of BSA=a multilumen central venous catheter
 - **Alb, p cell, FFP, Colloid**

ACUTE PHASE OF BURN INJURY

- Lasts until wound closure is complete
- Care is directed toward continued assessment and maintenance of the cardiovascular and respiratory system
- Pneumonia is a concern which can result in respiratory failure requiring mechanical ventilation
- Infection (Topical antibiotics – Silvadene)
- Tetanus toxoid
- Weight daily without dressings or splints and compare to pre-burn weight
- A 2% loss of body weight indicates a mild deficit
- A 10% or greater weight loss requires modification of calorie intake
- Monitor for signs of infection

LOCAL AND SYSTEMIC SIGNS OF INFECTION- GRAM NEGATIVE BACTERIA

- Pseudomonas, Proteus
- May lead to septic shock
- Conversion of a partial-thickness injury to a full-thickness injury
- Ulceration of healthy skin at the burn site
- Erythematous, nodular lesions in uninvolved skin
- Excessive burn wound drainage
- Odor
- Sloughing of grafts
- Altered level of consciousness
- Changes in vital signs
- Oliguria
- GI dysfunction such as diarrhea, vomiting
- Metabolic acidosis



PLANNING AND IMPLEMENTATION

- Nonsurgical management: removal of exudates and necrotic tissue, cleaning the area, stimulating granulation and revascularization and applying dressings. Debridement may be needed

DRESSING THE BURN WOUND

- After burn wounds are cleaned and debrided, topical antibiotics are reapplied to prevent infection
- Standard wound dressings are multiple layers of gauze applied over the topical agents on the burn wound



REHABILITATIVE PHASE OF BURN INJURY

- Started at the time of admission
- Technically begins with wound closure and ends when the client returns to the highest possible level of functioning
- Provide psychosocial support
- Assess home environment, financial resources, medical equipment, prosthetic rehab
- Health teaching should include symptoms of infection, drugs regimens, f/u appointments, comfort measures to reduce pruritus

DIET

- Initially NPO
- Begin oral fluids after bowel sounds return
- Do not give ice chips or free water lead to electrolyte imbalance
- High protein, high calorie



SKIN GRAFTS

- Done during the acute phase
- Used for full-thickness and deep partial-thickness wounds

POST CARE OF SKIN GRAFTS

- Maintain dressing
- Use aseptic technique
- Graft should look pink if it has taken after 5 days
- Skeletal traction may be used to prevent contractures
- Elastic bandages may be applied for 6 mo to 1 year to prevent hypertrophic scarring