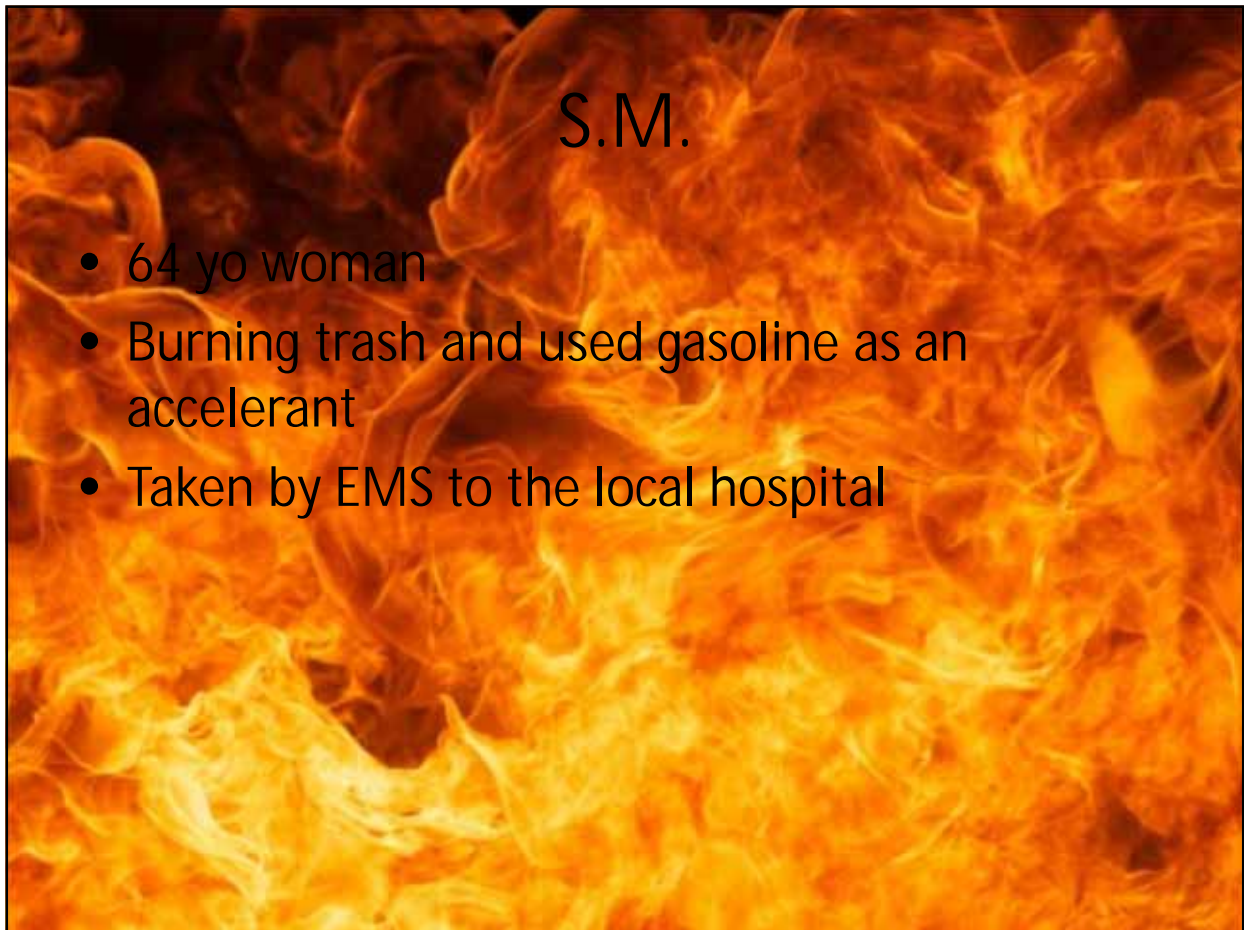
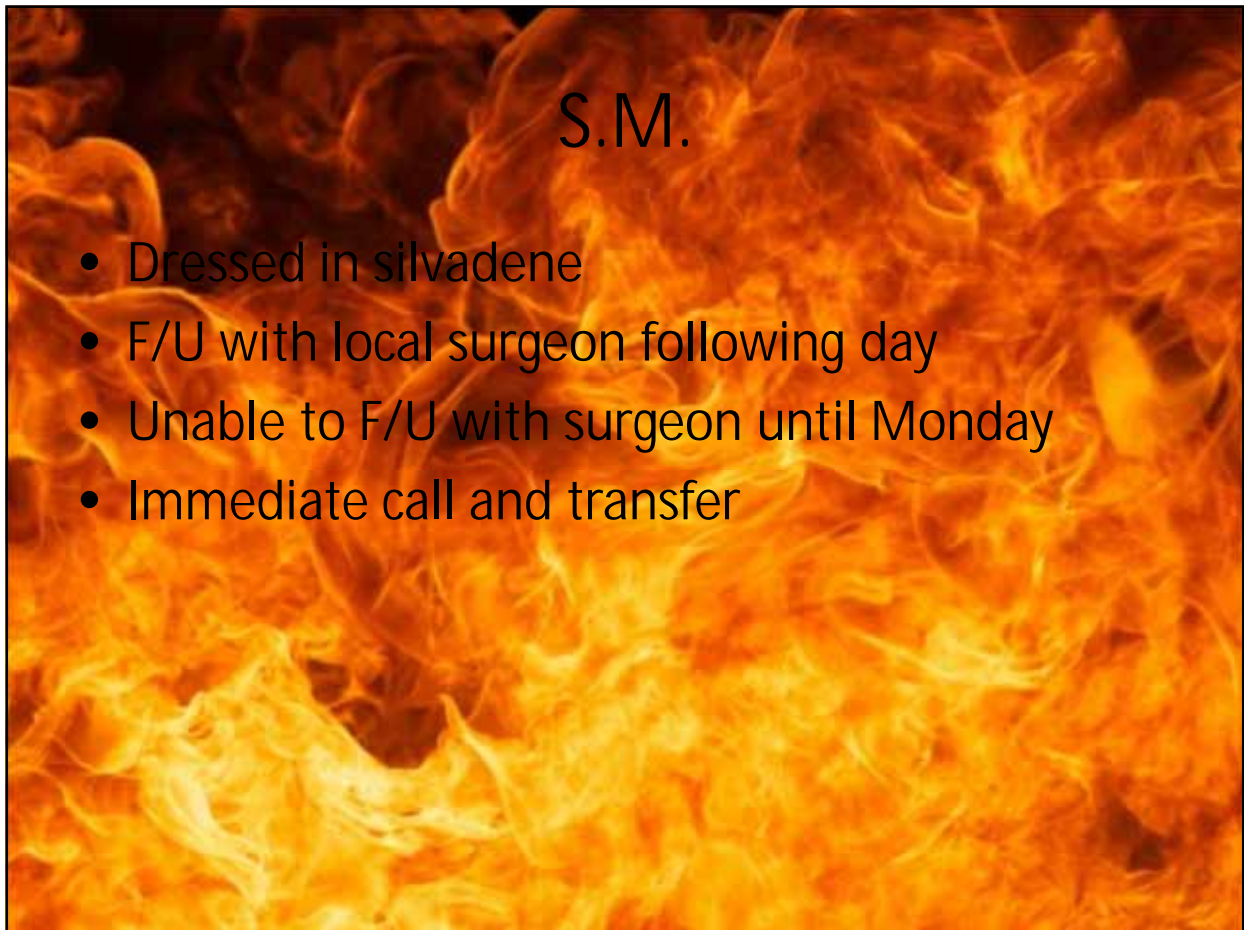




# Initial Burn Assessment and Treatment

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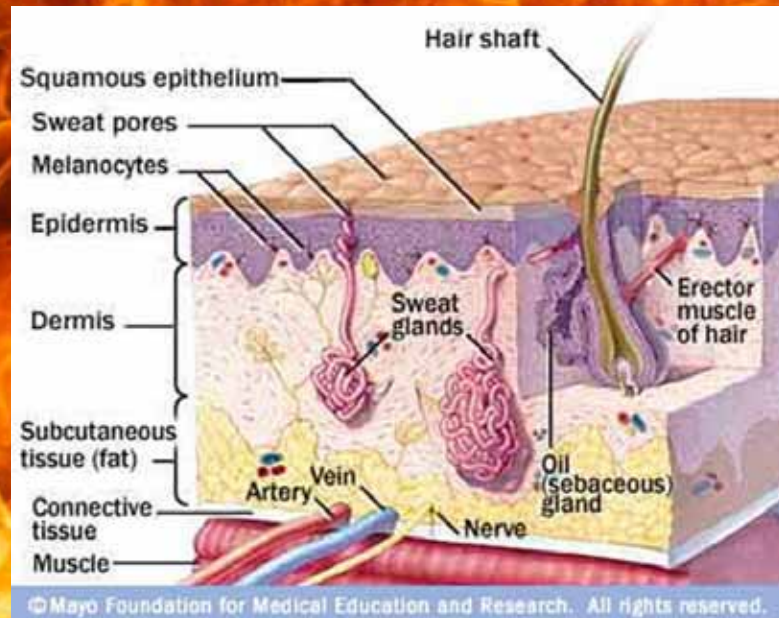
## Outline

- Burn Depth Classification
- Initial treatment
- Fluid resuscitation of the burn injured patient
- Transfer Criteria



# Burn Depth Classification

- 1<sup>st</sup> degree:  
Epidermis only
- 2<sup>nd</sup> degree:  
Part of Dermis
- 3<sup>rd</sup> degree:  
Through Dermis
- 4<sup>th</sup> degree:  
Muscle or Bone  
Involvement



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# 1<sup>st</sup> degree burn

Only affects the epidermis

Appearance:

- Red
- Blanching
- Moderately Painful

Heals within a few days

No Surgical intervention

Classic Presentation: Sunburn

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# Superficial 2<sup>nd</sup> degree

Affects superficial part of dermis

**Appearance:**

- Blisters (may be sloughed)
- Pink to Red, blanching
- Moist base
- Painful

Should heal within 2 weeks



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# Deep 2<sup>nd</sup> degree

Affects the deep portion of dermis

Appearance:

- Variable
- Often beefy red
- Can be whiter
- Drier base
- Blanching
- Painful

Variable healing

May need surgical intervention



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**3<sup>rd</sup> degree**

**Affects entire dermis to subcutaneous fat**

**Appearance:**  
White  
Leathery  
Dry

**Burn itself is not painful**  
**Surrounding tissues very painful**

**Usually needs surgical intervention**



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**4th degree**

Extends through entire skin, into underlying fat, muscle and bone

Appearance:  
Black  
Charred  
Dry

Burn is painless itself

Needs surgical intervention



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Most wounds are not homogeneous



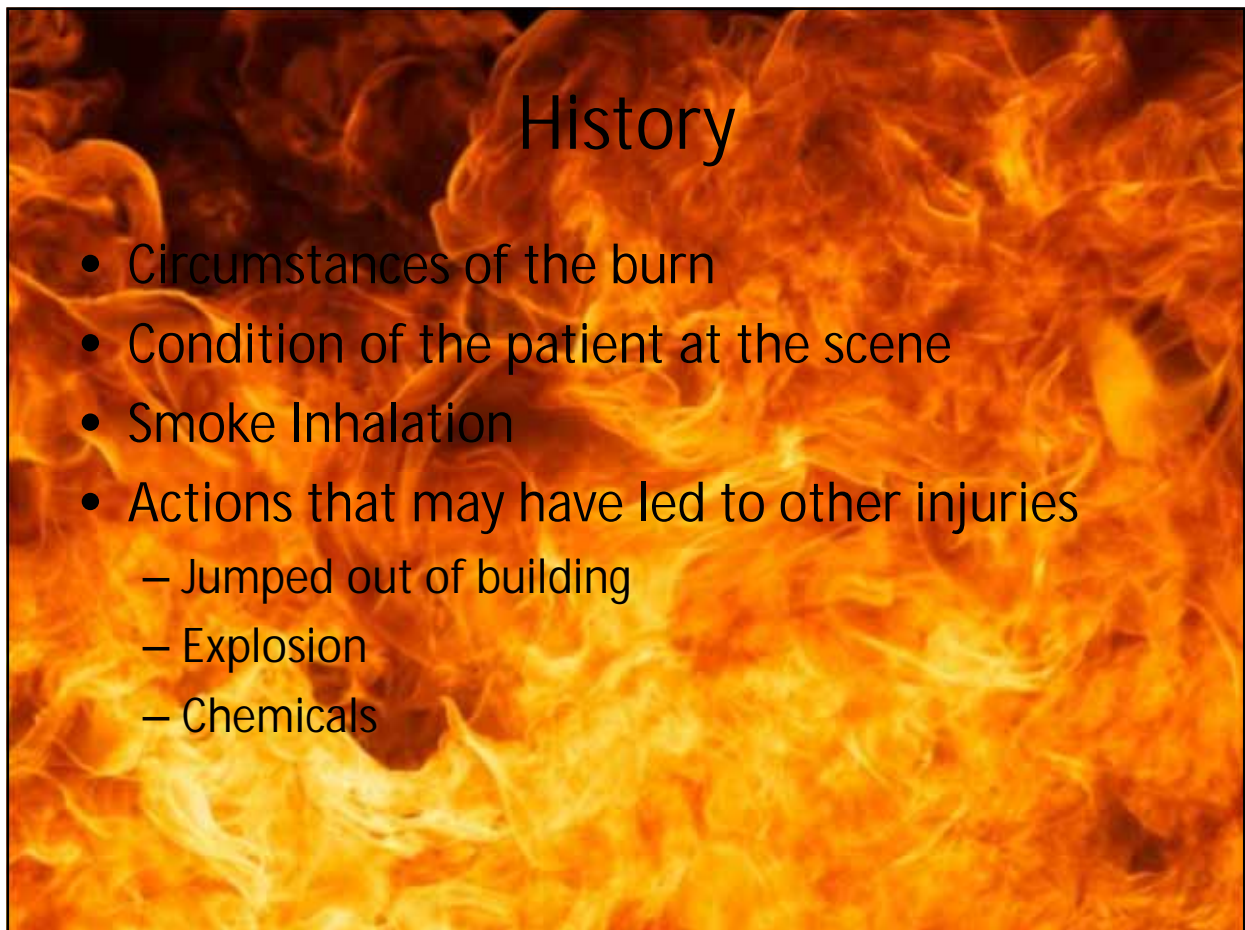
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## Initial Treatment

- Don't get burned or injured yourself
- Stop the burning process
  - Stop/Drop/Roll
  - Irrigate chemicals...a lot!
  - Shut off electrical current
- Trauma ABC's
- COVER
  - NO ICE WATER, WET DRESSINGS!!
  - Cover burns with clean dry cloth
- Keep patient warm
- Remove all rings and constricting jewelry
- Pain control (IV not PO, IM)





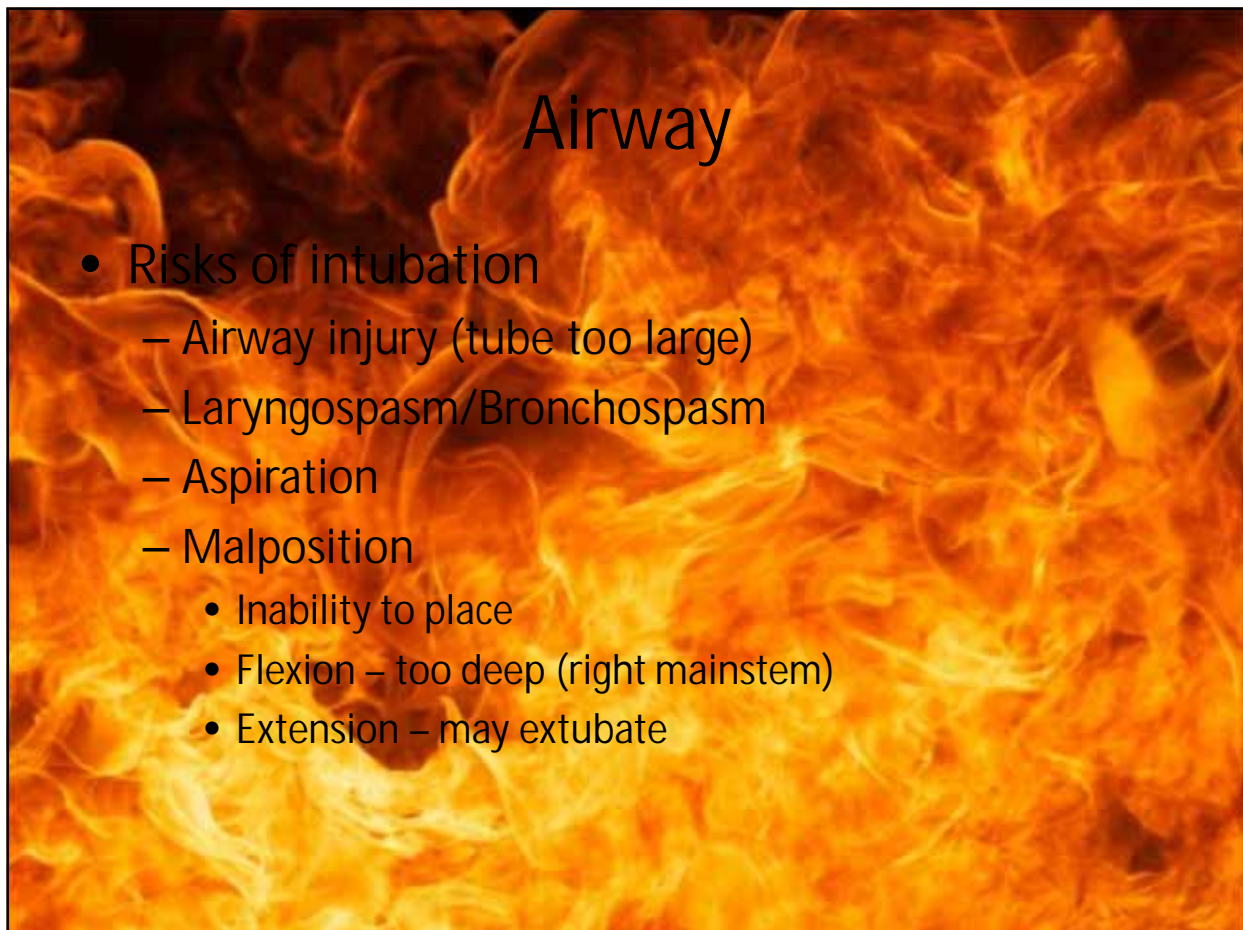


## History

- Circumstances of the burn
- Condition of the patient at the scene
- Smoke Inhalation
- Actions that may have led to other injuries
  - Jumped out of building
  - Explosion
  - Chemicals

## Airway


- Major concern is obstruction from edema
- Edema requires time to develop
- Balance risks of obstruction with risks of intubation (We will come back to this)
- Factors that increase risk of airway obstruction
  - Smaller airway size (younger)
  - Larger and deeper burns
  - Burns to face and head
  - Burns inside the mouth



## Airway

- Risks of intubation
  - Airway injury (tube too large)
  - Laryngospasm/Bronchospasm
  - Aspiration
  - Malposition
    - Inability to place
    - Flexion – too deep (right mainstem)
    - Extension – may extubate





## Breathing

- Pulmonary compromise: Still a major problem of all types of burn injury
- Prevention is key
- Carbon Monoxide poisoning
  - Treatment is remove from CO source and 100% O2
- Hypoxia
  - Fire consumes O2
  - Leading cause of death in house fires
  - Reason for smoke detectors
  - Reason for staying low

## Initial Fluid Resuscitation

- Insert a large bore intravenous catheter
- Can be through burned skin if necessary but unburned skin is preferred.
- Burns greater than 30% will require 2 large bore IVs
- Use LR when possible
- Prior to calculating the Total Body Surface Area (TBSA) burned, use the following guidelines as starting points:
  - 5 years old and younger: 125 ml Lactated Ringers (LR) per hour
  - 6 – 13 years old: 250 ml LR per hour
  - 14 years and older: 500 ml LR per hour

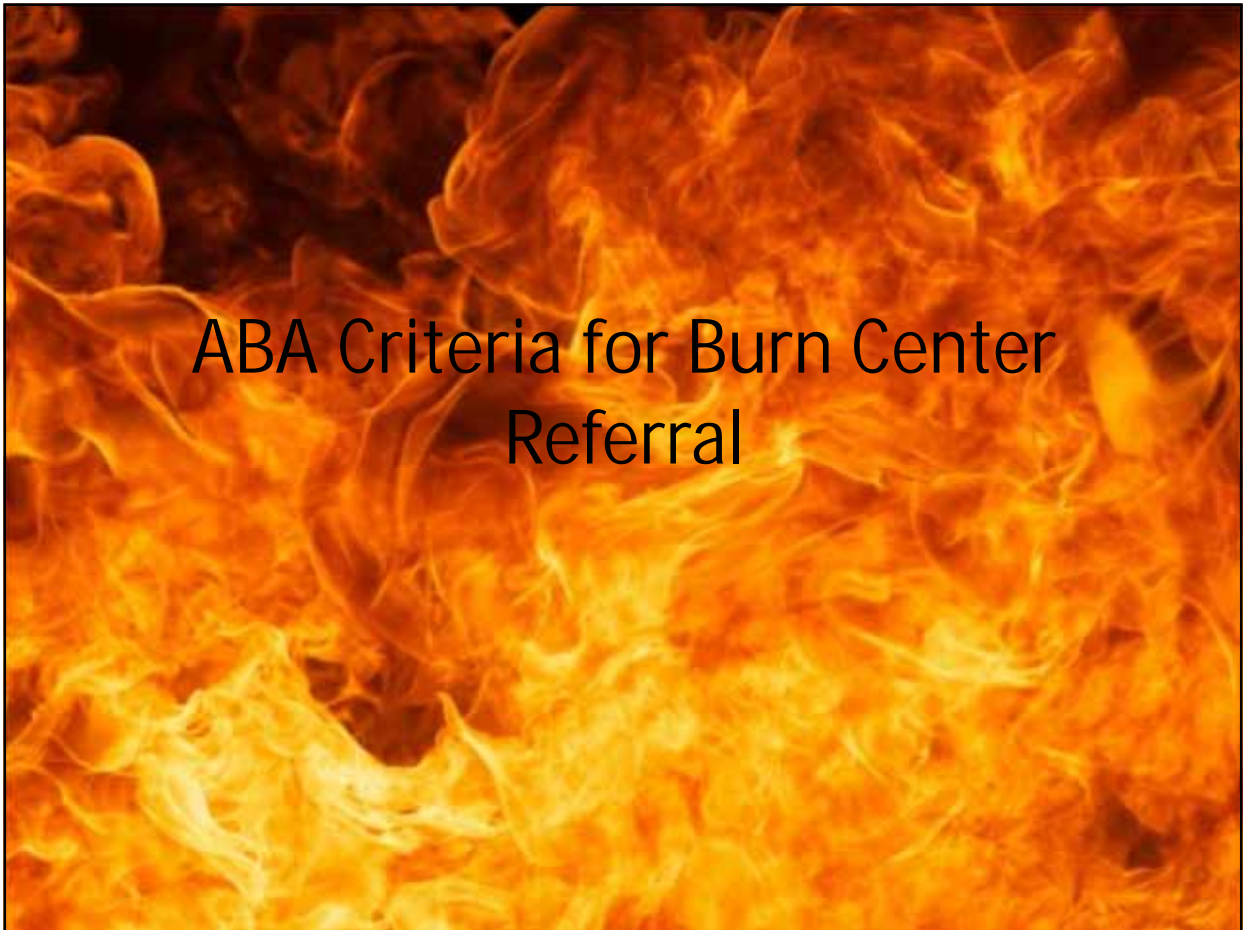
## Initial Fluid Resuscitation

- Resuscitation formulas only for getting started.
- Generally resuscitation is gauged by urine output
- Over resuscitation can be just as problematic as under resuscitation
- Judicious but adequate fluids is the key



## Parkland Formula

- 4ml/kg/%TBSA Burn
  - ½ in first 8 hours
  - ½ in second 16 hours
- Only a starting point
- Adjust fluids based on urine output



# ABA Criteria for Burn Center Referral

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## ABA Criteria for Burn Center Referral

**1. Partial thickness burns > 10% total body surface area (TBSA)**





## ABA Criteria for Burn Center Referral

- 1. Partial thickness burns > 10% total body surface area (TBSA).**
- 2. Burns on face, hands, feet, genitalia, perineum, or major joints.**



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## ABA Criteria for Burn Center Referral

- 1. Partial thickness burns > 10% total body surface area (TBSA)**
- 2. Burns on face, hands, feet, genitalia, perineum, or major joints**
- 3. Third degree burns in any age group**

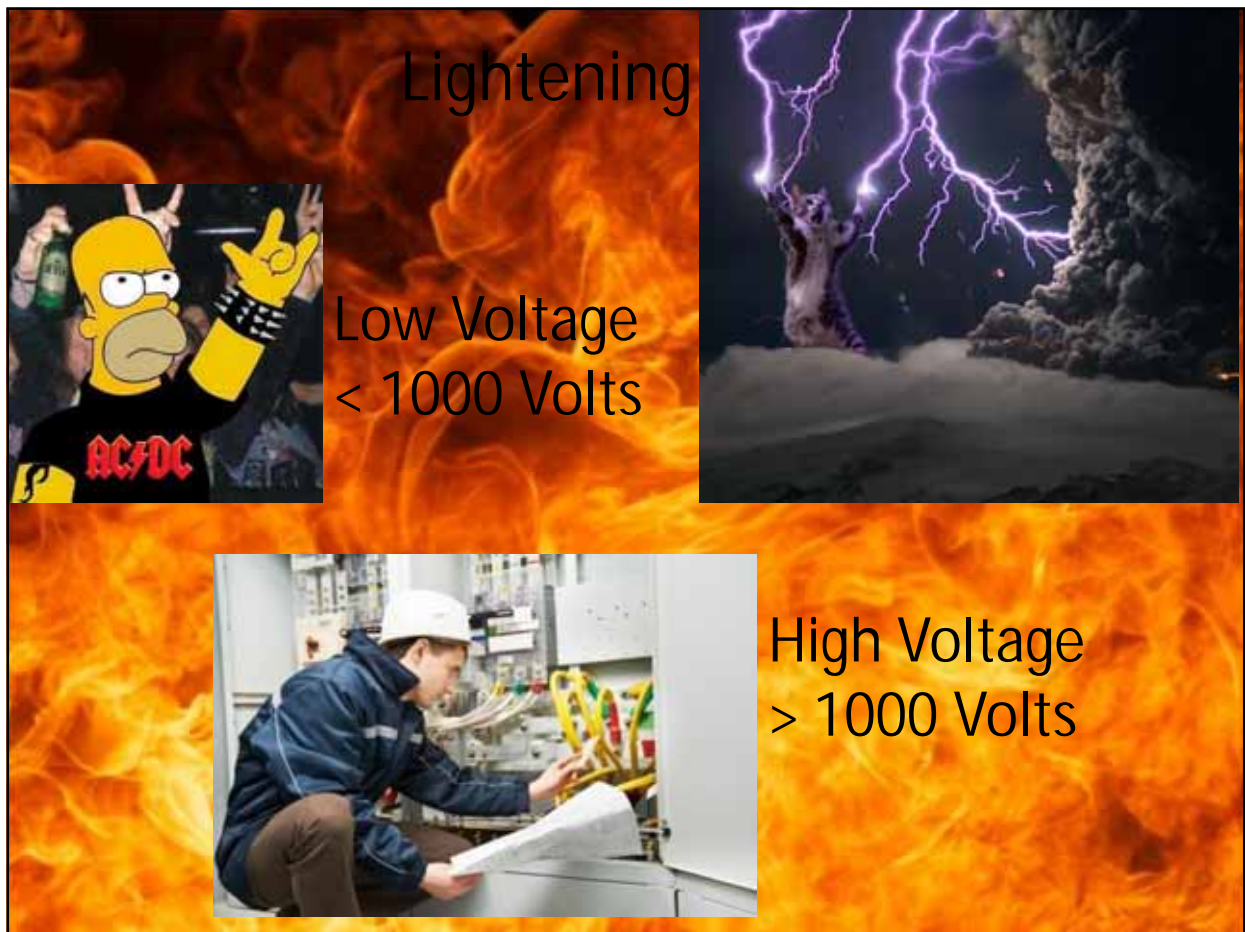


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## ABA Criteria for Burn Center Referral

1. **Partial thickness burns > 10% total body surface area (TBSA)**
2. **Burns on face, hands, feet, genitalia, perineum, or major joints**
3. **Third degree burns in any age group**
4. **Electrical burns**





The graphic features a background of orange and yellow flames. At the top center, the word "Lightning" is written in a black, sans-serif font. Below this, on the left, is a small inset image of Homer Simpson from the animated show "The Simpsons". He is wearing a black t-shirt with "AC/DC" written on it in red and white, and he is making the "devil horns" hand gesture. To the right of Homer Simpson, the text "Low Voltage < 1000 Volts" is written in black. On the right side of the graphic, there is a photograph of a lightning bolt striking a tree at night. Below this, on the left, is a photograph of an electrical worker wearing a blue jacket and a white hard hat, kneeling and working on a piece of electrical equipment. To the right of this worker, the text "High Voltage > 1000 Volts" is written in black.

Lightning

Low Voltage  
< 1000 Volts

High Voltage  
> 1000 Volts

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## Electrical Injuries

- Three types:
  - Flash
  - Arc
  - True Electrical Burn
- Damage depends on amperage
- Extent of injury is not obvious
- Damage along areas of increased resistance



## Electrical Injuries

- Associated injuries:
  - Cardiac
    - Low voltage: fibrillate
    - High voltage: asystole
    - Arrhythmias common
    - CPR may save a life



## Electrical Injuries

- Associated injuries:
  - Musculoskeletal
    - Muscles contract and cant let go
    - Check for fractures
      - Spine
      - Long bones
    - Muscle damage
      - Direct injury often deep
      - Compartment Syndromes common
      - Need fasciotomies
      - Damage leads to myoglobinuria

## Electrical Injuries

- Associated injuries:
  - Renal
    - Myoglobin is toxic
    - IV fluids to produce 75-100ml of urine per hour
    - Eliminate color in urine
  - Neurologic
    - Brain may shut down
    - Nerves at risk
    - Long term peripheral, central, and psychologic complications may occur
    - Eyes at risk for cataracts

## ABA Criteria for Burn Center Referral

1. Partial thickness burns > 10% total body surface area (TBSA)
2. Burns on face, hands, feet, genitalia, perineum, or major joints
3. Third degree burns in any age group
4. Electrical burns
5. Chemical burns





Household cleaners  
Usually Basic



Industrial chemicals  
Often Acids

Chemical Warfare



Meth Lab Explosions





## Special Tips for if you suspect burn is drug related

- Keep all clothing patient was wearing.
- Place in paper bag
- Make sure that the chain of custody is maintained



## Chemical Injuries

- Dilute the agent
- Do **NOT** look for antidote
- Call Burn Center
- Decontaminate the area

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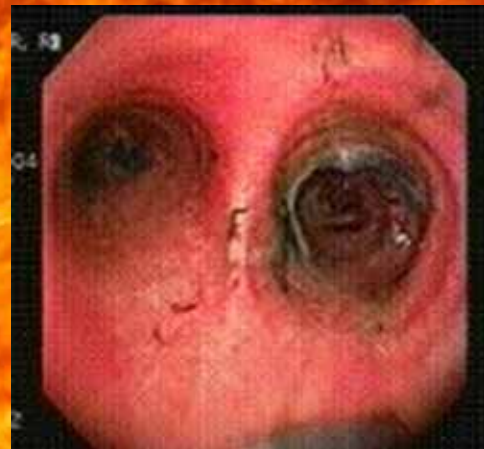
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1. Partial thickness burns > 10% total body surface area (TBSA)
2. Burns on face, hands, feet, genitalia, perineum, or major joints
3. Third degree burns in any age group
4. Electrical burns
5. Chemical burns
6. Inhalation injury

# Generally Must Be Enclosed



Housefire



Smoking on Oxygen

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# When should we intubate?

**Table 4.** Guidelines for intubation in the pre-burn center setting

Guidelines for intubation in the pre-burn center setting:

- Patient safety should not be compromised, and patient status is the ultimate determinant of intubation need
- Standard indications for intubation should be followed including but not limited to shortness of breath, wheezing, stridor, hoarseness, combativeness, or decreased level of consciousness
- Contact should be made with the regional burn center as soon as is safely feasible to discuss the events surrounding the burn and need for intubation
- If patient is clinically stable with no signs or symptoms compromised airway, burns with lower need for intubation before transfer to a burn center are as follows:
  - Burns that occur from causes other than flame injury
  - Burns that do not occur in enclosed spaces
  - Burns that are less than 20% TBSA
  - Burns that have no third degree burns to the face
  - Patient is within a reasonable distance to a burn center (approximately 3 hr transfer time)



## ABA Criteria for Burn Center Referral

1. Partial thickness burns > 10% total body surface area (TBSA)
2. Burns on face, hands, feet, genitalia, perineum, or major joints
3. Third degree burns in any age group
4. Electrical burns
5. Chemical burns
6. Inhalation injury
7. Preexisting medical disorders that could complicate management, prolong recovery, or affect mortality

## ABA Criteria for Burn Center Referral

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6. Inhalation injury
7. Preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
8. Concomitant trauma when burn poses the greatest risk of morbidity or mortality



**Motor Vehicle Crash**

**Falls**



**GSW and SW likely need treatment first**



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## ABA Criteria for Burn Center Referral

1. Partial thickness burns > 10% total body surface area (TBSA)
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7. Preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
8. Concomitant trauma when burn poses the greatest risk of morbidity or mortality
9. Children in hospitals without qualified personnel or equipment



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## Pediatric burns

- Approximately 40% of burn admissions are children
  - Pattern depends on age
  - Different risk factors than adults
  - Scalds most common
  - Sex prevalence changes as age increases



## Toddlers

- Explore world
  - Mouth – electric cord commissure burns
  - Hands – palm contact burns, electric outlet burns
- Curiosity
  - Reach for pot handles or cords leading to scald burns
- Reflexes need to be learned
  - Freeze when burned



## Toddlers

- Toilet Training
  - Period of greatest risk for abuse
  - Dip scalds often related to frequent training mistakes

## Grade School Age

- Boys begin to dominate
- Experimentation with flame (lighters, fireworks)
- Peer Pressure important
- Tend to ignore adults





## Teenagers

- Boys tend to increase risky behavior
- Relationships become more important
- Self mutilation/Suicide attempts increase
- Risk for automobile accidents

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## ABA Criteria for Burn Center Referral

1. Partial thickness burns > 10% total body surface area (TBSA).
2. Burns on face, hands, feet, genitalia, perineum, or major joints.
3. Third degree burns in any age group.
4. Electrical burns
5. Chemical burns
6. Inhalation injury.
7. Preexisting medical disorders that could complicate management, prolong recovery, or affect mortality.
8. Concomitant trauma when burn poses the greatest risk of morbidity or mortality.
9. Children in hospitals without qualified personnel or equipment
10. Need for special social, emotional, or rehabilitative intervention.



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## Test Review Question 1:

- **Fourth degree burns extend through the entire skin and into the underlying fat, muscle and bone.**
  - True
  - **False**

## Test Review Question 1:

- **Fourth degree burns extend through the entire skin and into the underlying fat, muscle and bone.**
  - True
  - False

## Test Review Question 2:

- **Flame burns are most common in children:**
  - True
  - False



## Test Review Question 2:

- **Flame burns are most common in children:**
  - True
  - **False**

## Test Review Question 3:

- **Greatest risk of abusive burns occurs during:**
  - A. Adulthood
  - B. Adolescent
  - C. Infancy
  - D. Toddler

## Test Review Question 3:

- **Greatest risk of abusive burns occurs during:**
  - A. Adulthood
  - B. Adolescent
  - C. Infancy
  - **D. Toddler**



## Test Review Question 4:

- **When taking care of a burn patient the first priority is:**
  - **A. Airway**
  - **B. Breathing**
  - **C. Circulation**
  - **D. Ensure the safety of yourself and your team by assessing the safety of the scene**

## Test Review Question 4:

- **When taking care of a burn patient the first priority is:**
  - A. Airway
  - B. Breathing
  - C. Circulation
  - **D. Ensure the safety of yourself and your team by assessing the safety of the scene**

## Test Review Question 5:

- The treatment of a chemical burn is to find the antidote.
  - True
  - False



## Test Review Question 5:

- The treatment of a chemical burn is to find the antidote.
  - True
  - **False**



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