Pediatric Burn Trauma

Objectives
- Understand the importance of having a regional Burn Center at VCU Medical Center
- Better understand and appreciate the complex cascade of changes to homeostasis a large burn causes
- Discuss the importance of Burn Education to the community and medical providers
- Identify signs and symptoms of abuse and the steps that should be undertaken
- Review basic anatomy of the skin
- Review burn physiology

Objectives
- Better understand basic burn management including fluid resuscitation
- Discuss strategies to promote prevention of burn injuries in this vulnerable population
- Appreciate the patient's journey from burn victim to burn survivor
Evan-Haynes Burn Center

- The first civilian burn center in the United States, opening in 1947
- Founded by Dr. E. I. Evans and lead by Dr. B. W. Haynes for 36 years, both were burn care pioneers and believed in a multidisciplinary approach to burn care
- 16 bed unit which facilitates Floor, Step-Down and ICU populations
- Care provided for patients from infancy through geriatrics and everything in between
- Central Virginia's only burn center affiliated with a level one trauma center
- Stop by and visit us in person or come see us on the web! http://www.burncenter.vcu.edu/

Epidemiology

- Over 2 million people are burned each year in the United States.
- Burn Injuries Receiving Medical Treatment: 450,000 (nearest 50,000)
- Fire and Burn Deaths Per Year: 3,500 (nearest 250)
- Hospitalizations for Burn Injury: 45,000, including 25,000 at hospitals with burn centers (nearest 5,000)
- Selected Statistics: 2001-2010 Burn Admissions to Burn Centers
  - Gender: 70% male, 30% female
  - Ethnicity: 60% Caucasian, 19% African-American, 15% Hispanic, 6% Other
  - Admission Cause: 44% fire/flame, 33% acid, 9% contact, 4% electrical, 3% thermal, 7% other
  - Place of Occurrence: 68% home, 12% occupational, 7% street/highway, 13% other

Source: American Burn Association National Burn Repository (2011 report)
http://www.ameriburn.org/resources_factsheet.php

Epidemiology

- Leading cause of death in the home for children
- Burns are among the most devastating of all injuries
- Third leading cause of accidental death in all age groups
- Fifth leading cause of unintentional injury in infants
- Mortality rate of 29% for those patients with smoke inhalation and cutaneous injuries
Burn Education, is it Important?
- Each year, more than 2,500 children die from thermal injuries and nearly 10,000 children suffer severe permanent disability from thermal injuries.
- 116,000 serious burns annually
- Scald Burns most common under the age of three/most common for abuse

A quick google search for pediatric burns revealed:
- Child receives second degree burns from school lunch- Oct 2013
- Baby in Coma After Police Grenade dropped in crib- May 2014
- Women arrested for child abuse- September 2014
- Baby found with third degree burns, parents arrested- September 2014
- 6month old treated for burns, broken bones in possible abuse case- September 2014

How far have we come?
- 1950s: Children with burns covering >50% TBSA had a 50% mortality rate related to shock, sepsis and multiorgan failure.
- 2000s: Children with burns covering >50% TBSA have a survival rate greater than 95% related to improvement in resuscitation, control of infection, nutritional support and other interventions.
Mechanisms of Burn Injury
- Thermal: scald, flame, flash, contact
- Chemical: acids, alkalis
- Electrical: alternating current versus direct current
- Radiation: ultraviolet or ionizing (not covered in this lecture)

Severity of Burns
Time (Duration of Contact) + Energy (Temperature, pH, Current) + Size (Body Surface Area) = Severity of Burn Injury

Injury Depth: Exposure Time & Temperature
- Children
  - Almost Instantaneous Full Thickness Burn
  - Tissue Destruction: 10 seconds
  - Tolerated for time
- Adult
  - Almost Instantaneous Full Thickness Burn
  - Severe Damage: 30 seconds
  - Tolerated for time

- 60 F
- 140 F
- 130 F
- 120 F
- 111 F
Anatomy and Physiology

- Skin has multiple functions:
  - Barrier to water, vapors, and functions
  - It regulates body temperature
  - Protects underlying body structures
  - After being damaged, the skin loses its ability to perform many functions
  - Loss of function depends on the depth of the injury

Anatomy and Physiology

- Skin: two layers
  - Epidermis: Varying thickness, functions as the external barrier between the outside environment and the rest of the body
  - Dermis: Highly vascularized and innervated (think pain!). Holds immune response, skin follicles, sweat glands, nerve endings, and oil glands

Burn Pathophysiology: Initial System Response

- Pain/fear/panic response causes massive catecholamine release
  - Vasconstriction
  - Hypertension
  - Tachycardia
  - Tachypnea
  - PAIN & ANXIETY
  - And the cycle then perpetuates itself
Bum Pathophysiology: Cellular Level
- Damaged cells release numerous cell mediators
  - Histamine and Prostaglandins: Vasodilation
  - Thromboxane A2: Increases size of zone of stasis by promoting platelet aggregation
  - Leukotrienes & Cytokines: Further the inflammatory response
  - Bradykinin: Increases permeability of the venules thereby increasing plasma losses
  - Oxygen Free Radicals: Damage local endothelial cell microcirculation, antioxidants may be of some benefit

Pathophysiology
Temperature Regulation
- Small muscle mass hampers ability to shiver
- Infants < 6 months old rely on metabolic temperature controls
- Monitor core temperature
- External protection, i.e., blankets, warm room

Pathophysiology
- Pathophysiology-cardiovascular
  - Fluid loss
  - Electrolyte loss
  - Increased catecholamine release
  - Acidosis
  - Vasodilation
  - Renal failure
Pathophysiology

- Cardiovascular effects
  - A series of fluid shifts occur, involving redistribution of H₂O, salt & protein
  - Increased capillary permeability allows intravascular fluid to leak into the interstitium
  - This causes a marked decrease in circulating blood volume

Pathophysiology

**BURN**

- Increased systemic vascular permeability
- Interstitial edema
- Increased Hematocrit
- Decreased blood volume
- Increased Viscosity
- Increased peripheral resistance
- Hypovolemic Shock/Decreased Cardiac Output

Pathophysiology

- Pathophysiologic and systemic complications of a burn injury
  - Third Spacing - Edema occurs during the first four to six hours and reaches its peak around 24 hours.
  - Very important to remember for smoke inhalation population.
  - Systemic Inflammation Response Syndrome
    - Hypermetabolism, increased permeability of cells (increased histamine production), hemodynamic changes (changes in regulation of BP) and extensive microthrombosis
    - Hypoproteinemia - Protein is needed to maintain blood pressure and peripheral vascular resistance
Pathophysiology
- Pathophysiologic and systemic complications hours post burn
  - Liver failure
  - Heart failure/Arrythmias
  - Potassium shifts out of the cell and is released through the kidneys causing Hypokalemia
  - Electrolyte imbalances can result in death
  - Hypovolaia/Anoxia
  - Formation of eschar
  - Hypothermia
  - Hypovolemia
  - Sodium shifts into the cell taking fluid with it
  - Infection
  - Greater mortality in burn patients post initial insult
  - Complications of a circumferential burn

Potassium
- Potentially life threatening
- Initial movement of potassium out of vascular space, resulting in an initial hypokalemia
- Permissive initial hypokalemia, rarely replaced in first 24 hours
- However, damaged cells release massive amounts of potassium that within 24 hours begins to move into the vascular space
- Results in a significant hyperkalemia
Burn Depth

- Depth classification of a burn injury
  - Superficial burn
  - Partial-thickness burn
  - Full-thickness burn
  - Other depth

Classifications according to local protocol

Bum Trauma
Burn Depth: Superficial
- Depth classification of a burn injury
- Superficial burn
  - Pain and redness
  - Underlying blood vessels become dilated
  - Blood flow is increased
  - Heals in a few days – epithelial cells peel away
  - Not included in calculating TBSA

Burn Depth: Partial Thickness
- Depth classification of a burn injury
- Partial-thickness burn
  - Skin may be red, blistered, wet or weepy
  - Blister and intense pain
  - Without intervention, can heal within two week to months
Burn Depth: Partial Thickness

- Depth classification of a burn injury
- Full-thickness burn
- May appear white or charred, with coagulated vessels
- No cap refill
- Depending on the source and depth of the burn, full-thickness burns appear:
  - White or waxy
  - Cherry red
  - Charred or black

Bum Trauma

Bum Depth: Full Thickness
Burn Depth: Full Thickness

Circumferential Burns
- Place patient at risk for decreased to minimal blood flow to vital organs and body parts.
- Should be assessed early! May require interventions.

- Edema develops normally.
- However, damaged skin is unable to expand, occluding blood flow to distal tissues.
- Loss of pulses is a LATE sign and ominous.
- Serial Doppler assessments very helpful.
- Look at capillary refill time.
- Classic sign is pain out of proportion to injury.
Abuse and Neglect

- One of the most common injuries in children
- Child abuse is possible
- Trivia question:
  - What, specifically, was the most common mechanism of burn injury in Pediatrics at Virginia Commonwealth University Medical Center over the past three years?

Abuse and Neglect

- Burns account for 10% of all cases of child abuse with scalds being most frequent
- Victims almost always are under the age of 10.
- Majority of victims are less than 2 years old

Abuse and Neglect

- Hallmarks of Child Abuse:
  - Inconsistent history
  - Child accuses adult
  - One parent accuses the other
  - Alleged Self-inflicted
  - Alleged Sibling-inflicted injury
  - Immersion burns
  - Failure to thrive
  - Delay in seeking medical attention
  - Multiple injuries in different stages of healing
  - Multiple visits to multiple ER’s
  - Multiple 911 calls
Suspicious Burn Patterns

Abuse and Neglect
- Our role as Health Care Providers is to be an advocate
- Be sensible to the situation
- We do not need to make the diagnosis of abuses
- Record/Report Facts
  - CPS: Virginia: 1-800-552-7096
  - Out-of-State: 804-786-8536
- Remember, cultural practices and norms when assessing for abuse

Management
- Airway:
  - Greatest risk of airway injury are blast or inhaled gases
  - Highest risk of airway compromise occur within the first 24 hours
- Breathing:
  - Signs of compromise: singed nasal hairs, spot around the nose, carbonaceous spumum, altered mental status
  - Absolute indications for intubation are increasing hoarseness, stridor, and drooling
- Circulation:
  - Signs of major bleeding (fluid loss is expected during initial stage)
  - Obtain IV Access/IO Access
  - Consider fluid resuscitation
  - Parkland Formula (according to TBSA)
Management

- **Primary Assessment**
  - Traumatic injuries should be suspected and looked for during your primary assessment
  - Stabilize other life threats prior to worrying about TBSA

- **Considerations:**
  - Vital Signs should be near normal during the initial injury
  - 5% of Hypovolemia is likely due to blood volume loss

Management

- Stop the burning process
  - Do not use ice packs in pain relief during acute and chronic phase

- **Pharmacological Support**
  - Analgesia per local protocol
  - Supportive Oxygenation
    - If CO poisoning is suspected, high flow O2 should be administered
    - Cyanokit: CYANOKIT® (hydroxocobalamin for injection) 5 g for intravenous infusion is indicated for the treatment of known or suspected cyanide poisoning. If clinical suspicion of cyanide poisoning is high, CYANOKIT® should be administered without delay.

Inhalation Injury

- Leading cause of burn related fatalities
- An estimated 78% of burn related deaths are secondary to smoke or toxic substance inhalation
- Due to the narrowed pediatric trachea, they are at increased risk of obstruction by swelling.
- Narrowest point is at the cricoid not the glottis like an adult.

- **Mechanism of Injury**
  - Closed space fires
  - Heavy smoke
  - Loss of consciousness, confusion, combative ness on scene
**Inhalation Injury**

- It may be necessary to use advanced airway techniques.
- Consider the need to use an ET tube smaller than expected with standard measurement techniques due to the swelling.
- A surgical airway like a cricothyroidotomy may be required if intubation is not possible.
- Succinylcholine (Absolutely contraindicated!)
  - Produces an exaggerated hyperkalemia response that may result in cardiac arrest
  - Can occur from burn onset until 2 years post-burn
- Hemorrhage, ulceration, and swelling progress rapidly.

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**Effects of Edema on Airway Resistance in the Infant versus the Adult**

<table>
<thead>
<tr>
<th></th>
<th>Infant</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
<tr>
<td>Edema 1 mm</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
<tr>
<td>Resistance (R)</td>
<td>1.16x</td>
<td>1.3x</td>
</tr>
<tr>
<td>X-Sect Area</td>
<td>76%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Normal airways are represented on the left, edematous airways (with firm or distensible alar implant on the right). Resistance to flow is inversely proportional to the fourth power of the lumen radius: laminar flow and to the 0.5 power for turbulent flow. The net result is a 72% decrease in cross-sectional area and a 16-fold increase in resistance in the infant versus 44% and 10-fold in the adult during quiet breathing. Turbulent flow in the child (e.g., crying) would increase the work of breathing 50-fold. Reproduced with permission from Cote and Tobin.

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**Adult vs. Pediatric Airway**

- [Image]

http://cpep.med.nyu.edu/files/cpep/3/Hrippala.pdf
Stabilization

- Circulatory support
  - Cardiac Monitor for large surface area burns
  - Foley catheter should be placed and urine output monitored closely
    - Specifically for large TBSA or Genital Related Burns
  - Urine output goal 1-2 cc/hr
  - Lactated ringsers is the fluid of choice
    - Normal Saline can be used initially

- Gastrointestinal (GI)
  - Keep patients NPO until patient is admitted to the PICU or Burn Center

- PERRLS
  - Ensure the patient has an updated tetanus booster
  - History
    - Ensure that a detailed history of the events is assessed
    - Past medical history including immunization history
Management: Wound Care

- Undress the patient if necessary and cover victim with sterile sheet.
- Ensure you keep patient warm.
- Ensure jewelry and body piercings are removed from affected areas.
- Dry, sterile dressings should be used to cover patients burns.
- Do not use chemicals or topical treatments without consulting medical control.
- Moistened dressings can be used for TBSA less than 10%.

Do not spend too much time with dressings, the wound care will be re-done.

Management: Wound Care

- Wound care is aimed at prevention of flora.
- Transport concern is to continue or initiate clean or sterile wound management.
- Cleaning of the wounds is to be done in the burn unit.
- Patient may have several topical creams: Silvadine, Silver Nitrate, Sulfamylon, Collagenase.

Hospital Management

Note, these are the products that the Evans-Haynes Burn Center utilized. If you were to venture to another burn center, the use of other products may be utilized.
4% Chlorhexidine Gluconate
- This is an antimicrobial scrub solution that effectively reduces the bacterial burden of the wound bed.
- All patients should receive a chlorhexidine scrub on admission.
- Often this is done during daily wound care.
- Not effective against pseudomonas.
- The solution must be rinsed well before applying anything else to the wound bed.
- Not to be substituted by chlorhexidine wipes, which are designed for daily bathing and NOT wound cleaning.

Collagenase
- Enzymatic debriding agent derived from Clostridium bacteria.
- Collagenase digests denatured collagen in wounds without damaging new or healthy collagen forming in granulation tissue.
- Collagenase can be inactivated in the presence of heavy metal ions (silver) or in acidic environments.
- Typically, a thin layer is applied to the wound bed once daily and covered with a non-adherent dressing (Mepitel or Adaptic).

Bacitracin/Bacitracin Opth.
- Antibacterial ointment that is often used on the face or on very superficial burns.
- Bacitracin Opth. Preferred near the eyes due to pH.
**Sulfamylon Solution (5% Mafenide Acetate Solution)**
- Topical antimicrobial solution that is effective against both gram positive and gram negative bacteria.
- It is effective against Pseudomonas aeruginosa.
- The solution is applied via solution soaked dressings and changed every 12 hours; it is re-moistened throughout the day as needed.
- Avoid in sulfa allergic patients.

**Sulfamylon Cream**
- Topical antimicrobial cream that is effective against both gram positive and gram negative bacteria.
- It is effective against Pseudomonas aeruginosa.
- Sulfamylon readily penetrates eschar and is therefore indicated for use on full thickness burns and on areas of poor vascularity (ear, nose).
- The cream is applied every 12 hours. Avoid in sulfa allergic patients.

**Dakin’s Solution**
- Antiseptic solution consisting of commercial bleach and sterile water or saline.
- The solution is highly diluted and mixed to a certain strength (2.5%, 5%, 10%) by mixing a small volume (25ml, 50ml or 100ml) of bleach in one liter of water.
- Dakin’s solution helps to dry the wound and kill gram negative bacteria in the wound bed.
Mepilex Lite
- Mepilex Lite is a conformable dressing designed for use on wounds with little or no exudate.
- It wicks away and absorbs drainage while maintaining a moist wound bed for optimum wound healing.
- The edges adhere to the intact skin around the wound, preventing maceration of the surrounding skin.

Mepilex Ag
- Mepilex Ag is a silver impregnated absorptive dressing used on partial thickness burns and newly placed skin grafts.
- The dressing is a silicone foam that absorbs exudate while releasing silver for up to seven days.
- In addition to the antimicrobial effects of the silver, the dressing creates a barrier through which exudates cannot escape to surrounding skin, which may cause maceration.

Mepitel
- Non-adherent silicone dressing with perforations to allow exudate transfer that can be used as a primary dressing or used over a topical product such as Collagenase.
- Can be removed, washed with antibacterial soap and re-applied to the wound for up to 5 days.
- Dressing of choice for skin grafted areas.
Mepilex Border

- Mepilex Border is an absorptive single dressing designed to be placed over highly exudative wounds.
- Both the absorptive area and the border are non-adherent to moist wound beds, but adhere gently to intact surrounding skin.
- The absorptive area is comprised of three distinct layers that draw moisture out of the wound bed and prevent reabsorption.
- The dressing backing is both breathable and waterproof, allowing for evaporation of moisture while preventing moisture and bacterial penetration.

Hydrofera Blue

- Hydrofera Blue is an antimicrobial dressing than is generally applied to non-healing or hypertrophic wounds to reduce pain, granulation tissue and wound size.
- The dressing is dampened with normal saline and applied to the wound, so it also provides a moist healing environment.
- The dressing may be left in place for up to three days.

Vacuum Assisted Closure (VAC) Therapy

- Generally changed 2-3 times per week
- Improves granulation tissue development, and improves donor skin take rate
  - Generally applied to grafted skin or areas recently debrided
- Leaks may develop that should be patched with Opsite. If the leak cannot be patched, the VAC should be changed or the wound care switched to another alternative
Split Thickness Skin Graft

- Skin grafting is the definitive treatment for deep partial thickness/full thickness burns.
- The burn eschar is debrided to viable tissue; a very thin layer of skin is harvested from a large surface area of unburned skin (usually the thigh, buttocks or back); that skin is expanded through meshing and secured to the debrided area.
- Through angioneogenesis, circulation develops and the graft becomes permanent.
- Patient activity should be limited to bed rest until attachment of the graft is ensured and patient can tolerate movement.

Healing Skin Graft & Donor Site

- EPICEL (CEA)
  - EPICEL is a cultured epidermal autograft.
  - A skin graft grown from a patient’s own skin, used as a permanent skin replacement for patients with large TBSA.
  - Applied in the OR with the representative present.
  - Daily wound care involves cleaning with sterile water and a mixture of topical antibiotics.
  - Very fragile matrix requiring education to take care of.
Stabilization/Transfers

- Pain medication
  - Pain control with narcotics by IV/PO routes only
  - Dosages are influenced by co-existing injury
- Empiric Antibiotics are not always indicated
- Documentation
  - Closely monitor I/O’s
  - Clearly document resuscitative efforts

Estimating Burn Size

- Rule of Nines
- Lund & Browder Chart
- SAGE Diagram
  - Variant of Lund & Browder Chart

Estimating Burn TBSA

**Rule of Nines**

- Divides the total body surface area (TBSA) into segments that are multiples of 9%
- Provides rough estimate of burn injury size
- Most accurate for adults and for children older than 10 years of age
  - Bigger heads and legs
Estimating Burn TBSA

LUND & BROWDER
- A more accurate method to determine the area of burn injury
- Assigns specific numbers to each body part
- Used to measure burns in infants and young children
- Allows for developmental changes in percentages of body surface

Estimating Burn TBSA

SAGE DIAGRAM
- Based on Lund & Browder Charts
- Available on-line free or via download for PDA (modest fee) at www.sagediagram.com
- Provides documentation for patient record
- Automatically calculates fluid needs based on user input
- Age, height & weight are needed for accurate calculations
- Pediatric diagram for ages 0-5 years

Estimating Burn Size
- When reporting burn size, we include area of second degree and third degree burns ONLY!
- Areas of first degree burns or hyperemia (non-blistered blanchable erythema) are not included in calculations!
- Burn size is reported as percent of the total body surface area (TBSA) burned
- Best advice to improve accuracy is to choose the method that works best for you and use that method consistently
- Using your TBSA burned, we then calculate fluid needs using the Parkland formula
What’s with the TBSA?
- Burn injuries cause massive fluid shifts in the body, where fluid exits the vasculature through capillary leakage and pools in the extra vascular space.
- The size of the burn is highly predictive of the patient’s fluid needs.
- Estimating burn size allows emergency department staff or burn center staff to adequately prepare for that patient’s needs.
- Critical triage factor in mass casualty situation.

Fluid Resuscitation
- Fluid resuscitation is generally indicated for any pediatric patient with >10% TBSA burned.
- Pediatrics (<10 years) generally have maintenance fluid requirements in addition to their fluid resuscitation needs.
- Patients with concomitant trauma, smoke inhalation, electrical injury, will often have greater fluid needs than estimated by conventional formulas.

Fluid Resuscitation
- The goal of fluid resuscitation is to give sufficient fluid to allow perfusion of vital organs without overhydrating the patient.
- Complications related to overhydrations:
  - Abdominal Compartment Syndromes
  - Life-Threatening complication
  - Cause decrease compliance of chest making it difficult to ventilate
  - Conversion of burns
Guidelines
- Fluid Resuscitation is initiated by the Parkland Formula but should be regulated by Urine Output
- A foley with a temperature probe should be inserted at the start of resuscitation
- Children’s output should be at least 1ml/kg/hr
- Infant’s output should be at least 2ml/kg/hr

Parkland Formula
Body Weight (KG) x TBSA burned x 4ml = 24 Hr Total
- Give first ½ of volume in hours 0-8 from time of injury
- Give second ½ of volume in hours 8-24 from time of injury
- Generally use Lactated Ringers, NS second choice
- Some Burn Centers will add Ascorbic Acid (Vitamin C) as a free radical scavenger, research on this practice is fairly inconclusive

Fluid Resuscitation End-Points
- Fluid resuscitation is initiated by the Parkland Formula, and is regulated by the “Pee Formula”:
- Pediatrics shall pee at least 1ml/kg/hr
- Therefore, all patients needing fluid resuscitation shall have a foley with a urimeter to measure urine output, initial contents do not count.
- Important caveat:
  - In situations where rhabdomyolysis or myoglobinuria is suspected, goal urine outputs will be doubled (Adults 1ml/kg/hr, Pediatrics 2ml/kg/hr)
  - Urine will be alkalinized with Sodium bicarbonate (1 amp per liter to reduce toxicity of pigments on renal tubules, with the goal of preventing acute renal failure.)
Fluid Resuscitation Complication

Fluid Creep
- Despite its almost universal acceptance as a tool for calculating the volume of fluid required to resuscitate the burn-injured patient, there is growing evidence that patients receive far more fluid than the Parkland formula predicts, a phenomenon that has been termed “fluid creep.”
- “Tendency to give too much fluid”
- A recent study of practice in six burn centers in the US found that 58% of patients exceeded the Parkland target

Fluid Creep
- The true cause is unknown.
- Possible Causes
  - Increase use of opioids related hypotension
  - The idea of “more fluid is better”
  - Recent studies suggest that a more aggressive approach to fluid resuscitation can be beneficial
  - Certain clinicians have been targeting fluid resuscitation towards lactate levels, base excess, central venous oxygen saturation and other indicators of tissue perfusion
  - Pre-Burn Center fluid resuscitation efforts

Fluid Creep
- Consequences:
  - Increased Edema
  - Increased intra-abdominal hypertension
  - Renal impairment, gut ischaemia, hepatic malperfusion, and cardiopulmonary dysfunction
  - Abdominal Compartment Syndrome
  - Why is this a concern?
  - Death
  - Pulmonary Edema
  - The need of Fasciotomies
  - Conversion of the burned tissue

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Prevention

- Designing an education program should focus on the risk factors for these types of injuries
  - Poverty: Identified as a major risk factor for many injuries
  - Education: has been shown to be inversely related to burn risk. Burn children are more likely to have parents with low level of education.
  - Ethnicity:
    - Family patterns

Prevention

- Advocacy at the state and local level is crucial in promoting burn education and preventing of injuries
  - Yearly, the Burn Center Directors and Physicians advocate on Capitol Hill for regulations and reimbursement
  - Improvements of building codes, improvement on handling of hazardous materials and changes in children's clothing are some of the changes that have been made.

Remains the single best way to manage pediatric burns/injuries

- Scald Burns:
  - Educate parents about stove safety
  - Never hold a child while working around hot substances
  - Set thermostat of hot water heater to <120 F
- Contact Burns
  - Monitor child closely around hot objects
Prevention

- Electrical Burns:
  - Keep electrical cords out of reach of children
  - Cover electrical outlets
- Prevention Campaigns are key:
  - Creating strategies that target children and their families
  - Visiting Schools with local Fire Departments
  - Burn Safety on Public Access Channels
  - Working with Local Media

Burn Center vs. Burn Unit

- A burn center is a service capability based in a hospital that has made the institutional commitment to care for burn patients. A multidisciplinary team of professionals staffs the burn center with expertise in the care of burn patients, which includes both acute care and rehabilitation. The center provides educational programs regarding burn care to all health care providers and involves itself in research related to burn injury.
- A burn unit is a specified area within a hospital, which has a specialized nursing unit dedicated to burn patient care.

- Remember Burn Centers are not the same as Trauma Center. There are only 123 burn care centers throughout the country, representing 1794 burn beds nationwide.

Burn Center vs. Burn Unit

- Burn Center Verification is a joint program of the American Burn Association (ABA) and the American College of Surgeons (ACS). To achieve verification, a burn center must meet the rigorous standards for organizational structure, personnel qualifications, facilities, services, and medical care services set out in the ABA chapter on Guidelines for the Operation of Burn Centers in the ACS, 2006, on Resources for Optimal Care of the Injured. The program requires completion of a pre-review questionnaire and an in-depth on-site review by members of the ABA Verification Committee. A written report by the site visit team is reviewed by the ABA Verification Committee and by the Committee on Trauma of the ACS.
- Burn Center verification provides a true mark of distinction for a burn center and is an indicator to government, third-party payers, patients, and their families, and accreditation organizations that the center provides a comprehensive service capability for burn patient care to burn patients from the time of injury through rehabilitation.
- American Burn Association, 2011
ABA Criteria for Transferring to a Burn Center
- Partial & full thickness > 10% TBSA in patients < 10 or > 50 years of age
- Partial & full thickness > 20% TBSA in all other patients
- Partial & full thickness with serious threat of functional or cosmetic impairment
  - Face, hands, feet, genitalia, perineum, major joints

ABA Criteria for Transferring to a Burn Center
- Any electrical burn including lightning
- Chemical burn with serious threat of cosmetic or functional impairment
- Circumferential burns of extremity, neck, chest

Questions?
Thank you very much for your time and attention. I want to specifically thank Julie Brackett and the Focus Pediatric Conference Committee for this amazing opportunity. I would also like to thank the Pediatric Emergency Department and the Pediatric ICU at MCV for the amazing care they provide our pediatric burns.

Any questions, comments, thoughts or concerns, please feel free to email me:

tjeter@mcvh-vcu.edu

You decide!

- Determine burn depth
- Determine need for care in a specialized burn center
- Determine if critical care transport is necessary, or can a patient/family safely provide transport, can it wait until tomorrow?

???????