Nursing Care of the Patient with a Burn Injury

An Introductory Seminar in Burn Nursing for Student Nurses

Presented by the Burn Center at Crozer Chester Medical Center

Nursing Care of the Patient with a Burn Injury: A Seminar for Student Nurses
Presented by the Burn Center at Crozer Health

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Learning Objectives: At the completion of this presentation, the students will be able to:

1. Describe extent and depth of a burn injury
2. Delineate the three phases of burn care
3. Develop a nursing plan of care for a patient with a burn injury
4. Discuss Outpatient management of a burn injury
5. Describe advances in burn wound products

U.S. Fire and Burn Injury Estimates

- 486,000 Total burn injuries receiving medical care
- 30,000 Total Burn Center hospitalizations
- 3,375 Fire/Smoke Inhalation Deaths yearly
- Survival rate in Burn Treatment Centers: 97%

Source: American Burn Association 2017 National Burn Repository (NBR) Report

Demographics of Admissions to Burn Centers

Gender: 32% F; 68% M
Ethnicity: 59.2% White, 20.7% Black, 10.7% Hispanic, Asian 2.5%, Native American 0.9%, 5.8% other

Source: American Burn Association 2017 NBR Report

Causes of Injury

- 41.4% fire / flame
- 34.7% scald
- 9.5% contact
- 3.1% electrical
- 3.4% chemical
- 2.2% other non-burn

Source: American Burn Association 2017 NBR Report

Populations at Risk

- Toddlers / Children
- Young Adults - male / female
- Older Adults
- People with Special Needs

Skin: The Largest Organ in the Body

Functions of the Skin

- First line barrier against infection
- Conservation of body fluid
- Temperature regulation
- Organ of excretion
- Organ of secretion
- Sensation
- Identity
- Vitamin D production
- Appearance

Degrees of Burn - *Burns are NOT staged*

First Degree Burn
Superficial
Epidermis layer injured
Dry, no blisters, minimal or no edema
Erythematous
Very painful
Rapid heat loss
Healing: 2-5 days with no scars
May have some discoloration

Second Degree Burn
Epidermis destroyed and dermis injured. Can be SHALLOW to DEEP

Second Degree *Partial Thickness*
Moist blebs, blisters. Underlying tissue – mottled pink & white, cherry red, weeping wounds. Coagulated blood vessels visible in deep dermal 2nd degree injuries. Good capillary refill. Very painful. Rapid heat loss.

Third Degree *Full Thickness*
Complete destruction of epidermis. Dermis injury down to subcutaneous tissue. May include fascia, muscle and bone.

- Dull red dry leathery, eschar
- Mixed white, waxy, pearly, khaki, mahogany, soot stained
- Insensate. Less rapid heat loss

Healing: Large areas require grafting, which may require months. Small areas may heal from the edges after weeks.

Percent of BSA (Body Surface Area) *Methods to Calculate Percent of Burns*

- Rule of Nines
- Palmer Method
- Lund & Browder Chart

Palmer Method:
1% TBSA = size of the *patient's* palm and fingers

Lund and Browder Chart

Phases of Burn Care

- Emergent/Resuscitative
- Acute
- Rehabilitative

Emergent/Resuscitative Phase

- First 48-72 hours post burn injury
- Goals:
    - Establish hemodynamic stability
    - Maintain tissue and organ perfusion

Primary Survey

- The initial assessment of the burn patient is like that of any trauma patient.
- Assess for other traumatic injuries
    - Blunt
    - Penetrating
- Stop the burning process. Cool the burn.
- After the cooling process, the burn wound becomes the last priority.

ABC's of Bun Care

- ***A***irway maintenance with cervical spine protection
- ***B***reathing and ventilation
- ***C***irculation with hemorrhage control
- ***D***isability (assess Neurologic deficit)
- ***E***xposure

Airway

- Must be assessed immediately
- Consider endotracheal intubation

Breathing and Ventilation

- Auscultate the chest. Verify breath sounds in both lungs.
- Assess rate & depth of respirations.
- High flow oxygen at 15L (100%), utilize a non-rebreathing mask.
- Circumferential full thickness chest burns of the trunk may impair ventilation & must be monitored closely.

Circulation

- Assess adequacy of circulation.
- Vascular access – 2 large bore IV's into unburned skin if possible.
- Begin fluid administration.
- Doppler examination – circulation deficit in circumferentially burned extremity.
- Pulse oximetry probe – circulation check

Disability, Neurologic Deficit

- Burn patients – usually alert & oriented initially.
- Altered LOC consider:

- Carbon monoxide poisoning
- Hypoxia
- Associated injury
- Substance abuse

Exposure/ Environmental Control

- Remove all jewelry & constricting clothing.
- Cool burn with cool water or saline.
- NO ice.
- NO creams, butter or ointments.
- Cool, wet compresses appropriate only in small burns (< 10% BSA).
- Maintain core body temperature.
- Warm emergency transport vehicles; ED triage area, etc.
- Remove ALL wet soaks, coverings, etc. before transport. Cover with dry sheets & blankets to prevent hypothermia

Use Warming Devices:

- Warm IV fluids.
- Bair Hugger, or other Hypothermia unit

Secondary Survey

Points to Consider

- History of the incident
  - Mechanism of injury
  - Location of victim
  - Presence of accelerants or contaminants
- Medical history
- Complete head to toe exam
- Tetanus prophylaxis

Determining the Severity of a Burn

- Depth of Tissue Damage
- Percent of BSA (Body Surface Area) involved
- Past Medical History – pre-existing illness
- Accompanying Trauma
- Special Care Areas: hands, face, feet, perineum, major joints
- Age – mortality / morbidity
- Electrical and Chemical Burns
- Burns with Inhalation Injuries

Adjuncts to the Secondary Survey

- Universal Precautions
- Fluid Resuscitation
- Baseline vital signs
- Insert gastric tube (BSA 20% &>)
- Foley catheter

- Assess pulses & extremity perfusion
- Continued ventilatory assessment
- Pain Management
- Psychosocial assessment

Baseline Diagnostic Studies

- CBC
- Hgb & Hct
- BMP (Basic Metabolic Panel) –
- Sodium, potassium, chloride, CO_2, glucose, BUN, creatinine, calcium
- CXR
- PT/PTT
- Platelets
- Urinalysis
- Microbiology – cultures ordered only if recent hospitalization or suspected infection
- Blood culture
- Urinalysis with reflex urine culture,
- sputum with gram stain
- wound with gram stain
- MRSA PCR (nasal)
- Altered LOC
- Toxicology screen
- EtOH
- Drug
- Covid test

tests in specialized circumstances

- Arterial blood gases (inhalation injury suspected)
- Carboxyhemoglobin (COHgb)
- 12 lead ECG
- Suspected Cardiac event
- CPK with isoenzymes
- Troponin
- Serum creatinine kinase, troponin, & urine hemoglobin and myoglobin – electrical injury or prolonged downtime
- Spine & long bone X-rays with suspected concomitant injuries

Burn Shock & Fluid Resuscitation

Goal – *maintain tissue & organ perfusion*
Avoid inadequate or excessive fluid therapy

Pathophysiology of Burn Shock

↑ Capillary Permeability ➔ Loss of Plasma, Protein & Electrolytes

↓

↑ Interstitial Fluid & ↓ Intravascular Volume

↓ ↓

Edema Hypovolemia & ↓ BP

The Undamaged tissue releases fluid ➔ Vascular spaces ➔ Interstitial spaces ➔causing general dehydration. Hemolysis of RBC ➔ Hemoconcentration

Fluid needs immediately post burn

Calculation of fluids: The total volume of fluid calculated from this formula is an <u>estimate</u> of the patient's fluid needs during the first 24 hours, p***ost burn***.

Resuscitation Fluid

- Isotonic crystalloid early
- Colloid of little use with increased capillary permeability

Fluid Resuscitation Formula

- Adults: Ringer's Lactate 2 - 4 ml x kg body weight x percent burn
- Children: Ringer's Lactate 3 - 4 ml x kg body weight x percent burn plus maintenance fluid
- Infants and Young Children: Add fluid with 5% dextrose at maintenance rate in addition to the resuscitation fluid noted above for children.
- Consult burn center for direction.
- 4ml LR x kg body weight x percent burn - electrical injury

Fluid Resuscitation Formula Example

2 ml LR / kg / % TBSA = Fluids over 1st 24h

- Administer ½ of the total volume over the first 8 hours post burn
- Administer ¼ of the total volume over the second 8 hours
- Administer ¼ of the total volume over the third 8 hours

35 yr old white male was involved in a steam explosion at work. The incident occurred at 1300 hours. He was admitted directly to the burn unit. Estimated BSA = 50% Wt. 70kg

- 2ml LR x 70 kg x 50% = _____ml in 1st 24 hrs.

Fluid Example 1st 8 hr.

- ½ of 7,000 ml = _____in first 8 hrs
- IV Rate in 1st 8 hrs. = _____ml/hr

Fluid Example 2nd 8 hr.

- ¼ of 24 hr. total in 2nd 8 hrs. = _____ml
- IV rate in 2nd 8 hrs. = _____ml/hr

Fluid Example 3rd 8 hr.

- ¼ of 24 hr. total in 2nd 8 hrs. = _____ml
- IV rate in 2nd 8 hrs. = _____ml/hr

Monitoring Resuscitation

- Hourly urine output
- Adults: 0.5 ml/kg/hr or (30-50 ml/hr)
- Children < 30 kg expect 1ml/kg/hr
- Children > 30 kg expect 30-50 ml/hr

Is more fluid needed?

- Inhalation injury
- Associated injuries
- Dehydration
- Electrical injury
- ETOH

Monitoring

- Management of oliguria
    - Increase resuscitation fluid
    - No fluid boluses
    - Avoid diuretics
- Management of Hemochromogenuria
    - Increase fluids
    - Urine output 1.0-1.5 ml/kg/hr or (75-100 ml/hr)
- Assess changes from baseline vital signs
- Hypotension vs hypertension
- Bradycardia vs tachycardia
- Hgb / Hct concentrated
    - Do Not resuscitate with blood products, unless associated trauma present
- Electrolyte abnormalities
    - Hyperkalemia
    - Hypokalemia
    - Hypernatremia

Neurovascular Compromise

- Circumferential extremity burns
- Circumferential trunk burns
- Palpate pulses / Doppler checks
- Remove constricting clothing & jewelry

Principles of a Releasing Escharotomy

- Relieve respiratory distress
- Prevent circulatory occlusion

Escharotomy

- Typically performed on full thickness, circumferential extremity or torso burns
- Evaluate tissue pressures
- Should ideally be done in the Burn Center

Fasciotomy

- Incision of investing muscle fascia beneath burned tissue
- Rarely required – very deep burns
- Electrical injury

Types of Burns

- Thermal
- Electrical
- Chemical
- Inhalation

Thermal Burns

- Flame
- Scald
- Heat Contact
- Steam

Electrical Injury Etiology & Incidence

- 3% Burn Unit Admissions
- Sex
- Age
- Work related
- TBSA
- Seasonal Fatalities

Electrical Burn

- Adults and small children
- Home
- Work related

Electrical Injury

Types of Electrical Injury

- True
- Arc
- Flame

Severity of Electrical Injury

- Factors that determine the extent of tissue damage and the complications:
    - Type of current
    - Amperage
    - Current pathway
    - Duration of contact
    - Resistance

Resistance of Electrical Energy

- Follows path of least resistance
- Varies according to tissue type:
    - Nerves (least resistance)
    - Blood vessels
    - Muscles Skin
    - Tendon
    - Fat
    - Bone (greatest resistance)

Electrical Arc Injury

- Current courses external to the body from the contact point to the ground

Electrical Flame Injury

- Low voltage
- Household appliances

Immediate Care of Electrical Injury

- At the Scene:
    - Determine power source
    - Turn power off
    - Assess for cardiac / respiratory arrest
    - C-spine control
    - Assess LOC, other injuries, contact points (entrance - exit wounds)
    - Keep patient warm

Hospital Care of Electrical Injury

- Possible intubation
- Cardiac monitoring - 12 lead EKG
- C-spine control
- IV access
- Foley catheter - keep urine output > 75-100 ml/hr
- Labs, urine myoglobin
- Assess pulses - all extremities
- X-rays to assess C-spine and fractures
- Reassure patient & family

"Iceberg Metaphor"

- The damage is worse below the surface of the skin
- Need for surgical exploration of the tissues-fasciotomy

Complications of Electrical Injury

- Immediate:
    - Cardiac arrest
    - Respiratory arrest
    - Fractures from tetanic contractures or falls
    - Extensive muscle damage
    - Myoglobinuria

- Long Term:
    - Neurological impairment, memory loss
    - Demylenization of nerves
    - Amputations
    - Cataracts
    - Impotence

Chemical Injuries

Why do people get chemical burns?

- Work related
- Household (cleaning) agents

- Accidental / intentional ingestion
- Assaults

Tissue damage depends on:
- Strength of concentration
- Quantity of chemical
- Manner & duration of contact
- Mechanism of chemical action

Types of Chemicals
- Acids
- Alkalis
- Organic compounds

Common chemical burns
- Radiator fluid
- Anhydrous ammonia
    - Used in methamphetamine production, industrial refrigerant, fertilizer

Emergency Treatment of Chemical Burns
- Protect yourself-wear gloves
- Remove all clothing don't forget shoes / boots
- Continuous flush 10-30 minutes
- Eye burns- remove contacts, continuous flush from center outwards
- Eye pH

Treatment
- Brush off powder agents except white phosphorus
- Copious H_2O
- Ø Neutralizing chemicals
    - Exothermic heat reaction

Emergency Treatment of Chemical Injury
- ABC's
- FLUSH! FLUSH! FLUSH!
- Nebulizer treatment
- Wound care
- Look for hidden burns

Flush! Flush! Flush!

Hydrofluoric Acid / Concrete / Treatment
- Copious H_2O or saline irrigation

Hydrofluoric Acid
- Copious irrigation
- ↑ Concentration can be life threatening

REMEMBER...

☆ ...Tissue damage caused by a chemical will progress until the chemical has been removed or inactivated.

Inhalation Injury

- Three types:
    - Carbon monoxide poisoning
    - Injury above the glottis
    - Injury below the glottis

Carbon monoxide poisoning

- 200 Xs > affinity for Hgb than for oxygen
    - 15-40% CNS changes of varying degrees
    - 40-60% Obtunded, LOC
    - 50-70% Fatalities

Event History

- Where did injury occur?
- What was burning?
- Were noxious chemicals involved?
- Did patient lose consciousness?
- Describe patient assessment when rescued.

Physical findings

- Carbonaceous sputum
- Facial burns, singed nasal hairs, soot
- Agitation (hypoxia)
- Intercostal retractions
- Tachypnea
- Rales, rhonchi, diminished breath sounds
- Nasal or Oropharyngeal edema

Physical findings

- Agitation, anxiety, stupor, cyanosis, or other signs of hypoxia
- Hoarse voice, brassy cough, grunting, or guttural respiratory sounds
- Use of accessory muscles
- Inability to swallow

Treatment

- Maintain patent airway
- Consider intubation
    - # 8.0 mm oral endotracheal preferred
- 100% oxygen, non-rebreather mask
- Obtain ABG's, COHgb levels
- Frequent suctioning
- Ventilator

Injury Above the Glottis

- Majority of heat damage occurs above the glottis
- Resulting edema severe; may occlude airway
- Consider early intubation for signs of respiratory distress
- Fiberoptic bronchoscopy in the Burn Center

Injury Below the Glottis

- Fiberoptic Bronchoscopy exam:
  - Ulcerations
  - Erythema
  - Edema
- Usually chemical injury

When to Intubate

- Follow ABLS/ATLS Protocol
- Indications
  - Airway obstruction imminent
  - Progressive hoarseness
  - Stridor
  - Level of consciousness GCS<8
  - NOT JUST BURNED FACE !!!

Ventilator Management

- VDR High Frequency Percussive Ventilation
- ARDS NET Vt= 6cc/kG
- Nitric Oxide
- Liquid Ventilation
- APRV Airway Pressure Release Ventilation
- ECMO Extracorporeal Membrane Oxygenation
- No Level I Data /Further Eval

Why go to a Burn Center?????? Advantages of a Burn Center

- Specialized burn educated personnel
- Continual upgrading through experience
- High staff / patient ratio
- Multidisciplinary Team

Burn Center Referral Criteria

Resources for Optimal Care of the Injured Patient.
American Burn Association, American College of Surgeons, Committee on Trauma
Revised 2014

- Partial thickness burns greater than 10% total body surface area (TBSA)
- Burns that involve the face, hands, feet, genitalia, perineum, or major joints
- Third degree burns in any age group
- Electrical burns, including lightning injury
- Chemical burns
- Inhalation injury
- Burn injury in patients with preexisting medical disorders that could complicate

management, prolong recovery, or affect mortality
- Any patients with burns and concomitant trauma in which the burn injury poses the greatest risk of morbidity or mortality
- Burned children in hospitals without qualified personnel or equipment for the care of children
- Burn injury in patients who will require special social, emotional, or long-term rehabilitative intervention.

Transfer Process
- 24 hour availability
- Direct phone call to Burn Center Charge nurse
  - 610-447-2800
- Followed by conference call with Burn Attending Physician
- Smartphone telemedicine consultation / triage

Stabilization: Prepare to Transport
- Continuous reassessment
  - Secure airway
  - Secure IV lines
- Pain/sedation medication
- Anxiolytics
- Gastric tube ≥ 20% TBSA & / or intubated
- Foley catheter
  - Monitor & document hourly urine output
  - Accurate I & O
- Tetanus immunization
- No prophylactic antibiotics or steroids

Stabilization: Prepare to Transport
- Maintain core temperature
- Warm room / transport vehicle / fluids
- Remove all wet soaks, coverings, etc. before transport.
- Keep patient covered; dry sheets; blankets
- Do not delay transfer for debridement or application of topical antimicrobial
- Dressings not required if Burn Center admission
- Documentation

Glimpse of the Burn Center
Acute Phase
- 48 hours post burn until wounds are covered
- Goals:
  - Prevent infection and sepsis
  - Wound management

Control of Infection
- Environmental Control
- Wound Care and Hydrotherapy
- Topical Antimicrobials

- Infection and Sepsis

Enforce Strict Handwashing

- Waterless hand wash up to five uses between soap and water washes.
- Soap and water wash hands for one full minute.

Daily and Terminal Environmental Cleaning

Compliance with Infection Control Measures

- Educate all members of the multi-disciplinary team.

Limit Potential for Cross-Contamination

- Reduce unnecessary repeated patient contact
- Enforce strict traffic control
- Restrict access

Woundcare and Hydrotherapy / Proper Planning

- Patient Room vs. Hydrotherapy Room
- Pre-heat the room
- Equipment gathered
- Pre-medicate Patient
- Educate Patient

Bedside Procedure: Unstable patient

Hydrotherapy Area / Shower Trolley

- Hard-wire monitor capabilities
- Ventilator capabilities
- Temperature controlled
- For Acute or Sub-acute patients

Ambulatory Shower

- Lower level patient
- Wound care participation by patient
- May sit or stand

Premedicate

Hydrotherapy & Dressing Change / Cleansing the Wounds

Wound Assessment

- Overall Appearance
- Color
- Drainage vs. Dry
- Area Involved
- Blistered or Intact
- Circumferential
- Pulses

Circumferential Burn

Patient Weight

Examination

- Burn Attending examines the burn wounds daily to determine changes to treatment plan
- Thorough & concise documentation by Nursing

Physical / Occupational Therapy

Applying Burn Wound Dressings

Topicals
Ag Dressings

- Controls bacterial colonization of wound
- Silvadene
- Sulfamylon
- **Sustained Release Silver Products**
- Acticoat
- Mepilex Ag - Safetac Technology
-

Negative Pressure Wound Therapy VACS in Burn Care

- Post skin grafting

Total Body Wound VAC

Wound Coverage

- Temporary coverage
- Permanent wound coverage

Temporary Wound Coverage
Wound is free of debris with minimal or no infection and waiting to be grafted OR wound will heal without grafting.

Xenograft
A graft of tissue obtained from an animal of species other than the recipient.

- Pigskin

Allograft
A graft transferred from on human (living or cadaveric) to another.

- Cadaver skin

Permanent Wound Closure

- Surgical Excision
- Harvesting Donor Sites
- Skin Grafting
- Graft Dressings
- Donor Site Care

Early Excision & Skin Grafting

- Split thickness Skin Graft (STSG)
- Sheet Graft
- Meshed Graft

Burn Operating Room

Excising the Burn Wound

Harvesting Donor Sites

Meshed Graft

- Interstices – diamond shaped pattern of perforations created by the mesher at a pre-selection ratio eg: 1:1, 3:1, 6:1

Sheet Graft

- Applied in areas of cosmetic significance
- Intimate contact with wound bed

Dermal Replacement Products

- Bi-layer skin replacement system.
- Consists of dermal replacement layer containing collagen
- Consists of epidermal layer of silicone

INTEGRA

- Artificial skin, bilayer dermal replacement matrix

Cultured Epidermal Autografts (CEA)

- Full thickness biopsy
- Lab grown in culture medium
- First harvest in 14 days

Re-Cell

- Spray on skin

Donor Site Dressings
Donor Site Care

- Keep donor site clean and dry
- Can be more painful than the burn itself
- Heals in 10-14 days / may have scarring
- Donor Site can be used again

Healed Donor Site

Infection and Sepsis

Signs & Symptoms
Sepsis Warning Assessment Tool - SWAT positive

- Increased Blood Sugar
- Increased or Decreased Platelet and WBC Count
- Increased HR and RR
- Increased Weight Gain without Increased Muscle Mass
- Glycosuria
- Ileus
- Mental Confusion

Complications

- Hypotension
- Lactic Acidemia
- Metabolic Acidosis
- Pulmonary Interstitial Edema
- Ischemia of the Gastrointestinal Tract
- Renal Failure

Local /Non-Invasive Wound Infection Signs & Symptoms

- Localize erythema or cellulitis surrounding wound
- Purulent drainage
- Graft loss
- Breakdown of previously healed areas
- Temp > 101.3

Invasive Wound Infection Signs & Symptoms

- Conversion of PT to FT injury
- Focal, dark, discolored eschar
- Rapid separation of eschar
- Necrosis of subcutaneous small vessels
- Edema, erythema, tenderness at wound margins
- Red or black nodular lesion in unburned skin

Fungal Wound

Promote wound healing and patient recovery with good nutrition...

Nutritional Aspects of Burn Care

- Increased Metabolism
- Increased Catabolism
- Need increased calorie intake
- Supplements & Increased Protein for healing
- Enteral Feeds Vs. Parental Feeds
- Vitamins and Antioxidants

Nutritional Complications

- Weight Loss and Muscle Wasting
- Ileus
- Constipation
- Fatigue – need for rest
- Electrolyte imbalance
- Curling's Ulcer (stress ulcer)
- Tube feedings
    - Critically ill, intubated patients

PAIN CONTROL AND SEDATION

Pain Management

- Manage pain continuously not p.r.n.
- Manage anxiety
- Manage sleep
- Intravenous
- Individual dosing

Pain Variables

- Pain is variable in burn patients
    - Can't give too much medication to interfere with function
    - Can't give too little and not treat pain

Pain Behavior

- Inadequate relief of pain leads to:
    - Increase reports of pain
    - More frequent requests for medication
    - Poor cooperation with treatment
    - Increase demanding behavior
    - Increase dependent behavior
    - Lack of sleep
    - Decrease appetite

Types of Pain

- Nocioceptive
- Anatomic
    - Visceral
- Burn Pain
    - Somatic
    - Acute
    - Background
    - Procedural
- Psychological Pain

Pharmacological Treatment of Pain

- Opioids
- Continuous infusion
- Sustained release

- Anxiolytics
- NSAIDS
- PCA-patient controlled analgesia
- Sedation
- Anesthesia

Non-pharmacological Interventions
- Distraction
- Hypnosis
- Music
- Relaxation
- Virtual Reality

Psychosocial
- Burn Center Recreational Therapist
- Daily assessment / interaction with all burn patients & their families

Making Patients Smile

Lighthearted Moments

Rehabilitative Phase
Acute Setting: Begins at time of admission with continued emphasis during wound healing and recovery.
Recovery Setting: Scar management, reconstruction surgery, and re-integration into society

Rehab
MAJOR GOALS:
- Return patient to his/her pre-burn level of activity
- Facilitate re-entry to society
- Achieve an acceptable functional and cosmetic outcome

Burn Rehab Intensive Care

Burn Scar Management
- Early excision & grafting
- Splinting & positioning
- Exercise
- Mechanical Pressure
- Gel sheeting
- Pharmacologic therapy
- Massage
- Ultrasound
- Dressing techniques
- Surgical reconstruction
- Laser therapy

Splinting & Positioning

- Imposes passive stretch
- Blocks reorganization of collagen fibers

Exercise

- Passive stretch --stretches scar tissue
- Active exercise--prevents joint capsule contractures

Physical Therapy Gym

Complications

- Skin/joint contractures
- Amputations
- Neuromuscular deficits
- Heterotopic calcification
- Pruritis
- Sensitivity to temperature changes
- Hypertrophic scarring

Hypertrophic Scars

Characteristics:

- Erythematous, rigid, firm, raised, pruritis
- Develop 6-8 weeks after healing
- Confined of original wound
- Usually undergo partial spontaneous resolution
- Often associated with contractures

Mechanical Pressure

- Custom made elastic garment
- Worn 18-24 hrs/day
- Accelerates scar maturation
- Modify's disorganized collagen
- Decreases vascularity
- Decreases proteoglycans

90% of Burn Center Admissions < 20% TBSA

Outpatient Management & Home Care

Care of Minor Burn

- Clean and dry
- Daily cleansing
- Mild soap
- Minimal topical agent (1/16")
- Bandages should not interfere with function
- Signs of infection

Care of Healing Burn

- Pain management
- Pruritis
- Nutrition
- Extreme temperatures
- Rest
    - Sleep
    - Sleep medications
    - Nightmares
- Activity
    - Exercise

Care of Healed Burn

- Protection
    - Brimmed hat
    - Long sleeves
    - Sun block
    - Non-constricting clothes
    - Avoid injury to skin
    - Friction
    - Cut nails
- Moisturizers
    - Emollients
    - Cocoa butter
    - Mineral oil
- Scar management
    - Pressure garments
    - Massage

Outpatient Burn Wound Care Center (BWCC)

- Provides closure of the loop
- New referrals
- New products available designed to
    - Promote patient comfort
    - Decrease or eliminate daily dressing changes
    - Promote faster healing
    - Optimize patient compliance

Cost of Burn Injury

- Injury
- Hospitalization
- Loss of life or loved ones
- Loss of home and possessions
- Loss of jobs or careers
- Loss of self esteem & independence
- Financial burden

Other Types of Diagnoses Treated in Burn Centers

- Severe Exfoliative Diseases (SJS / TEN, SSSS, etc)
- Abrasion injury (road rash)
- Tar burns
- Soft Tissue Infection (necrotizing fasciitis, calciphylaxis, purpura fulminans, etc)
- Frostbite injury

Case Studies

Patient EG 27 y/o

- Mortality
- Admit date: 11/17/2008
- Date of death: 04/12/09

H&P

- 27 y/o with no PMHx/SHx, admitted on 11/17/2008 with 95% - deep 3rd degree with loss of body part (2 or more digits)
- Mechanism of burn: the patient was burning wood (hardwood floor) in his backyard using gasoline (tossed gasoline in the fire pit). ETT at scene, transferred to Cooper; transfer to Crozer via helicopter

Admission labs

- CBC: WBC 59.4, Hb 18, Hct 50.7, Plt 240
- BMP: Na 140, K 4.1, HCO3 19, BUN 20, Cr 1.0, Mg 0.9, PO4 3.3, Gluc 133
- Coag's: PT 21.9, PTT 34, INR 1.9
- ABG: 7.29/32/16/261/neg 11 (AC40%/5/500/16)
- CXR: ET Tube
- Toxicology screen: pos opiates

Initial treatment

- Fluid resuscitation 28.8 l – 1st 24h
- AC mode, A-line, Triple lumen
- Pulmonary CS for Bronch
- Ancef IV
- Dressing – SSD full body

Day 1: 11/17/08

- Neuro: Morphine, Ativan, Fentanyl gtt
- CV: ST, no pressors
- Pulm :AC/550/40/16/5
- GI: NPO, Protonix, Tense abdomen
- GU: UO adequate
- ID: Ancef 1g IV Q 8h
- Labs:
    - CBC: WBC 33.6, Hb 16, Plts 138
    - INR: 2.1
    - BMP: Na 136, K 4.9, Cl 107, CO2 19, BUN 18, Cr 0.8, Gluc 127
    - ABG: 7.42/24/136/19/-7

- OR:
    - Escharotomies chest wall, BL UES, BL LES, BL hands and fingers
- Labs:
    - CBC: WBC 10.5, Hb 12.5, Plts 56 ; BMP normal; Mg 1.3
    - INR 2.5, PT 27.2
- OR:
    - BL escharotomies MAL of abdomen and pelvis; ex lap, abd wd VAC
    - Vent. pressure down to 34 from 60

Day 3: 11/19/08

- Neuro: Morphine, Versed gtt
- CV: hypotension, Neo gtt
- Pulm: P/F ratio 182
- GU: uo > 40 cc/hr, IVF LR 1L/hour
- ID: on Ancef

Day 4 OR- Integra Placement, STSG, Biopsy for CEA

Microbiology Week 2

- 11/24: Sputum- Pseudomonas, L foot E. faecalis, Pseudomonas
- 11/26: Neck –E. Faecalis
- 11/27: Blood- Alcaligenes species
- 11/28: Blood- Non Lactose fermenter species
- 11/29: L leg- Pseudomonas, E faecalis

Week 3

- Neuro: sedated
- CV: stable
- Pulm: APRV
- GI: TF dht @ goal, TPN off
- GU: ARF, HD
- ID: Primaxin, Levaquin, Zyvox, Cancidas, Tigacyllin, Flagyl

Use of Negative Pressure Therapy with Severe Hypothermia

- 12/4/08:
    - 8500 cm2- integra, 988 cm2 biobrane;
    - Amputation: portion R thumb, L thumb, L 2nd and L 3rd digit
    - Whole body VAC

OR: Month 3

- 1/29/09: Debridement, STSG to R wrist, R hand 319 cm2; temp OR 36.8-34.4;
- L hand procedure aborted Ø 2/6/09: Debridement, Cadaver graft placement post LE

OR: Month 4

- 3/6/09: Bedside Fiberoptic Bronchoscopy R-clear, L-copious thick secretions
- 3/9/09: Dressing takedown, debridement, placement of CEA post and ant torso 3360 cm2

Month 5: 3/16/09- 4/12/09

- Neuro: sedated
- CV: Swan catheter
- Pulm: APRV
- GI: protonix drip, TF & TPN , reglan, colace, rectal tube
- ID: Capsofungin (D/C 3/17), Bactrim SS, Minocycline, Primaxin, Minocyclin (3/9), Voriconazole (3/17), vancomycin, zosyn, cefepime, tobramycin, levaquin
- Endo: Hydrocortisone, Synthroid
- GU: low UO, HD, Lasix drip
- OR 4/11/09
    - Ex Lap sigmoid colon resection, VAC; perf in lateral distal sigmoid colon wall 3mm diameter, no evidence of diverticulitis but large diverticulum 2-3cm away from perf on ant wall; temp dropped to 35.7; plans for 2nd operation (colostomy)
- 4/12/09
    - Critically ill (Neo, Vaso, Levo), **Lactate 18.8**
    - Code status: Level III, then IV (10.22 am)
    - Pressors turned off when relatives arrived
    - 11.37 am – the patient expired

Case Study Admission photos Pediatric Scald 5.5% TBSA

- **Glass Fronted Gas Fireplace contact burn**
- Small %BSA Contact burn
- Significant sequelae

Nathan Speare Regional Burn Treatment Center 610-447-2800
Burn Care*: It's All We Do!*

Student Nurse Seminar Evaluation

Nursing Care of the Patient with a Burn Injury

Thank you for attending the "Nursing Care of the Patient with a Burn Injury" seminar sponsored by the Burn Centers at Crozer Chester Medical Center and Temple University Hospital. In order to provide our program for the student nurses in our three-state region, we schedule these seminars at convenient locations that will accommodate several schools. We sincerely appreciate the cooperation of the hosting institutions in making their facilities available without charge for these programs. Be aware, however, that as visitors, we have little or no control over the temperature of the rooms or on occasion, the rescheduling to another room within the building.

We are interested in your evaluation of the program. Please place a [x] check in the column that best describes your learning experience with the topics presented in today's seminar. Suggestions and comments from students and instructors attending our programs are very helpful to the nurse educators who lecture and develop the content for the seminars.

Knowledge gained	Content still unclear	Topics	Comments
		Epidemiology and Burn Prevention	
		Determining Severity, burn depth, % body surface area burned	
		Distinguishing burn types; i.e.: thermal, electrical, chemical, and inhalation	
		Initial assessment and management of burns (first aid / pre-hospital care)	
		Acute Phase of burn care	
		Rehabilitative Phase of burn care	
		Psychological Care of a burn patient	
		Other patients treated in a Burn Center – SJS/ TEN, "road rash", necrotizing fasciitis	
		Outpatient Burn Wound Care Centers	

What were the 3 most significant things you learned today?

Any suggestions for improving the program?