Wednesday, December 22, 2010

Dear Nurse Manager:

Your hospital is one of over 150 in Eastern Pennsylvania, New Jersey, and Delaware whose emergency department refers seriously injured burn patients to one or more of our region’s four burn treatment centers. The staff of the burn centers deeply appreciates the cooperation and high level of skill normally reflected in the initial treatment of these patients and their preparation for transfer. Questions arising during these transfers led our Nurses Advisory Council to draft “Guidelines for Early Care and Transfer of Burn Patients” in 1991. The enclosed third edition of these guidelines reflects recent changes in burn care practice and admissions criteria since the second edition in 2005.

“Guidelines for Early Care and Transfer of Burn Patients” is designed in a bulleted columnar format to make it useful both as a teaching tool and as an immediate reference when care is being provided. For ease of use, this third edition provides a complete specific treatment sequence for each type of burn (thermal, electrical, chemical burns, and inhalation injuries) together with the rationale for each step.

The manual is now on CD in PDF format for ease of consultation in a busy emergency department. We have also enclosed a wall chart in a washable, stain resistant material that briefly summarizes some of the important information in the Guide. Finally, there are wallet cards to help pre-hospital personnel assess the seriousness of a burn injury and whether transport is indicated. The manual is also available for download from our website, www.burnfoundation.org. Additional wall charts and wallet cards can be ordered from the website or from our office for a nominal fee.

The Foundation also offers burn prevention programs, seminars in emergency burn care for hospitals and nursing students and psychosocial support for burn survivors and their families. If you have questions about any of these programs, please contact the Burn Foundation at 215-545-3816 or via email at info@burnfoundation.org.

The publication and distribution of this manual was underwritten by grants from ConvaTec and Bio-Concepts, Inc. We also extend our gratitude and appreciation to the Nurse Advisory Council (NAC) members who so generously gave their time and expertise in preparing this resource. We hope that you find the enclosed information helpful.

Sincerely,

Patsy Porter
President & CEO
FOREWORD

In 1973 Crozer-Chester Medical Center and St. Agnes Medical Center introduced specialized burn care to the Middle Atlantic states by establishing the region’s first burn centers. That same year they also created the Burn Foundation, to address common interests and concerns of the burn treatment community. By 1980, Lehigh Valley Hospital and St. Christopher’s Hospital for Children had established burn centers and joined the Burn Foundation consortium. The group’s membership expanded to five when Temple University Hospital opened a burn center in 1999, and fell back to four when St. Agnes Medical Center closed its burn center as part of a conversion to a long-term care facility in 2004.

The consortium’s burn centers admit over 1,000 patients a year from a four-state area embracing the Eastern half of Pennsylvania, Southern New Jersey, Delaware and Northern Maryland. Since 1973 over 25,000 patients from this region have been admitted to one of the consortium’s burn centers after experiencing a severe burn. Thousands more have benefited from outpatient treatment provided by multidisciplinary burn teams at these centers.

With this coordinated group of burn centers at its core, the Burn Foundation represents a comprehensive regional approach to burn injury. Since its formation, the Foundation’s mission has grown to embrace professional and public education in burn treatment and prevention, and services to children and adult burn survivors following their treatment in a burn center.

The enclosed 2010 Edition “Guidelines for Early Care and Transfer of Burn Patients”, the product of a three year effort by members of the Burn Foundation’s Nurse Advisory Council (NAC), on which its member burn centers are represented, is a reflection of the clinical experience and best practices of seasoned professionals in burn care.

We hope that you find the manual useful and that it enhances the quality and efficiency of care for serious burn patients throughout our region.
INTRODUCTION

The Burn Foundation’s Nurse Advisory Council (NAC) composed of burn center nurse managers and clinical educators, conceived the idea for “Guidelines for Early Care and Transfer of Burn Patients” in the 1990s. Prepared with input from the region’s burn center medical directors as well as NAC members, the guidelines were intended to assist those who manage or train emergency department staff as well as those who treat burn injury directly in emergency or pre-hospital settings.

The enclosed 2010 guidelines address issues that have arisen subsequent to the first edition, during burn center referrals or in seminars presented by burn center staff. The new guidelines, again incorporating input from regional burn center medical directors, also address the role of pre-hospital personnel in providing initial burn care.

The Early Care and Transfer of Burn Patients is divided into eight sections. These chapters address four types of burn injury (thermal, chemical and electrical burns, and inhalation injuries) and are further divided into pre-hospital and emergency department treatment sections.

These guidelines are not meant to replace standard texts in emergency care or override procedures developed by regional or state EMS organizations and the American Burn Association’s Guidelines for Burn Care. They should not be considered the sole guide to burn management. A detailed discussion of burn risk and treatment regimen from many specific sources, for example, is beyond the scope of this document.

For additional information, please contact the Burn Foundation office or the burn center nurse manager at

Crozer-Chester Medical Center
610-447-2800

Lehigh Valley Hospital
610-402-2876 (BURN) 800-710-2876 (BURN)

St. Christopher’s Hospital for Children
215-427-6900

Temple University Hospital
215-707- BURN (2876)
Burn Foundation

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DISCLAIMER

This publication is intended to serve as a general reference for persons and organizations engaged in the care of burn patients. It is not intended to serve as a definitive guide to the diagnosis or treatment of specific burn patients and should not be used in such a manner. Diagnosis and treatment of specific burn patients should be undertaken only under the supervision and with the specific advice of licensed health personnel.
Guidelines for Early Care and Transfer of Burn Patients

Pre-hospital Care of the Patient with Thermal Burns
PRE-HOSPITAL GUIDELINES
THERMAL INJURY

Many of the procedures listed will be provided simultaneously. Initiate in order of priority.

A. Scene Size-up

Includes checking scene safety; determining the mechanism of injury or nature of illness; finding out how many patients are involved; and determining whether you need additional help.

Use universal precautions.

B. Stop the burning process.

THERMAL INJURY

1. Remove patient from heat source/cold source. Prevents extension of burn.

2. Remove smoldering and constricting clothing, shoes, boots, jewelry, earrings. Such items retain heat and may extend depth of burn. A tourniquet-like effect can result as edema forms and can damage neurovascular structures.

3. Immediately cool the burn with room-temperature water or saline for no more than a few minutes. Remove all clothing and baby diapers. If clothing or other material adheres, do not remove. Cool burned skin, adhered clothing and material, with room temperature water and cover patient immediately with clean, dry sheet and blankets. Stops burning; relieves pain. Cooling is most effective when performed within 5 to 10 minutes of exposure. Body heat escapes through open wounds, which may intensify shock. Cooling dissipates heat from the tissue which decreases burn depth.

4. Do not use ice or cold water. Cold water and ice may damage tissue and lower core temperature.
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Keep patient warm. Do not allow the patient to become hypothermic.</td>
<td>The loss of body heat through open wounds may intensify shock. Hypothermia can occur in the burn patient even in warm weather.</td>
</tr>
<tr>
<td>6. Do not break blisters. Blisters may break from routine handling and during transportation. If this occurs, keep areas covered with a clean, dry sheet or dressing.</td>
<td>To prevent further tissue damage.</td>
</tr>
<tr>
<td>7. Extreme cold exposure can lead to tissue destruction. Extremities should be warmed slowly.</td>
<td>Rapid re-warming may cause further tissue damage.</td>
</tr>
</tbody>
</table>

C. Conduct primary survey or initial assessment.

Establish airway, breathing and circulation (ABC’s). Maintain C-spine immobilization.  

1. Perform CPR as needed.  
3. Apply 100% oxygen (use humidified oxygen if available) by non-rebreather mask. If possible draw blood for carboxyhemoglobin at scene.  
4. Continually monitor the patient’s airway.  
   a. Determine from patient’s history if injury occurred in an enclosed space.  
   b. Determine from the patient’s history if patient was at anytime unconscious, or shows signs of alcohol/drug intoxication.  
   c. Note amount of facial, neck and chest burn.  

**Guidelines for Early Care and Transfer of Burn Patients**  
Pre-hospital Care of the Patient with Thermal Burns
### TREATMENT

<p>| | |</p>
<table>
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<tbody>
<tr>
<td><strong>d.</strong> Assess for singed nasal hair, facial hair, eyebrows.</td>
<td>Presence can indicate inhalation injury.</td>
</tr>
<tr>
<td><strong>e.</strong> Inspect mouth for soot, erythema, blisters, edema or carbonaceous sputum.</td>
<td>Presence can indicate inhalation injury.</td>
</tr>
<tr>
<td><strong>f.</strong> Determine presence of hoarseness.</td>
<td>Indicative of laryngeal edema.</td>
</tr>
<tr>
<td><strong>g.</strong> Assess for bronchial breath sounds, wheezing, crackles.</td>
<td>Indicates inhalation injury.</td>
</tr>
<tr>
<td><strong>h.</strong> Determine presence of stridor. <strong>If present intubate patient immediately.</strong></td>
<td>Indicates imminent airway occlusion. Burn patients can progress rapidly from mild dyspnea to respiratory arrest.</td>
</tr>
<tr>
<td><strong>i.</strong> Document level of consciousness and orientation.</td>
<td>Mental orientation changes may indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.</td>
</tr>
<tr>
<td><strong>j.</strong> Assess for circumferential burns of the chest and neck.</td>
<td>Circumferential chest burns can restrict ventilatory movement; neck burns can cause restricted airway.</td>
</tr>
<tr>
<td><strong>k.</strong> Apply cardiac monitor and pulse oximetry.</td>
<td>Continuous monitoring of patient’s cardiac rhythm and oxygenation can identify cardio-pulmonary complications. Pulse oximetry will not reflect carbon monoxide levels.</td>
</tr>
</tbody>
</table>

5. **Treatment**

**Consider intubation for any evidence of inhalation injury, severe facial burns or swelling - especially prior to transport.**

**a.** If patient assessment reveals potential for obstructed airway, intubate patient. Oral intubation preferred unless contraindicated. Consider using Rapid Sequence Intubation (RSI) techniques and pharmacological adjuncts.  

To insure patent airway and access to ventilation prior to edema. Decreases possibility of sinusitis. Use succinylcholine cautiously. Succinylcholine may worsen the hyperkalemia associated with severe burns.
<table>
<thead>
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<th>TREATMENT</th>
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<tbody>
<tr>
<td>b. Suction tracheal-bronchial tree thoroughly.</td>
<td>Removes soot and prevents atelectasis.</td>
</tr>
<tr>
<td>c. Deliver humidified 100 % O₂</td>
<td>Improves oxygenation and may reduce the half-life of CO.</td>
</tr>
<tr>
<td>d. Check for hemorrhage, shock and other injuries, especially head or spinal trauma; treat per existing trauma protocol.</td>
<td>These are immediate concerns that take priority over the burn wound in the prehospital stage.</td>
</tr>
<tr>
<td>e. Maintain C-spine immobilization when indicated.</td>
<td>C-spine immobilization reduces range of motion of the patient’s head and neck and prevents damage to the cervical spine.</td>
</tr>
<tr>
<td>f. Establish IV. Select site and insert large bore peripheral. Consider 2 large bore IV sites. If difficulty gaining access, intraosseous (IO) route can be used. Use Lactated Ringer’s solution.</td>
<td>For administration of medications and fluids. Well balanced isotonic solution that aids in resuscitation.</td>
</tr>
<tr>
<td>Pediatric Consideration For infants and small children</td>
<td>Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid. Due to inadequate glycogen stores. Maintenance fluid is not titrated.</td>
</tr>
<tr>
<td>Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid. For the first 10 kg of body weight: 100 ml/kg over 24 hours. For the second 10 kg of body weight: 50 ml/kg over 24 hours. For each kg of body weight above 20Kg: 20 ml/kg over 24 hours</td>
<td></td>
</tr>
<tr>
<td>• Consult burn center regarding fluid management.</td>
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</tbody>
</table>
D. Conduct focused and rapid trauma assessment with secondary survey.

A complete secondary survey should be conducted from head to toe—a detailed physical examination and a focused history.

PHYSICAL EXAMINATION

DCAP—deformities, contusions, abrasions, penetrations, punctures.

BTLS—burns, tenderness, lacerations, swelling.

Pain: OPQRST—onset, provocation, quality, radiation, severity, time.

a. Note vital signs, Glasgow coma scale and trauma score.

b. Assess burn injury, the presence of concurring medical problems, other accompanying trauma and factors that influence severity.

Pre-existing conditions or illnesses can compound the severity of the injury and influence the patient’s care and outcome.

The severity of a burn injury is determined primarily by the extent of the body surface area involved and, to a lesser extent, by the depth of the burn. However, other factors must be considered such as age, the presence of concurrent medical problems, and complications that accompany certain types of body burns such as those of the face, hands, feet, genitalia, perineum, and any areas that include a joint.

(1) Estimate percentage of Body Surface Area (BSA) burned. DO NOT INCLUDE SUPERFICIAL/FIRST DEGREE BURNS IN THIS PERCENTAGE.
TREATMENT

Palmar Method: The size of the patient’s palm is equal to 1%.

Use Palmer Method for small burns.

Rule of Nines: The Rule of Nines formula divides the total BSA into 9% or multiples of 9% segments. In the infant or child, the Rule deviates because of the larger surface area of the child’s head:

Rule of Nines:

(2) Classify burns according to depth.

RATIONALE

PALMAR METHOD:
Patient’s palm = 1% BSA

The greater surface area of a child’s head in relation to total body size influences the BSA estimation and calculation of the percentage of BSA of burn injury.

Depth of burn is a factor in the decision to refer a patient to a specialized burn care facility.
### DEPTH CATEGORIES:

**Characteristics:**

- **Superficial / 1st Degree:**
  - red, swelling, tender, blanches w/ pressure, painful. **Do not include in BSA% estimate.**
  - Epidermis injured but intact.

- **Partial Thickness / 2nd Degree:**
  - red, blisters, weeping, blanches w/ pressure, painful.
  - All epidermis and varying degrees of dermis are destroyed.

- **Full Thickness / 3rd Degree:**
  - dry, red, white, black or brown; does not blanch w/pressure; inelastic; hair pulls out easily; diminished pain sensation; leather-like appearance.
  - Epidermis and dermis are destroyed. Extends into subcutaneous layers or even deeper into muscles, bones, and internal organs.

(3) Assess the location of the burn injury.

**Special Care Areas:** face, hands, feet, major joints, genitalia, perineum. Refer to Burn Center.

2nd and 3rd degree burns involving the face, hands, feet, genitalia, perineum and major joints can be a threat to function or result in cosmetic impairment. American Burn Association recommends burn center care.

(4) Inspect for circumferential areas of burn.

- Extremities may suffer vascular compromise, nerve and/or muscle impairment from compartment syndrome due to increased edema.

(5) Assess respiratory effort, chest expansion, and status of distal circulation.

- Burns around chest may restrict respiratory movement due to increasing edema.

(6) Burns caused by the following mechanisms: chemicals, electricity or inhalation injury need Burn Center care.

- Chemical and electrical burns are considered occult injuries because the extent of the damage may extend far beyond what is visible on the surface.

(7) Assess for accompanying trauma.

- Burn injury with inhalation and/or concomitant trauma increases morbidity or mortality.
### TREATMENT

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<th>OBTAIN PATIENT HISTORY – S A M P L E:</th>
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**Age of the patient.**

Be aware of high risk groups:
- Under 10 years of age
- Over 50 years of age

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### RATIONALE

*Pre-existing medical disorders may complicate burn treatment, prolong recovery or affect mortality.*

*Individuals under the age of 10 and over the age of 50 are considered at greater risk for burn complications. Therefore, smaller percentages of BSA burns to someone in these age groups may be considered a major or critical injury.*

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**E. Pain Management**

Administer pain medication as per Medical Command physician. Morphine is indicated for pain. (0.1 mg morphine/kg body weight is recommended dosage.) Narcotics should only be given intravenously in small doses and only enough to manage pain. Do not use the intramuscular or subcutaneous route.

*Excessive and frequent administration of narcotics leads to compromised respiratory status. Because fluid volume and circulation changes occur in burn injury, absorption of pain medication given intramuscularly or subcutaneously may be ineffective and unpredictable.*
<table>
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<tr>
<th>TREATMENT</th>
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<tr>
<td>F. Provide emotional support.</td>
<td>-----------------------------------------------------------------------------------------------------</td>
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<tr>
<td>G. Transport patient as directed by Medical Command.</td>
<td>Transport patient to the nearest hospital or specialized burn care facility according to Medical Command.</td>
</tr>
<tr>
<td>H. Provide information on disposition of patient to family members.</td>
<td>Provide directions to Burn Center as needed.</td>
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</table>
EMERGENCY DEPARTMENT GUIDELINES
THERMAL INJURY

TREATMENT

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<td>Many of the procedures listed will be provided simultaneously. Initiate in order of priority.</td>
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THE BURN PATIENT MAY BE A MULTI-TRAUMA PATIENT AND SHOULD RECEIVE A RAPID BUT FULL EXAMINATION TO RULE OUT OTHER TRAUMA.

A. Stop the burning process.

- Remove all clothing and jewelry, including all rings, earrings, bracelets and piercings.
  - Assure that this has occurred in the prehospital stage.
  - Metal retains heat and may extend the burn.
  - Rings may restrict circulation when swelling occurs.

- Cool the burn with room temperature water or saline for a few minutes. Do not use cold water or ice. Implementation in ED dependent upon treatment at scene, length of transport, and burn type. Cover with clean dry sheet and blankets.
  - Stops burning process and prevents progression of burn. Over-cooling may aggravate shock state and may cause hypothermia and acidosis.

- Measure body temperature on arrival and every 30 minutes thereafter.
  - Regulation of body temperature is diminished or destroyed as a result of burn injury.

- Keep patient covered during exam.
  - Minimizes hypothermia.

- If transfer to a burn unit is anticipated, DO NOT apply any topical agents.

B. Provide and maintain an open airway.

1. Airway management

   - The first step in the care of any trauma patient is to establish an open airway and adequate ventilation. Prophylactic intubation may be indicated to prevent airway obstruction.
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<tr>
<td>Respiration is adversely affected by edema, carbon monoxide poisoning, smoke inhalation, circumferential trunk burn. Pulmonary injuries may not present clinical symptoms in the early post-burn hours. Airway obstruction may occur due to swelling caused by smoke inhalation.</td>
<td></td>
</tr>
</tbody>
</table>

   a. Determine from patient’s history if injury occurred in an enclosed space. Airway obstruction may occur due to swelling caused by smoke inhalation.
   b. Determine the patient’s history, if the patient was unconscious at any time, or shows signs of alcohol/drug intoxication. Mental orientation changes could indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.
   c. Document level of consciousness and orientation. Change in level of consciousness may indicate long exposure to smoke and potential for inhalation injury.
   d. Note amount of facial, neck and chest burn. Anticipate edema; suspect inhalation injury.
   e. Assess for singed nasal hair, facial hair, and eyebrows. Presence can indicate inhalation injury.
   f. Inspect mouth for soot, erythema, edema or carbonaceous sputum. Presence indicates inhalation injury.
   g. Determine presence of hoarseness. Indicative of laryngeal edema.
   h. Assess for bronchial breath sounds, wheezing, crackles. Indicates inhalation injury.
   i. Determine presence of stridor. If present **intubate patient immediately**. Indicates imminent airway occlusion.
### TREATMENT | RATIONALE
---|---
j. Assess for circumferential burns of the chest and neck. | Circumferential chest burns may restrict adequate ventilation; neck burns may cause restricted airway. An escharotomy and/or fasciotomy should only be performed AFTER consultation with the Burn Center Attending Physician.

k. Obtain ABG carboxyhemoglobin (COHgb) levels. Continue pulse oximetry. | For aid in diagnosis of inhalation injury and carbon monoxide poisoning. Pulse oximetry will not reflect carbon monoxide levels.

l. Consider testing for cyanide poisoning. | Cyanide is a by-product of burning synthetic materials.
m. Obtain chest x-ray. | Provides baseline for future assessment.

### 3. Treatment

CONSIDER INTUBATION FOR ANY EVIDENCE OF INHALATION INJURY, SEVERE FACIAL BURNS OR SWELLING - ESPECIALLY PRIOR TO TRANSPORT TO BURN CENTER.

a. If patient reveals potential for obstructed airway, have patient intubated. | Insures access to ventilation prior to edema.

Oral intubation is preferred, unless contraindicated. | Decreases possibility of sinusitis.

Consider using Rapid Sequence Intubation (RSI) techniques and pharmacological adjuncts.

b. Suction tracheal-bronchial tree thoroughly. | Removes soot and prevents atelectasis.

c. Administer 100% humidified O₂. Titrate O₂ after carboxyhemoglobin (COHgb) equals less than 10%. | Provides adequate oxygenation. Carbon monoxide binds with hemoglobin, robbing the blood of oxygen.

d. Use mechanical ventilation if needed. | Optimal ventilatory control.

e. Steroids are contradicted in inhalation injury. | Steroids use may result in immuno-suppression and compromise wound healing.
TREATMENT | RATIONALE
---|---
f. Prophylactic antibiotics are not recommended.

C. Provide CPR if needed

D. Circulatory Management

1. Assess for hemorrhage.  
   *Concurrent injury from the burn incident may cause external or internal bleeding.*

2. Fluid management
   
a. Draw blood for CBC, electrolytes, osmolality, BG, carboxyhemoglobin, ABG.  
   *Establishes baseline and guides treatment.*

   b. Select site and insert large bore peripheral IV if burn is greater than 10% BSA. If necessary, insert through burned surface. Consider 2 large bore IV sites. If unable to find a suitable peripheral line, insert a central line and confirm placement.  
   *Large fluid volumes required to prevent or correct hypovolemic shock.*

   c. Use Lactated Ringers solution.  
   *Well balanced isotonic solution that aids in resuscitation.*

*Pediatric Considerations*
### TREATMENT

For Infants and Small Children:

Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid.

- **For the first 10 kg of body weight:** 100 ml/kg over 24 hours.
- **For the second 10 kg of body weight:** 50 ml/kg over 24 hours.
- **For each kg of body weight above 20Kg:** 20 ml/kg over 24 hours.
- Consult burn center regarding fluid management
- Check the patient’s glucose level at the bedside

**d. Calculate fluid requirements for first 24- hours post injury following the Consensus Formula:**

\[
2-4 \, ml \times wt \, in \, Kg \times \% \, of \, Body \, Surface \, Area \, burned
\]

Give 1/2 in first 8 hrs. post-burn (i.e. time injury occurred, not time of admission): remainder next 16 hrs.

**e. Insert Foley catheter for local perineal burns and burns requiring resuscitation. Monitor output hourly.**

### RATIONALE

**Use D5LR as maintenance fluid due to inadequate glycogen stores.**

**Maintenance Fluid is not titrated.**

**Replaces circulatory volume as fluid shifts from intravascular compartment to interstitial space.**

**Careful titration needed. Greatest fluid shift from intravascular compartment to interstitial space is in the first 12 hours.**

**Helps to assess resuscitation efficacy.**

**Hourly urine output is the single most important factor in assessing the patient’s response to fluid resuscitation.**
**TREATMENT**

4. Assess urine for myoglobin in deep major burns or electrical burns.
   - Observe for maroon color urine.
   - Send urine sample to laboratory for presence of myoglobin.
   - If myoglobin is positive, treat with:
     - IV sodium bicarbonate 1-2 meq/Kg.
     - Maintain output at 75-100 ml urine/hour. In children, maintain output at \( \geq 2cc/Kg/hr. \)

5. Perform neurovascular check.

6. Evaluate for presence of circulatory compromise by checking peripheral pulses with doppler. Absence of pulses indicates a **medical emergency**: contact Burn Center immediately.

**RATIONALE**

4. **Extensive or deep burns and electrical injuries have a high incidence of myoglobinuria. Higher urine output is necessary to prevent renal tubular necrosis resulting from occlusion of tubules with by-products of RBC and muscle destruction.**

5. **Increased edema will compromise perfusion to extremities.**

6. **Extremities may suffer vascular compromise and nerve and/or muscle impairment due to increasing edema.**
   - An escharotomy and fasciotomy should only be performed AFTER consultation with the Burn Center Attending Physician.

**E. Review for major trauma**

1. The burn patient should receive a full examination to assess for trauma.

2. Treat per existing Advanced Trauma Life Support (ATLS) protocols.

3. Assess and continually re-evaluate level of consciousness.

**F. Maintain body temperature**

1. Use **dry** clean sheets and blankets to avoid systemic hypothermia.

**Guidelines for Early Care and Transfer of Burn Patients**

Pre-hospital Care of the Patient with Thermal Burns

**ET6**
2. Monitor body temperature every 30 minutes. Consider using warming devices such as heat lamp, warming blankets, warm fluids, warm humidifier and/or initiate hypothermia protocols if needed.

**TREATMENT**

**RATIONALE**

Burn injury decreases the skin’s ability to regulate body temperature.

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**G. Assess burn injury and complications.**

1. Determine date, time, cause and circumstance of burn injury.  
   
   Passage of time and mechanism of injury may influence injury severity and dictate assessment and treatment priorities. Delay of time before initiation of emergency care increases risks of complications.

2. Estimate BSA percentage of the burn using Rule of Nines. **Do not include superficial 1st degree burns in this percentage.**

   The percentage of Body Surface Area (BSA) burned is one of the indicators of severity and is used to determine fluid resuscitation needs.

   The Rule of Nines formula divides the total BSA into 9% or multiples of 9% segments. In the infant or child, the Rule deviates because of the larger surface area of the head and smaller surface area of the legs.

   **Rule of Nines:**

   ![Rule of Nines Diagram](image)
TREATMENT | RATIONALE
---|---
3. Classify burns according to depth. | Depth of burn is a factor in the decision to refer a patient to a specialized burn care facility.

**DEPTH CATEGORIES:**
**Characteristics:**
- **Superficial / 1st Degree:**
  - red, swelling, tender, blanches w/ pressure, painful, **Do not include in BSA% estimate.**
  - Epidermis injured but intact.
- **Partial Thickness / 2nd Degree:**
  - red, blisters, weeping, blanches w/ pressure, painful.
  - All epidermis and varying degrees of dermis are destroyed.
- **Full Thickness / 3rd Degree:**
  - dry, red, white, black or brown; does not blanch w/pressure; inelastic; hair pulls out easily; diminished pain sensation; leather-like appearance.
  - Epidermis and dermis are destroyed.
  - Extends into subcutaneous layers or even deeper into muscles, bones, and internal organs.

4. Obtain summary of prehospital treatment, including time of burn injury, past medical history, and events leading to the injury. | May obtain data useful for medical, social and legal history, and for epidemiological analysis.

5. Obtain past medical history including prior tetanus immunization and allergies. | Patient is at risk for Tetanus due to contaminated and potentially deep wounds.

6. Inspect for circumferential areas of burn.
   - Assess respiratory effort and chest expansion.
   - Obtain baseline chest x-ray if indicated.
   - Note ABG results.
   - Assess status of distal circulation. | Chest burns may restrict adequate ventilation; neck burns may cause restricted airway; extremities may suffer nerve and muscle impairment.
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<tr>
<td>- Use Doppler if peripheral pulses are not palpable. Absence of pulses</td>
<td>Decrease or absent peripheral pulses indicates decreased tissue perfusion</td>
</tr>
<tr>
<td>indicates a medical emergency: contact Burn Center immediately.</td>
<td>and can result in ischemic changes and possible limb loss.</td>
</tr>
</tbody>
</table>

An escharotomy and/or fasciotomy should only be performed AFTER consultation with the Burn Center Attending Physician.
## H. Treat Burn Wound

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stabilize other injuries (fractures, etc.).</td>
<td></td>
</tr>
<tr>
<td>2. Manage pain, IV pain medication: Morphine sulfate preferred medication unless contraindicated by allergy or past medical history (0.1 mg/kg body weight or equivalent to achieve desired effect). Narcotics should only be given intravenously in small doses and <strong>only</strong> enough to manage pain.</td>
<td><em>Because changes in fluid volume and circulatory changes in burn injury, absorption of pain medication given intramuscularly or subcutaneously may be ineffective and unpredictable (Restlessness may be from hypoxia). Patients respond better to small frequent doses than occasional large ones.</em></td>
</tr>
<tr>
<td>3. Transferring patient to a Burn Center: Initial burn center assessment and care requires extensive wound cleaning.</td>
<td></td>
</tr>
<tr>
<td>Remove any wet dressings and cover patient with clean, <strong>dry</strong> sheet and blankets.</td>
<td><em>Helps maintain body heat.</em></td>
</tr>
<tr>
<td>Gently cleanse wounds with soap and water or saline. Apply topical agents and/or dressing per existing ED protocols.</td>
<td><em>Refer to new chapter on Out-Patient Burn Wound Care.</em></td>
</tr>
<tr>
<td>Contact local Burn Center for Out-Patient follow-up care.</td>
<td></td>
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</tbody>
</table>

## I. Other Treatment Considerations

<table>
<thead>
<tr>
<th>TREATMENT</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Maintain patient NPO.</td>
<td></td>
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<tr>
<td>2. Assess for bowel function</td>
<td></td>
</tr>
<tr>
<td>3. Use orogastric tube as needed for burns over 20%, facial inhalation injury, nausea, vomiting, or expected air transport. Use cotton ties to secure tubes.</td>
<td><em>Prevents gastric distention and vomiting.</em> <em>Provides route for antacid therapy and potential feeding tube.</em></td>
</tr>
<tr>
<td>4. Tetanus prophylaxis.</td>
<td></td>
</tr>
<tr>
<td>TREATMENT</td>
<td>RATIONALE</td>
</tr>
<tr>
<td>-----------</td>
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</tr>
<tr>
<td>5. IV antibiotics for <strong>associated trauma</strong> with contaminated wounds.</td>
<td><em>As per CDC (Centers for Disease Control) protocol.</em></td>
</tr>
<tr>
<td>6. Explanation, information and emotional support to patient and family.</td>
<td></td>
</tr>
</tbody>
</table>
TREATMENT RATIONALE

BURN CENTER TRANSFER CRITERIA:


1. Partial thickness burns (2nd degree burns) greater than 10% total body surface.
2. Full thickness burns (3rd degree burns) in any age group.
3. Burns that involve the face, hands, feet, genitalia, perineum or major joints.
4. Chemical burns.
5. Electrical burns including lightning injury.
6. Inhalation injury.
7. Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality.
8. Patients with concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn center. Physician judgement will be necessary in such situations and should be in concert with any applicable medical control plans and triage protocols.
10. Patients who require special social, emotional, or long-term rehabilitative intervention.
### BURN CENTER TRANSFER GUIDELINES

<table>
<thead>
<tr>
<th>Role of Referring Hospital</th>
<th>Role of Burn Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Burn Center staff member receiving the call will normally accept the patient referred, pending contact with the Burn Center attending physician. Data from the “Burn Foundation Burn Referral Data Sheet” (attached) will be collected at this time. If the Burn Center receiving the call is at capacity, the center will call one or more other Burn Centers to obtain placement and follow-up to confirm that a representative of the receiving facility has made contact with the referring hospital.</td>
<td></td>
</tr>
</tbody>
</table>

### FOR CONSULTATION, ADMISSION TO BURN CENTER, OR OUTPATIENT FOLLOW-UP CARE:

- **Crozer-Chester Medical Center**
  610-447-2800
- **Lehigh Valley Hospital**
  610-402-BURN (1-800-710-BURN)
- **St. Christopher’s Hospital for Children**
  215-427-5323
- **Temple University Hospital**
  215-707-2876

1. **Transportation Arrangement.**

   Transfer of patient will be arranged between the burn center and referring hospital. Patient condition, distance, weather conditions and availability of vehicles and personnel will determine the transport mode. **The Burn Center will confirm ETA and assist with transfer arrangements if needed.**
2. Preparation of Patient for Transfer.

- Complete “Burn Foundation Burn Referral Data Sheet” (Attachment ).

- Prepare record of intake/output. *Accurate intake/output records provide guidelines for determining adequacy of fluid resuscitation measures.*

- Record all medication.

- Maintain full C-spine control. *Document C-spine clearance if appropriate and send supportive radiologic data.*

- Secure all IV sites and ET tubes prior to transport. Avoid tape over facial burns; use cotton ties to secure tubes. *Prevent dislodgement of tubes during transfer*

- Record size and location of all inserted lines and catheters (Foley, IV, NG, ET).

- Copy complete ED chart, along with prehospital record if available, including lab data. Send original x-rays.

3. Preparation of Family for Transfer.

- Provide information and emotional support.

- **Provide directions to Burn Center.**

- Provide Burn Center Informational Guide for Families (Attachment) *If unavailable in ED, contact burn center to fax a copy of Family Guide.*
Guidelines for Early Care and Transfer of Burn Patients

Pre-hospital Care of Patient with Inhalation Injuries
Many of the procedures listed will be provided simultaneously. Initiate in order of priority.

A. Scene Size-up

Includes checking scene safety; determining the mechanism of injury or nature of illness; finding out how many patients are involved; and determining whether you need additional help.

Use universal precautions.

B. Conduct primary surveyor initial assessment.

Establish airway, breathing and circulation (ABC’s). Maintain C-spine immobilization.

1. Perform CPR as needed.


3. Apply 100% oxygen (use humidified oxygen if available) by non-rebreather mask. If possible draw blood for carboxyhemoglobin at scene.

4. Continually monitor the patient’s airway.

   a. Determine from patient’s history if injury occurred in an enclosed space.

   b. Determine from the patient’s history if patient was at anytime unconscious, or shows signs of alcohol/drug intoxication.
### TREATMENT

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>c.</td>
<td>Note amount of facial, neck and chest burn.</td>
</tr>
<tr>
<td></td>
<td><em>Anticipate edema; suspect inhalation injury.</em></td>
</tr>
<tr>
<td>d.</td>
<td>Assess for singed nasal hair, facial hair, eyebrows.</td>
</tr>
<tr>
<td></td>
<td><em>Presence can indicate inhalation injury.</em></td>
</tr>
<tr>
<td>e.</td>
<td>Inspect mouth for soot, erythema, blisters, edema or carbonaceous sputum.</td>
</tr>
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<td><em>Presence can indicate inhalation injury.</em></td>
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<td>f.</td>
<td>Determine presence of hoarseness.</td>
</tr>
<tr>
<td></td>
<td><em>Indicative of laryngeal edema.</em></td>
</tr>
<tr>
<td>g.</td>
<td>Assess for bronchial breath sounds, wheezing, crackles.</td>
</tr>
<tr>
<td></td>
<td><em>Indicates inhalation injury.</em></td>
</tr>
<tr>
<td>h.</td>
<td>Determine presence of stridor. If present <strong>intubate patient immediately</strong>.</td>
</tr>
<tr>
<td></td>
<td><em>Indicates imminent airway occlusion. Burn patients may progress rapidly from mild dyspnea to respiratory arrest.</em></td>
</tr>
<tr>
<td>i.</td>
<td>Document level of consciousness and orientation.</td>
</tr>
<tr>
<td></td>
<td><em>Mental orientation changes may indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.</em></td>
</tr>
<tr>
<td>j.</td>
<td>Assess for circumferential burns of the chest and neck.</td>
</tr>
<tr>
<td></td>
<td><em>Circumferential chest burns may restrict ventilatory movement; neck burns may cause restricted airway.</em></td>
</tr>
<tr>
<td>k.</td>
<td>Apply cardiac monitor and pulse oximetry.</td>
</tr>
<tr>
<td></td>
<td><em>Continuous monitoring of patient’s cardiac rhythm and oxygenation can identify cardiopulmonary complications. Pulse oximetry will not reflect carbon monoxide levels.</em></td>
</tr>
</tbody>
</table>

### 5. Treatment

**Consider intubation for any evidence of inhalation injury, severe facial burns or swelling - especially prior to transport.**
### TREATMENT

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<table>
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<tr>
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<tbody>
<tr>
<td>b.</td>
<td>Suction tracheal-bronchial tree thoroughly.</td>
</tr>
<tr>
<td>c.</td>
<td>Deliver 100% humidified O₂.Titrate O₂, after carboxyhemoglobin (COHgb) equals less than 10%.</td>
</tr>
<tr>
<td>d.</td>
<td>Check for hemorrhage, shock and other injuries, especially head or spinal trauma; treat per existing trauma protocol.</td>
</tr>
<tr>
<td>e.</td>
<td>Maintain C-spine immobilization when indicated.</td>
</tr>
<tr>
<td>f.</td>
<td>Establish IV. Select site and insert large bore peripheral IV. Consider 2 large bore IV sites. If difficulty gaining access, intraosseous (IO) route can be used. Use <strong>Lactated Ringer’s solution</strong>. If Lactated Ringer’s is unavailable contact Medical Command physician.</td>
</tr>
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</table>

### RATIONALE

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>a.</td>
<td><em>To insure patent airway and access to ventilation prior to edema.</em> Decrease possibility of sinusitis. <em>Use succinylcholine cautiously.</em> Succinylcholine may worsen the hyperkalemia associated with severe burns.</td>
</tr>
<tr>
<td>b.</td>
<td><em>Removes soot and prevent atelectasis.</em></td>
</tr>
<tr>
<td>c.</td>
<td><em>Provides adequate oxygenation.</em> Carbon monoxide binds with hemoglobin, robbing the blood of oxygen.</td>
</tr>
<tr>
<td>d.</td>
<td>These are immediate concerns that take priority over the burn wound in the prehospital stage.</td>
</tr>
<tr>
<td>e.</td>
<td><em>C-spine immobilization reduces range of motion of the patient’s head and neck and prevents damage to the cervical spine.</em></td>
</tr>
<tr>
<td>f.</td>
<td><em>For administration of medication and fluids.</em> Well balanced isotonic solution that aids in resuscitation.</td>
</tr>
<tr>
<td>TREATMENT</td>
<td>RATIONALE</td>
</tr>
<tr>
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</tbody>
</table>
| *Pediatric Consideration*  
For infants and small children  
Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid.  
For the first 10 kg of body weight:  
100 ml/kg over 24 hours.  
For the second 10 kg of body weight:  
50 ml/kg over 24 hours.  
For each kg of body weight above 20Kg: 20 ml/kg over 24 hours  
- Consult burn center regarding fluid management. | Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid due to inadequate glycogen stores.  
*Maintenance fluid is not titrated.* |

C. Conduct focused and rapid trauma assessment with secondary survey.

A complete secondary survey should be conducted from head to toe—a detailed physical examination and a focused history.  
*Pre-existing conditions or illnesses can compound the severity of the injury and influence the patient’s care and outcome.*

PHYSICAL EXAMINATION

DCAP—deformities, contusions, abrasions, penetrations, punctures.

BTLS—burns, tenderness, lacerations, swelling.

Pain: OPQRST—onset, provocation, quality, radiation, severity, time.

a. Note vital signs, Glasgow coma scale and trauma score.

b. Assess for accompanying trauma, concurring medical problems, and factors that influence severity.  
*Burn injury with inhalation and/or concomitant trauma poses increases morbidity or mortality.*
TREATMENT

OBTAIN PATIENT HISTORY -
S A M P L E:

S  Signs and Symptoms
A  Allergies (food, medication, latex)
M  Medications
P  Pre-existing medical history (diabetes, hypertension, cardiac or renal disease, etc.) Does patient have advance directives, living will or donor card?
L  Last meal, including liquids
E  Events prior to burn injury:
  * Cause of burn
  * Did the injury occur in an enclosed space?
  * Is there a possibility of smoke inhalation?
  * Were there hazardous chemicals involved?
  * Was patient thrown by an explosion?
  * Did the patient jump or fall from any height?

Pre-existing medical disorders may complicate burn treatment, prolong recovery or affect mortality.

Age of the patient.
Be aware of high risk groups:
under 10 years of age
over 50 years of age

Individuals under the age of 10 and over the age of 50 are considered at greater risk for burn complications.

D. Pain Management

Administer pain medication as per Medical Command physician. Morphine is indicated for pain. (0.1 mg morphine/kg body weight is recommended dosage.) Narcotics should only be given intravenously in small doses and only enough to manage pain. Do not use the intramuscular or subcutaneous route.

Excessive and frequent administration of narcotics leads to compromised respiratory status.

Because fluid volume and circulation changes occur in burn injury, absorption of pain medication given intramuscularly or subcutaneously may be ineffective and unpredictable.

E. Provide emotional support.
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. Transport patient as directed by Medical Command.</td>
<td>Transport patient to the nearest hospital or specialized burn care facility according to Medical Command.</td>
</tr>
<tr>
<td>G. Provide information on disposition of patient to family members.</td>
<td>Provide directions to Burn Center as needed.</td>
</tr>
</tbody>
</table>
Guidelines for Early Care and Transfer of Burn Patients

Emergency Care of the Patient with Inhalation Injuries
**TREATMENT** | **RATIONALE**
---|---
Many of the procedures listed will be provided simultaneously. Initiate in order of priority.

THE BURN PATIENT MAY BE A MULTI-TRAUMA PATIENT AND SHOULD RECEIVE A RAPID BUT FULL EXAMINATION TO RULE OUT OTHER TRAUMA.

A. Provide and maintain an open airway.

1. Airway management

   Respiration is adversely affected by edema, carbon monoxide poisoning, smoke inhalation, circumferential trunk burn.

   Pulmonary injuries may not present clinical symptoms in the early post-burn hours.


   a. Determine from patient’s history if injury occurred in an enclosed space.

   Airway obstruction may occur due to swelling caused by smoke inhalation.

   b. Determine the patient’s history, if the patient was unconscious at any time, or shows signs of alcohol/drug intoxication.

   Mental orientation changes may indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.

   c. Document level of consciousness and orientation.

   Change in level of consciousness may indicate long exposure to smoke and potential for inhalation injury.

   d. Note amount of facial, neck and chest burn.

   Anticipate edema; suspect inhalation injury.
<table>
<thead>
<tr>
<th>TREATMENT</th>
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<tbody>
<tr>
<td>e. Assess for singed nasal hair, facial hair, and eyebrows.</td>
<td>Presence indicates inhalation injury.</td>
</tr>
<tr>
<td>f. Inspect mouth for soot, erythema, edema or carbonaceous sputum.</td>
<td>Presence indicates inhalation injury.</td>
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<tr>
<td>g. Determine presence of hoarseness.</td>
<td>Indicative of laryngeal edema.</td>
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<tr>
<td>h. Assess for bronchial breath sounds, wheezing, crackles.</td>
<td>Indicates inhalation injury.</td>
</tr>
<tr>
<td>i. Determine presence of stridor If present intubate patient immediately.</td>
<td>Indicates imminent airway occlusion.</td>
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<tr>
<td>j. Assess for circumferential burns of the chest and neck.</td>
<td>Circumferential chest burns may restrict adequate ventilation; neck burns may cause restricted airway.</td>
</tr>
<tr>
<td>k. Obtain ABG carboxyhemoglobin (COHgb) levels. Continue pulse oximetry.</td>
<td>For aid in diagnosis of inhalation injury and carbon monoxide poisoning. Pulse oximetry will not reflect carbon monoxide levels.</td>
</tr>
<tr>
<td>l. Consider testing for cyanide poisoning.</td>
<td>Cyanide is a by-product of burning synthetic materials.</td>
</tr>
<tr>
<td>m. Obtain chest x-ray.</td>
<td>Provides baseline for future assessment.</td>
</tr>
</tbody>
</table>

3. Treatment

**CONSIDER INTUBATION FOR ANY EVIDENCE OF INHALATION INJURY, SEVERE FACIAL BURNS OR SWELLING - ESPECIALLY PRIOR TO TRANSPORT TO BURN CENTER.**

a. If patient assessment reveals potential for obstructed airway, have patient intubated.  
   Insures access to ventilation prior to edema. 
   Oral intubation is preferred, unless contraindicated. 
   Decreases possibility of sinusitis.
<table>
<thead>
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<th>TREATMENT</th>
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<tbody>
<tr>
<td>Secure tube to prevent dislodgement. Avoid tape over facial burns; use cotton ties.</td>
<td></td>
</tr>
<tr>
<td><strong>b. Suction tracheal-bronchial tree thoroughly.</strong></td>
<td><strong>Removes soot and prevents atelectasis.</strong></td>
</tr>
<tr>
<td><strong>c. Administer 100% humidified O₂. Titrate O₂ after carboxyhemoglobin (COHgb) equals less than 10%.</strong></td>
<td><strong>Provides adequate oxygenation. Carbon monoxide binds with hemoglobin, robbing the blood of oxygen.</strong></td>
</tr>
<tr>
<td><strong>d. Use mechanical ventilation if needed.</strong></td>
<td><strong>Optimal ventilatory control.</strong></td>
</tr>
<tr>
<td><strong>e. Steroids are contradicted in inhalation injury.</strong></td>
<td><strong>Steroids use may result in immunosuppression and compromise wound healing.</strong></td>
</tr>
<tr>
<td><strong>f. Prophylactic antibiotics are not recommended.</strong></td>
<td></td>
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</tbody>
</table>

**B. Provide CPR if needed**

**C. Circulatory Management**

1. **Assess for hemorrhage.**

   *Concurrent injury from the burn incident may cause external or internal bleeding.*

2. **Fluid management**

   a. **Draw blood for CBC, electrolytes, osmolality, BG, carboxyhemoglobin, ABG.**

      *Establishes baseline and guides treatment.*

   b. **Select site and insert large bore peripheral IV if burn is greater than 10% BSA. If necessary, insert through burned surface. Consider large bore IV sites. If unable to find a suitable peripheral line, insert a central line and obtain a chest x-ray for placement.**

      *Large fluid volumes required to prevent or correct hypovolemic shock.*
### TREATMENT

<table>
<thead>
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<tbody>
<tr>
<td>c. Use Lactated Ringers solution.</td>
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</table>

### Pediatric Considerations

**For Infants and Small Children:**

- Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid.
  - For the first 10 kg of body weight: 100 ml/kg over 24 hours.
  - For the second 10 kg of body weight: 50 ml/kg over 24 hours.
  - For each kg of body weight above 20Kg: 20 ml/kg over 24 hours.
- Consult burn center regarding fluid management
- Check the patient’s glucose level at the bedside

### TREATMENT

<table>
<thead>
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<tbody>
<tr>
<td>d. Calculate fluid requirements for first 24-hours post injury following the Consensus Formula: <strong>2-4 ml x wt in Kg x % of Body Surface Area burned.</strong></td>
</tr>
</tbody>
</table>

Give 1/2 in first 8 hrs. post-burn (i.e. time injury occurred, not time of admission): remainder next 16 hrs.

- e. Insert Foley catheter for local perineal burns and burns requiring resuscitation. Monitor output hourly. | Helps to assess resuscitation efficacy. |

### TREATMENT

3. Assess and monitor the following parameters for adequate fluid resuscitation:

- Vital signs
- Urine output:
  - Maintain hourly output at least 30-50 ml/hr. in adults; 1ml/kg/hr in children. | Hourly urine output is the single most important factor in assessing the patient’s response to fluid resuscitation. |
### TREATMENT

4. Assess urine for myoglobin in deep major burns or electrical burns.
   - Observe for maroon color urine.
   - Send urine sample to laboratory for presence of myoglobin.
   - If myoglobin is positive, treat with: IV Sodium Bicarbonate 1-2 meq/Kg
     Maintain urine output 75-100 ml/hr.

   **RATIONALE**
   - Extensive or deep burns and electrical injuries have a high incidence of myoglobinuria. Higher urine output is necessary to prevent renal tubular necrosis resulting from occlusion of tubules with by-products of RBC and muscle destruction.

   In adults with electrical burn injury, maintain output at 75-100ml urine/hour. In children, maintain output at ≥ 2 ml/kg/hr.

5. Perform neurovascular check.

6. Evaluate for presence of circulatory compromise by checking peripheral pulses with doppler. Absence of pulses indicates a medical emergency, contact Burn Center immediately.

   **RATIONALE**
   - Increased edema will compromise perfusion to extremities.
   - Extremities may suffer vascular compromise and nerve and/or muscle impairment due to increasing edema.
   - An Escharotomy and/or fasciotomy should only be performed AFTER consultation with the Burn Center Attending Physician.

### D. Review for major trauma

1. The burn patient should receive a full examination to assess for trauma.

   **RATIONALE**
   - Head and spinal trauma may be overlooked in burn injuries accompanying falls, motor vehicle crashes (MVC), electrical injury.

2. Treat per existing Advanced Trauma Life Support (ATLS) protocols.

3. Assess and continually re-evaluate level of consciousness.

   **RATIONALE**
   - Loss or decreasing level of consciousness may be caused by other sources such as head injury or related trauma.

### E. Maintain body temperature

1. Use dry clean sheets and blankets to avoid systemic hypothermia.

   **RATIONALE**
   - Prolonged hypothermia causes respiratory acidosis.
<table>
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</thead>
<tbody>
<tr>
<td>2. Monitor body temperature every 30 minutes. Consider using warming devices such as heat lamp, warming blankets, warm fluids, warm humidifier and/or initiate hypothermia protocols if needed.</td>
<td><em>Burn injury decreases the skin’s ability to regulate body temperature.</em></td>
</tr>
</tbody>
</table>
**F. Assess burn injury and complications.**

1. Determine date, time, cause and circumstance of burn injury. 

   *Passage of time and mechanism of injury may influence injury severity and dictate assessment and treatment priorities. Delay of time before initiation of emergency care increases risks of complications.*

2. Estimate BSA percentage of the burn using Rule of Nines. Do not include superficial 1st degree burns in this percentage. 

   The percentage of Body Surface Area (BSA) burned is one of the indicators of severity and is used to determine fluid resuscitation needs.

   The Rule of Nines formula divides the total BSA into 9% or multiples of 9% segments. In the infant or child, the Rule deviates because of the larger surface area of the head and smaller surface area of the legs.

   **Rule of Nines:**

   ![Rule of Nines Diagram]

   3. Classify burns according to depth. 

   *Depth of burn is a factor in the decision to refer a patient to a specialized burn care facility.*
**TREATMENT** | **RATIONALE**
---|---
**DEPTH CATEGORIES:**

**Characteristics:**

- **Superficial / 1st Degree:**
  - red, swelling, tender, blanches w/pressure, painful, **Do not include in BSA% estimate.**
  
  **Epidermis injured but intact.**

- **Partial Thickness / 2nd Degree:**
  - red blisters, weeping, blanches w/pressure, painful
  
  **All epidermis and varying degrees of dermis are destroyed.**

- **Full Thickness / 3rd Degree:**
  - dry, red, white, black or brown; does not blanch w/pressure; inelastic; hair pulls out easily; diminished pain sensation; leather-like appearance.
  
  **Epidermis and dermis are destroyed.**
  
  Extends into subcutaneous layers or even deeper into muscles, bones and internal organs.

4. Obtain summary of prehospital treatment, including time of burn injury, past medical history, and events leading to the injury.

   **May obtain data useful for medical, social and legal history, and for epidemiological analysis.**

5. Obtain past medical history including prior tetanus immunization and allergies.

   **Patient is at risk for Tetanus due to contaminated and potentially deep wounds.**

6. Inspect for circumferential areas of burn.

   - Assess respiratory effort and chest expansion.
   
   **Chest burns may restrict adequate ventilation; neck burns may cause restricted airway; extremities may suffer nerve and muscle impairment.**

   - Obtain baseline chest x-ray if indicated.

   - Note ABG results.

   - Assess status of distal circulation.

   - Use Doppler if peripheral pulses are not palpable. Absence of pulses indicates a medical emergency: contact Burn Center immediately.

   **Decreased or absent peripheral pulses indicate decreased profusion that can result in ischemic changes and possible limb loss.**

   **An Escharotomy and/or fasciotomy should only be performed AFTER consultation with the Burn Center Attending Physician.**
### G. Treat Burn Wound

1. Stabilize other injuries (fractures, etc.).

2. Manage pain, IV pain medication: Morphine sulfate preferred medication unless contraindicated by allergy or past medical history (0.1 mg/kg body weight or equivalent to achieve desired effect). Narcotics should only be given intravenously in small doses and only enough to manage pain. 

   *Because fluid volume and circulatory changes occur in burn injury, absorption of pain medication given intra-muscularly or subcutaneously may be ineffective and unpredictable. Patients respond better to small frequent doses than occasional large ones.*

3. Transferring Patient to a Burn Center:

   - Extensive cleansing of burn wounds is not necessary. *DO NOT* apply any topical agents.
   
   - Initial burn center assessment and care requires extensive wound cleaning.

   - Remove any wet dressings and cover patient with clean, *dry* sheet and blankets.

   *Helps maintain body heat.*

4. Treatment of minor burns:

   - Gently cleanse wounds with soap and water or saline. Apply topical agents and/or dressing per existing ED protocols.

   *Minimizes infection.*

### H. Other Treatment Considerations

1. Maintain patient NPO.

2. Assess for bowel function

3. Use orogastric tube as needed for burns over 20%, facial or inhalation injury, nausea, vomiting, or expected air transport. Use cotton ties to secure tubes.

   *Provides gastric distention and vomiting.*

   *Provides route for antacid therapy and potential feeding tube.*

4. Tetanus prophylaxis.

5. IV antibiotics for **associated trauma** with contaminated wounds.

   *As per CDC (Centers for Disease Control) protocol.*
6. Explanation, information and emotional support to patient and family.

**BURN CENTER TRANSFER CRITERIA:**


1. Partial thickness burns (2\textsuperscript{nd} degree burns) greater than 10\% total body surface.

2. Full thickness burns (3\textsuperscript{rd} degree burns) in any age group.

3. Burns that involve the face, hands, feet, genitalia, perineum or major joints.

4. Chemical burns.

5. Electrical burns including lightning injury.

6. Inhalation injury.

7. Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality.

8. Patients with concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn center. Physician judgement will be necessary in such situations and should be in concert with any applicable medical control plans and triage protocols.


10. Patients who require special social, emotional, or long-term rehabilitative intervention.
**Role of Referring Hospital**

The Burn Center staff member receiving the call will normally accept the patient referred, pending contact with the Burn Center attending physician. Data from the “Burn Foundation Burn Referral Data Sheet” (attached) will be collected at this time. If the Burn Center receiving the call is at capacity, the center will call one or more other Burn Centers to obtain placement and follow-up to confirm that a representative of the receiving facility has made contact with the referring hospital.

---

**Role of Burn Center**

For consultation, admission to Burn Center, or outpatient follow-up care:

- **Crozer-Chester Medical Center**
  610-447-2800

- **Lehigh Valley Hospital**
  610-402-BURN (1-800-710-BURN)

- **St. Christopher’s Hospital for Children**
  215-427-5323

- **Temple University Hospital**
  215-707-2876

1. Transportation Arrangement.

   Transfer of patient will be arranged between the burn center and referring hospital. Patient condition, distance, weather conditions and availability of vehicles and personnel will determine the transport mode.

   The Burn Center will confirm ETA and assist with transfer arrangements if needed.
2. Preparation of Patient for Transfer.

- Complete “Burn Foundation Burn Referral Data Sheet” (Attachment).
- Prepare record of intake/output. Accurate intake/output records provide guidelines for determining adequacy of fluid resuscitation measures.
- Record all medication.
- Maintain full C-spine control. Document C-spine clearance if appropriate and send supportive radiologic data.
- Secure all IV sites and ET tubes prior to transport. Avoid tape over facial burns; use cotton ties to secure tubes. Prevent dislodgement of tubes during transfer.
- Record size and location of all inserted lines and catheters (Foley, IV, NG, ET).
- Copy complete ED chart, along with prehospital record if available, including lab data. Send original x-rays.

3. Preparation of Family for Transfer.

- Provide information and emotional support.
- **Provide directions to Burn Center.**
  - Provide Burn Center Informational Guide for Families (Attachment). If unavailable in ED, contact burn center to fax a copy of Family Guide.
PRE-HOSPITAL GUIDELINES
ELECTRICAL BURNS

TREATMENT RATIONALE

Many of the procedures listed will be provided simultaneously. Initiate in order of priority.

A. Scene Size-up

Includes checking scene safety; determining the mechanism of injury or nature of illness; finding out how many patients are involved; and determining whether you need additional help.

Use universal precautions.

B. Stop the burning process

ELECTRICAL BURNS

1. Contact officials to turn off current.  
   Rescuer must protect self. Scene must be safe and secure.

When scene is safe and secure:

1. Establish airway, breathing and circulation (ABC’s). Initiate CPR if necessary.  
   Cardiac arrest may occur as a result of interference with the normal electrical activity of the heart. Severe muscle contraction can cause respiratory arrest, tetanic movement, spinal cord injury or spinal injury.

2. Maintain C-spine control and immobilization at all times. Assess for loss of consciousness (LOC).  
   True or direct electrical injuries can produce severe muscle contractions. Severe muscle contraction can cause spinal injury. Falls and other injury can occur from the force of electrical energy and/or loss of consciousness (LOC).

3. Provide continuous ECG monitoring for dysrhythmias, abnormal cardiac rate, or irregular rhythm.  
   Electrical injury can cause cardiac, muscle and vessel necrosis.
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
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</thead>
<tbody>
<tr>
<td>4. Note type of current.</td>
<td>There are two types of electrical injury; <strong>true, or arc</strong>, and <strong>flame/flash</strong> burns resulting from an electrical source. Low voltage injuries (&lt;1,000 volts) mimic thermal injuries. High voltage injury (&gt;1,000 volts) consists of varying degrees of cutaneous burns combined with hidden destruction of deep tissue.</td>
</tr>
<tr>
<td>5. Examine for entry and exit wounds; cover wounds with a dry dressing. Treat patient as a critical burn/trauma.</td>
<td>Extent of injury depends on type of current, path of current, tissue resistance, and duration of contact. Electrical burns may be combined with thermal burns when clothing catches fire.</td>
</tr>
<tr>
<td>6. History of the event will help determine pathway of destruction.</td>
<td></td>
</tr>
<tr>
<td>7. Obtain detailed sequence of the electrical event from patient, family, bystanders or rescuers.</td>
<td></td>
</tr>
</tbody>
</table>

**C. Conduct primary survey or initial assessment**

- **Establish airway, breathing and circulation (ABC’s). Maintain C-spine immobilization.**
  
  1. Perform CPR as needed.  
  2. Assess for respiratory comprise.  
  3. Apply 100% oxygen (use humidified oxygen if available) by non-rebreather mask.  
  4. Continually monitor the patient’s airway.  
    a. Determine from patient’s history if injury occurred in an enclosed space.  

  C-spine immobilization reduces range of motion of the patient’s head and neck and prevents damage to the cervical spine.  

  Electrical trauma to tissues can cause edema and interfere with respiratory function.  

  An open airway could become an obstructed airway because of swelling caused by chemical inhalation.
### TREATMENT

<table>
<thead>
<tr>
<th><strong>TREATMENT</strong></th>
<th><strong>RATIONALE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Determine from the patient’s history if patient was at anytime unconscious, or shows signs of alcohol/drug intoxication.</td>
<td>Indicates long exposure to smoke and potential for inhalation injury.</td>
</tr>
<tr>
<td>c. Note amount of facial, neck and chest burn.</td>
<td>Anticipate edema; suspect inhalation injury.</td>
</tr>
<tr>
<td>d. Assess for singed nasal hair, facial hair, eyebrows.</td>
<td>Presence can indicate inhalation injury.</td>
</tr>
<tr>
<td>e. Inspect mouth for soot, erythema, blisters, edema or carbonaceous sputum.</td>
<td>Presence can indicate inhalation injury.</td>
</tr>
<tr>
<td>f. Determine presence of hoarseness.</td>
<td>Indicative of laryngeal edema.</td>
</tr>
<tr>
<td>g. Assess for bronchial breath sounds, wheezing, crackles.</td>
<td>Indicates inhalation injury.</td>
</tr>
<tr>
<td>h. Determine presence of stridor. <strong>If present intubate patient immediately.</strong></td>
<td>Indicates imminent airway occlusion. Burn patients may progress rapidly from mild dyspnea to respiratory arrest.</td>
</tr>
<tr>
<td>i. Document level of consciousness and orientation.</td>
<td>Mental orientation changes may indicate anoxia or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.</td>
</tr>
<tr>
<td>j. Assess for circumferential burns of the chest and neck.</td>
<td>Circumferential chest burns may restrict ventilatory movement; neck burns may cause restricted airway.</td>
</tr>
<tr>
<td>k. Apply cardiac monitor and pulse oximetry.</td>
<td>Electrical current may cause dysrhythmia. Continuous monitoring identifies cardiopulmonary complications.</td>
</tr>
</tbody>
</table>

5. Treatment  
**Consider intubation for any evidence of inhalation injury, severe facial burns or swelling – especially prior to transport.**
<table>
<thead>
<tr>
<th>TREATMENT</th>
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</tr>
</thead>
<tbody>
<tr>
<td>a. If patient assessment reveals potential for obstructed airway intubate patient. Oral intubation preferred unless contraindicated. Consider using Rapid Sequence Intubation (RSI) techniques and pharmacological adjuncts.</td>
<td>To insure patent airway and access to ventilation prior to edema. Decreases possibility of sinusitis. Use succinylcholine cautiously. Succinylcholine may worsen hyperkalemia associated with severe burns.</td>
</tr>
<tr>
<td>b. Suction tracheal-bronchial tree thoroughly.</td>
<td>Removes soot and prevents atelectasis.</td>
</tr>
<tr>
<td>c. Deliver humidified O₂ (40-100%). Consider pre-existing medical history, i.e. COPD, asthma.</td>
<td>Improves oxygenation.</td>
</tr>
<tr>
<td>d. Check for hemorrhage, shock and other injuries, especially head or spinal trauma; treat per existing trauma protocol.</td>
<td>These are immediate concerns that take priority over the burn wound in the pre-hospital stage.</td>
</tr>
<tr>
<td>e. Maintain C-spine immobilization when indicated.</td>
<td>C-spine immobilization reduces range of motion of the patient’s head and neck and prevents damage to cervical spine.</td>
</tr>
<tr>
<td>f. Establish IV. Select site and insert large bore peripheral. Consider 2 large bore IV sites. If difficulty gaining access, intra-osseous (IO) route can be used. Use Lactated Ringer’s solution. If Lactated Ringer’s is unavailable contact Medical Command physician.</td>
<td>For administration of medication and fluids. Well balanced isotonic solution that aids in resuscitation.</td>
</tr>
</tbody>
</table>
### TREATMENT

**Pediatric Consideration**

For infants and small children

Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid.

**For the first 10 kg of body weight:**

100 ml/kg over 24 hours.

**For the second 10 kg of body weight:**

50 ml/kg over 24 hours.

**For each kg of body weight above 20Kg:**

20 ml/kg over 24 hours.

- Consult burn center regarding fluid management.

### RATIONALE

Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid due to inadequate glycogen stores.

**Maintenance fluid is not titrated.**

### D. Conduct focused and rapid trauma assessment with secondary survey.

A complete secondary survey should be conducted from head to toe — a detailed physical examination and a focused history.

**PRE-EXISTING CONDITIONS OR ILLNESSES CAN COMPOUND THE SEVERITY OF THE INJURY AND INFLUENCE THE PATIENT’S CARE AND OUTCOME.**

### PHYSICAL EXAMINATION

**DCAP** – deformities, contusions, abrasions, penetrations, punctures.

**BTLS** – burns, tenderness, lacerations, swelling.

**Pain:** OPQRST – onset, provocation, quality, radiation, severity, time.

- Note vital signs, Glasgow coma and trauma scores.

- Assess burn injury, the presence of concurring medical problems, other accompanying trauma and factors that influence severity.

**PRE-EXISTING CONDITIONS OR ILLNESS CAN COMPOUND THE SEVERITY OF THE INJURY AND INFLUENCE THE PATIENT’S CARE AND OUTCOME.**
Guidelines for Early Care and Transfer of Burn Patients
Pre-hospital Care of the Patient with Electrical Burns

TREATMENT

The severity of a burn injury is determined primarily by the extent of the body surface area involved and, to a lesser extent, by the depth of the burn. However, other factors must be considered such as age, the presence of concurrent medical problems, and complications that accompany certain types of body burns such as those of the face, hands, feet and genitalia.

(1) Estimate percentage of Body Surface Area (BSA) burned. Do not include superficial/1st degree burns in this percentage.

Palmar Method: The size of the patient’s palm is equal to 0.5%-1%. Use Palmer Method for small burns.

Rule of Nines: The Rule of Nines formula divides the total BSA into 9% or multiples of 9% segments. In the infant or child, the Rule deviates because of the larger surface area of the child’s head:

Rule of Nines:

The greater surface area of a child’s head in relationship to the total body size influences the BSA estimation and calculation of the percentage of BSA of burn injury.

RATIONAL

Estimate percentage of Body Surface Area (BSA) burned. Do not include superficial/1st degree burns in this percentage.

Palmar Method:

Patient’s palm = 0.5%-1% BSA

Rule of Nines:

The greater surface area of a child’s head in relationship to the total body size influences the BSA estimation and calculation of the percentage of BSA of burn injury.
### TREATMENT

| (2) Classify burns according to depth. | Depth of burn is a factor in the decision to refer a patient to a specialized burn care facility. |

### DEPTH CATEGORIES:

**Characteristics:**

- **Superficial / 1st Degree:**  
  red, swelling, tender, blanches w/ pressure, painful. *Do not include in BSA% estimate.*  
  Epidermis injured but intact.

- **Partial Thickness / 2nd Degree:**  
  red, blisters, weeping, blanches w/ pressure, painful.  
  All epidermis and varying degrees of dermis are destroyed.

- **Full Thickness / 3rd Degree:**  
  dry, red, white, black or brown; does not blanch w/pressure; inelastic; hair pulls out easily; diminished pain sensation; leather-like appearance.  
  Epidermis and dermis are destroyed. Extends into sub-cutaneous layers or even deeper into muscles, bones, and internal organs.

| (3) Assess the location of the burn injury. | 2nd and 3rd degree burns involving the face, hands, feet, genitalia, perineum and major joints can be a threat to function or result in cosmetic impairment. American Burn Association recommends burn center care. |

**Special Care Areas:** face, hands, feet, major joints, genitalia, perineum. Refer to Burn Center.

| (4) Inspect for circumferential areas of burn. | Extremities may suffer nerve and/or muscle impairment from compartment syndrome. |

| (5) Assess respiratory effort and chest expansion, status of distal circulation. | Burns around chest may restrict respiratory movement due to increasing edema. |

| (6) Burns caused by the following mechanisms: chemical, electrical or inhalation injury need Burn Center care. | Chemical and electrical burns are considered occult injuries because the extent of the damage may extend far beyond what is visible on the surface. |

| (7) Assess for accompanying trauma. | Burn injury with inhalation and/or concomitant trauma poses greatest risk of morbidity or mortality. |
### Guidelines for Early Care and Transfer of Burn Patients
#### Pre-hospital Care of the Patient with Electrical Burns

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
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<tbody>
<tr>
<td><strong>OBTAIN PATIENT HISTORY -</strong></td>
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<tr>
<td><strong>S A M P L E:</strong></td>
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<tr>
<td><strong>S</strong></td>
<td>Signs and symptoms</td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Allergies (food, medication, latex)</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>Medications</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>Past/present health/medical history:</td>
</tr>
<tr>
<td></td>
<td>pre-existing illnesses (diabetes, hypertension, cardiac or renal disease, etc.) Does patient have advance directives, living will or donor card?</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Last meal, including liquids</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Events prior to burn injury:</td>
</tr>
<tr>
<td></td>
<td>* Cause of burn</td>
</tr>
<tr>
<td></td>
<td>* Did the injury occur in a closed space?</td>
</tr>
<tr>
<td></td>
<td>* Is there a possibility of smoke inhalation?</td>
</tr>
<tr>
<td></td>
<td>* Were there hazardous chemicals involved?</td>
</tr>
<tr>
<td></td>
<td>* Was patient thrown by an explosion?</td>
</tr>
<tr>
<td></td>
<td>* Did the patient jump or fall from any height?</td>
</tr>
<tr>
<td><strong>Age of the patient.</strong></td>
<td></td>
</tr>
<tr>
<td>Be aware of high risk groups:</td>
<td></td>
</tr>
<tr>
<td>Under 10 years of age</td>
<td></td>
</tr>
<tr>
<td>Over 50 years of age</td>
<td></td>
</tr>
</tbody>
</table>

**E. Pain Management**

Administer pain medication as per Medical Command physician. Morphine is indicated for pain. (0.1 mg morphine/kg body weight is recommended dosage.) Narcotics should **only** be given **intravenously** in small doses and only enough to control pain. Do not use the intramuscular or subcutaneous route. **Pre-existing medical disorders may complicate burn treatment, prolong recovery or affect mortality.**

**Individuals under the age of 10 and over the age of 50 are considered at greater risk for burn complications. Therefore, smaller percentages of BSA burns to someone in these age groups may be considered a major or critical injury.**

Excessive and frequent administration of narcotics leads to compromised respiratory status. **Because fluid volume and circulation changes occur in burn injury, absorption of pain medication given intramuscularly or subcutaneously may be ineffective and unpredictable.**
<table>
<thead>
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<tbody>
<tr>
<td>F. Provide emotional support.</td>
<td></td>
</tr>
<tr>
<td>G. Transport patient as directed by Medical Command.</td>
<td><em>Transport patient to the nearest hospital or specialized burn care facility according to Medical Command.</em></td>
</tr>
<tr>
<td>H. Provide information on disposition of patient to family members.</td>
<td><em>Provide directions to Burn Center as needed.</em></td>
</tr>
</tbody>
</table>
Guidelines for Early Care and Transfer of Burn Patients

Emergency Care of the Patient with Electrical Burns
EMERGENCY DEPARTMENT GUIDELINES
ELECTRICAL BURNS

TREATMENT  RATIONALE

Many of the procedures listed will be provided simultaneously. Initiate in order of priority.

All electrical and chemical burns regardless of the percentage of body surface areas involved, meet the American Burn Association’s criteria for burn center admission.

**Electrical burns are occult injuries.** Electrical injuries caused by direct contact and passage of current through the tissue results in extensive areas of coagulated necrosis. The external skin is most often charred and often exploded apart with a surrounding area of whitish-gray skin. Surrounding this entrance wound will be a variable extent of damage to muscle, nerve, bone, and vessels, often hidden under normal skin; the exit site shows a similar pattern. It is the hidden damage under normal skin, lying between the entrance and exit sites, that pose the greatest threat to the patient’s life.1


**THE BURN PATIENT MAY BE A MULTI-TRAUMA PATIENT AND SHOULD RECEIVE A RAPID BUT FULL EXAMINATION TO RULE OUT OTHER TRAUMA.**

**A. Stop the burning process.**

Remove all clothing and jewelry, including all rings, earrings, bracelets and piercings. Assure that this has occurred in the prehospital stage.  

Metal retains heat and may extend the burn.  
Rings may restrict circulation when swelling occurs.

Cool the burn with room temperature water or saline for a few minutes. Do not use cold water or ice. Implementation in ED dependent upon treatment at scene, length of transport, and burn type. Cover with clean dry sheet and blankets. 

Stops burning process and prevents progression of burn. Over-cooling may aggravate shock state and may cause hypothermia and acidosis

Measure body temperature on arrival and every 30 minutes thereafter. 

Regulation of body temperature is diminished or destroyed as a result of burn injury.

Keep patient covered during exam.  

To prevent hypothermia.
TREATMENT | RATIONALE
---|---
B. Provide and maintain an open airway with C spine control and adequate oxygen.

1. Airway management  
   - Prophylactic intubation may be indicated to prevent airway obstruction.  
   - Respiration is adversely affected by edema, carbon monoxide poisoning, smoke inhalation, circumferential trunk burn.  
   - Pulmonary injuries may not present clinical symptoms in the early post-burn hours.  
   - Airway obstruction may occur due to swelling caused by smoke inhalation.

   a. Determine from patient’s history if injury occurred in an enclosed space.  
   - Airway obstruction may occur due to swelling caused by smoke inhalation.
   b. Determine the patient’s history, if the patient was unconscious at any time, or shows signs of alcohol/drug intoxication.  
   - Mental orientation change may indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma. Fine motor coordination may be impaired.
   c. Document level of consciousness and orientation.  
   - Change in level of consciousness may indicate long exposure to smoke and potential for inhalation injury.
   d. Note amount of facial, neck and chest burn.  
   - Anticipate edema; suspect inhalation injury.
   e. Assess for singed nasal hair, facial hair, and eyebrows.  
   - Presence indicates inhalation injury.
   f. Inspect mouth for soot, erythema, edema or carbonaceous sputum.  
   - Presence indicates inhalation injury.
   g. Determine presence of hoarseness.  
   - Indicative of laryngeal edema.
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<tr>
<td>h. Assess for bronchial breath sounds, wheezing, crackles.</td>
<td>Indicates inhalation injury.</td>
</tr>
<tr>
<td>i. Determine presence of stridor. If present intubate patient immediately.</td>
<td>Indicates imminent airway occlusion.</td>
</tr>
<tr>
<td>j. Assess for circumferential burns of the chest and neck.</td>
<td>Circumferential chest burns may restrict adequate ventilation; neck burns may cause restricted airway.</td>
</tr>
<tr>
<td>k. Obtain ABG and carboxyhemoglobin (CO Hgb) levels. Continue pulse oximetry.</td>
<td>For aid in diagnosis of inhalation injury and carbon monoxide poisoning.</td>
</tr>
<tr>
<td>l. Consider testing for cyanide poisoning.</td>
<td>Cyanide is a by-product of burning synthetic materials.</td>
</tr>
<tr>
<td>m. Obtain chest X-ray.</td>
<td>Provides baseline for future assessment.</td>
</tr>
<tr>
<td>3. Treatment.</td>
<td></td>
</tr>
</tbody>
</table>

CONSIDER INTUBATION FOR ANY EVIDENCE OF INHALATION INJURY, SEVERE FACIAL BURNS OR SWELLING - ESPECIALLY PRIOR TO TRANSPORT TO BURN CENTER.

- a. If patient assessment reveals potential for obstructed airway, have patient intubated. Insures access to ventilation prior to formation of edema.

  Oral intubation is preferred, unless contraindicated. Decreases possibility of sinusitis.

  Secure tube to prevent dislodgement. Avoid tape over facial burns.

- b. Suction tracheal-bronchial tree thoroughly. Removes soot and prevents atelectasis.
### Guidelines for Early Care and Transfer of Burn Patients

**Emergency Care of the Patient with Electrical Burns**

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<tbody>
<tr>
<td>c. Administer 100% humidified O₂. Titrate O₂ after carboxyhemoglobin (COHgb) equals less than 10%.</td>
<td>Provides adequate oxygenation. Carbon monoxide binds hemoglobin robbing the blood of oxygen.</td>
</tr>
<tr>
<td>d. Use mechanical ventilation if needed.</td>
<td>Optimal ventilatory control.</td>
</tr>
<tr>
<td>e. Steroids are contraindicated in inhalation injury.</td>
<td>Steroid use may result in immunosuppression and compromise wound healing.</td>
</tr>
<tr>
<td>f. Prophylactic antibiotics are not recommended.</td>
<td></td>
</tr>
</tbody>
</table>

### C. Circulatory Management

1. Provide CPR as needed.

2. Assess for hemorrhage. **Concurrent injury from the burn incident may cause external or internal bleeding.**

3. Continuous ECG monitoring for arrhythmias, CPR, abnormal cardiac rate or irregular rhythm. **Current may cause cardiac or respiratory arrest.**

4. Fluid management

   a. Draw blood for CBC, electrolytes, osmolality, BG, carboxyhemoglobin, AGC, PT/PTT, and cardiac enzymes. **Establishes baseline values and guides treatment.**

   b. Select site and insert large bore peripheral IV if burn under 10% BSA. If necessary, insert through burned surface and secure with suture. Consider 2 large bore IV sites. Suture prior to transfer. If unable to find a suitable peripheral line, insert a central line and obtain a chest x-ray for placement. **Large volumes required to prevent or correct hypovolemic shock.**

   c. Use Lactated Ringers solution except in pediatric patients less than one year old. **Well balanced isotonic solution that aids in resuscitation.**
### TREATMENT

<table>
<thead>
<tr>
<th><strong>Pediatric Considerations</strong></th>
<th><strong>RATIONALE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For Children less than 1 year old</strong></td>
<td><strong>Use D5LR or fluid prescribed by regional protocols for pediatric patient under 1 year of age due to inadequate glycogen stores.</strong></td>
</tr>
<tr>
<td>• Use D5LR</td>
<td></td>
</tr>
<tr>
<td>• Consult burn center regarding fluid management.</td>
<td></td>
</tr>
<tr>
<td>• Check the patient’s glucose level at the bedside.</td>
<td></td>
</tr>
</tbody>
</table>

**d. Calculate fluid requirements for first 24-hours post injury following the Consensus Formula:**

\[
2-4 \text{ ml x wt. in Kg x } \% \text{ of Body Surface Area burned.}
\]

Replace circulatory volume as fluid shifts from intravascular compartment to interstitial space.

Give ½ in first 8 hrs. post-burn (i.e. time injury occurred, not time of admission); remainder next 16 hrs.

**e. Insert Foley catheter for local perineal burns and burns requiring resuscitation.** Monitor output hourly.  

**Helps to assess resuscitation efficacy.**

**5. Obtain 12 or 18 lead EKG.**

**6. Assess and monitor the following parameters for adequate fluid resuscitation:**

- Vital Signs
- Cardiac Monitor
- Urine output:
  - Maintain hourly output at least 30-50 cc/hr. in adults, 1-2cc/kg./hr in children.

**Hourly urine output is the most important factor in assessing the patient’s response to fluid resuscitation.**

**7. Assess urine for myoglobin in electrical burns and deep major burns:**

- Observe for maroon color urine.
- Send urine sample to laboratory for presence of myoglobin.
- If myoglobin is positive, treat with:
  - IV sodium bicarbonate 1-2 meq/Kg

**Higher urine output is necessary in patients with myoglobinuria, to prevent renal tubular necrosis resulting from occlusion of tubules with by-products of RBC and muscle destruction.**
### TREATMENT

<table>
<thead>
<tr>
<th></th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>In adults with deep burns or electrical burn injury, maintain output at 75-100cc urine/hour. In children, maintain output at ≥ 4cc/Kg/hr.</td>
<td>Extensive or deep burns and electrical injuries have a high incidence of myoglobinuria.</td>
</tr>
</tbody>
</table>

8. Perform neurovascular check. | 
Increased edema will compromise perfusion to extremities. |

9. Evaluate for presence of circulatory compromise by checking peripheral pulses with Doppler. Absence of pulses indicates a medical emergency: contact Burn Center immediately. | Decreased or absent peripheral pulses indicates decreased profusion that results in ischemic changes and possible limb loss. |

### D. Review for major trauma.

1. The patient with an electrical burn should receive a full examination to assess for trauma. | Head and spinal trauma may be overlooked in burn injuries accompanying falls, motor vehicle crashes (MVC), electrical injury. |

2. Treat per existing Advanced Trauma Life Support (ATLS) protocols. |  |

3. Immobilize cervical spine and log-roll patient until spine is cleared with x-rays or CT scan. | Avoids further injury to spine. |

### E. Maintain body temperature.

1. Use dry clean sheets and blankets to avoid systemic hypothermia. | Prolonged hypothermia causes respiratory acidosis. |

2. Monitor body temperature every 30 minutes. Consider using warming devices such as heat lamp, warming blankets, warm fluids, warm humidifier and/or initiate hypothermia protocols if indicated. | Burn injury decreases the skin’s ability to regulate body temperature. |
F. Assess burn injury and complications

1. Determine date, time, agent and circumstance of burn.

   Passage of time and mechanism of injury may influence injury severity and dictate assessment and treatment priorities. Delay of time before initiation of emergency care increases risks of complications.

2. Check for entrance and exit wounds.

3. Estimate BSA using Rule of Nines. **Do not include superficial/1st Degree Burns in this percentage.**

   The percentage of Body Surface Area (BSA) burned is one of the indicators of severity and used to determine fluid resuscitation needs.

   The Rule of Nines divides the total BSA into 9% or multiples of 9% segments. In the infant or child, the Rule deviates because of the larger surface area of the child’s head:

   [Image of Rule of Nines chart]

4. Classify burns according to depth.

   Depth of burn is a factor in the decision whether to refer a patient to specialized burn care facility.
DEPTH CATEGORIES:
Characteristics:

- **Superficial / 1st Degree:**
  red, swelling, tender, blanches w/ pressure, painful. **Do not include in BSA% estimate.**

- **Partial Thickness / 2nd Degree:**
  red, blisters, weeping, blanches w/pressure, painful.

- **Full Thickness / 3rd Degree:**
  dry, red, white, black or brown; does not blanch w/pressure; inelastic; hair pulls out easily; diminished pain sensation; leather-like appearance.

4. Obtain summary of prehospital treatment, including time of burn injury, past medical history, and events leading to the injury. **May contain data useful for medical, social and legal history, and for epidemiological analysis.**

5. Obtain past medical history including prior tetanus immunization and allergies. **Patient is at risk for Tetanus due to contaminated and potentially deep wounds.**

6. Inspect for circumferential areas of burn. **Chest burns may restrict adequate ventilation; neck burns may cause restricted airway; extremities may suffer nerve and muscle impairment.**
   - Assess respiratory effort and chest expansion.
   - Obtain baseline chest x-ray if indicated.
   - Note ABG results.
   - Assess status of distal circulation.
   - Use Doppler if peripheral pulses are not palpable. Absence of pulses indicates a **medical emergency**, contact burn center immediately. **Decreased or absent peripheral pulses indicate decreased tissue perfusion and can result in ischemic changes and possible limb loss.**
### G. Treat Burn Wound

1. Stabilize other injuries (fractures, etc.).

2. Relieve pain, IV pain medication:
   - Morphine sulfate preferred medication unless contraindicated by allergy or past medical history (0.1 mg/kg body weight or equivalent to achieve desired effect).
   - Narcotics should only be given intravenously in small doses and only enough to control pain.
   - **Rationale: Because of changes in fluid volume and circulation, absorption of pain medication given intramuscularly or subcutaneously may be ineffective and unpredictable.**

3. **Transferring Patient to a Burn Center**
   - Extensive cleansing of burn wounds not necessary. **DO NOT** apply any topical agents.
   - Remove any wet dressings and cover patient with clean, dry sheet and blankets.
   - **Rationale:** Helps maintains body heat

4. Treatment of minor burns:
   - Gently cleanse wounds with soap and water or saline. Apply topical agents and/or dressing per existing ED protocols.
   - **Rationale:** Minimizes infection.

### H. Other Treatment Considerations

1. Maintain patient NPO.

2. Assess for bowel function.

3. Use oralgastric tube as needed for burns over 20% BSA, facial or inhalation injury, nausea, vomiting, or expected air transport. Avoid tape over facial burns. Use cotton ties to secure tubes.
   - **Rationale:** Prevents gastric distention and vomiting. Provides route for antacid therapy and potential feeding tube.

4. Tetanus prophylaxis.

5. IV antibiotics for **associated trauma** with contaminated wounds.
   - **Rationale:** As per CDC (Centers for Disease Control) protocol.
TREATMENT

6. Explanation, information and emotional support to patient and family.

RATIONALE

BURN CENTER TRANSFER CRITERIA:


1. Partial thickness burns (2\textsuperscript{nd} degree burns) greater than 10\% total body surface.

2. Full thickness burns (3\textsuperscript{rd} degree burns) in any age group.

3. Burns that involve the face, hands, feet, genitalia, perineum or major joints.

4. Chemical burns.

5. Electrical burns including lightning injury.

6. Inhalation injury.

7. Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality.

8. Patients with concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn center. Physician judgement will be necessary in such situations and should be in concert with any applicable medical control plans and triage protocols.


10. Patients who require special social, emotional, or long-term rehabilitative intervention.
BURN CENTER TRANSFER GUIDELINES

Role of Referring Hospital

FOR CONSULTATION, ADMISSION TO BURN CENTER, OR OUTPATIENT FOLLOW-UP CARE:

The Burn Center staff member receiving the call will normally accept the patient referred, pending contact with the Burn Center attending physician. Data from the “Burn Foundation Burn Referral Data Sheet” (attached) will be collected at this time. If the Burn Center receiving the call is at capacity, the center will call one or more other Burn Centers to obtain placement and follow-up to confirm that a representative of the receiving facility has made contact with the referring hospital.

1. Transportation Arrangement.

Transfer of patient will be arranged between the burn center and referring hospital. Patient condition, distance, weather conditions and availability of vehicles and personnel will determine the transport mode.
2. Preparation of Patient for Transfer. The Burn Center will confirm ETA and assist with transfer arrangements if needed.

- Complete “Burn Foundation Burn Referral Data Sheet” (Attachment ).
- Prepare record of intake/output.
- Record all medication. Accurate intake/output records provide guidelines for determining adequacy of fluid resuscitation measures.
- Maintain full C-spine control.
- Secure all IV sites and ET tubes prior to transport. Avoid tape over facial burns; use cotton ties to secure tubes.
- Record size and location of all inserted lines and catheters (Foley, IV, NG, ET).
- Record size and location of all inserted lines and catheters (Foley, IV, NG, ET).
- Copy complete ED chart, along with prehospital record if available, including lab data. Send original x-rays.

3. Preparation of Family for Transfer. If unavailable in ED, contact burn center to fax a copy of Family Guide.

- Provide information and emotional support.
- **Provide directions to Burn Center.**
- Provide Burn Center Informational Guide for Families (Attachment).
Guidelines for Early Care and Transfer of Burn Patients

Pre-hospital Care of the Patient with Chemical Burns
PRE-HOSPITAL GUIDELINES
CHEMICAL BURNS

TREATMENT RATIONALE

Many of the procedures listed will be provided simultaneously. Initiate in order of priority.

A. Scene Size-up

Includes checking scene safety; determining the mechanism of injury or nature of illness; finding out how many patients are involved; and determining whether you need additional help.

Use universal precautions.

B. Stop the burning process

CHEMICAL BURNS

The following treatment guidelines apply to virtually all chemical burn injuries. Certain classes of chemicals which may be used in industrial settings require specific antidotes and precautions (e.g. water-reactive chemicals such as lithium, sodium, magnesium, calcium and phenol).

For information on specific chemicals, refer to resources listed in Attachment A. For Hazmat response guidelines, refer to the most recently-published North American Emergency Response Guidebook or Firefighters Hazmat Handbooks (Geniums).

Dry Chemical
1. Remove clothing (rescuer should protect self.) To contain chemicals place clothing in bags.

2. Brush chemical off body. Remove as much dry powder from the patient as possible before flushing; otherwise, it may be diluted and splashed on the patient. Turn patient’s face away from the affected area to prevent further inhalation and lye sensitive reactions.

3. Proceed as per liquid chemical.

Reduces the amount of chemical and minimizes chemical concentration during flushing.
## Guidelines for Early Care and Transfer of Burn Patients
### Pre-hospital Care of the Patient with Chemical Burns

<table>
<thead>
<tr>
<th><strong>TREATMENT</strong></th>
<th><strong>RATIONALE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquid Chemical</strong></td>
<td>Knowledge of chemical helps to determine the severity of injury and course of treatment.</td>
</tr>
<tr>
<td>1. Rescuer should protect self from chemical burn. Notify the authority with jurisdiction for hazardous materials incidents and hospital ED prior to arrival.</td>
<td></td>
</tr>
<tr>
<td>2. For household chemical injuries – bring chemical container along to hospital.</td>
<td>Chemical burns need rapid and effective decontamination. Running water will carry away chemical. Chemical may otherwise remain concentrated and continue to burn. Hazardous materials on patient or clothing could contaminate rescue and medical personnel.</td>
</tr>
<tr>
<td>3. For occupational accidents, request copy of “Material Safety Data Sheet” (MSDS) from safety personnel, which provides information on the characteristics of the chemical(s) involved.</td>
<td></td>
</tr>
<tr>
<td>4. Flush all affected areas with copious amount of room temperature running water for at least 30 minutes, or until burning stops; and follow Hazmat decontamination procedure. Avoid cold water if at all possible to prevent hypothermia. Use garden hose or low pressure water from fire truck. Remove clothing during flushing. To contain chemicals place clothing in bags.</td>
<td></td>
</tr>
<tr>
<td><strong>Do not delay transport for critically injured patients—continue flushing en route.</strong></td>
<td>Prevents further burning. The severity of a chemical burn is related to the duration of contact.</td>
</tr>
<tr>
<td>5. Do not soak involved area.</td>
<td></td>
</tr>
<tr>
<td>6. If eyes are involved, remove contact lenses and provide continuous irrigation. Irrigation should continue throughout transport (eyes can be irrigated with NSS IV solution connected to a nasal cannula pointed at the eyes).</td>
<td></td>
</tr>
<tr>
<td>TREATMENT</td>
<td>RATIONALE</td>
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</tr>
<tr>
<td>7. Do not try to neutralize chemical.</td>
<td>Wastes precious time. Use of neutralizing agent may produce heat. Neutralizing agents often react violently with the contaminants they neutralize. They may ultimately increase the heat of reaction and induce thermal burns.</td>
</tr>
<tr>
<td>8. Cover patient immediately after flushing with clean, dry sheet and blankets.</td>
<td></td>
</tr>
<tr>
<td>9. Do not use ice or cold water.</td>
<td>Ice or cold water may damage tissue and lower core temperature.</td>
</tr>
<tr>
<td>10. Keep patient at comfortable temperature. Do not allow the patient to become hypothermic.</td>
<td>The loss of body heat through open wounds, may intensify shock. Hypothermia can occur in the burn patient even in warm weather.</td>
</tr>
<tr>
<td>11. Identify and document chemical that caused the injury.</td>
<td></td>
</tr>
</tbody>
</table>

**Additional treatment for Hydrofluoric Acid**

1. If greater than 1% BSA burned, or if hydrofluoric acid solution concentration is greater than 30% solution, immediately start IV. Discuss company first aid treatment and protocols. Company protocol may indicate use of calcium slurry or inhaler.  
   **Fluoride ion is very active and binds with calcium in large burns.**

2. Monitor cardiac rhythm.  
   **Decreased calcium may cause cardiovascular problems.**

**Special Precautions:**  
**Unignited Petroleum**

1. Prolonged contact with unignited petroleum products such as gasoline or diesel fuel can cause a deep chemical burn. (For example: prolonged contact in boots or with soaked clothing.)  
   **Systemic toxicity may be evident within 6 to 24 hours as indicated by pulmonary insufficiency, hepatic and renal failure. Within 24 hours, hepatic enzymes are elevated and urinary output diminished.**
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Prolonged contact can cause a full thickness burn that initially appears to be only partial thickness or second degree.</td>
<td></td>
</tr>
<tr>
<td>3. Lead toxicity can occur if the gasoline contains tetraethyl lead.</td>
<td></td>
</tr>
<tr>
<td>4. Caution should be exerted by the resuscitation team to prevent ignition of gasoline or diesel fluid.</td>
<td></td>
</tr>
</tbody>
</table>

C. Conduct primary survey or initial assessment

**Establish airway, breathing and circulation (ABC’s). Maintain C-spine immobilization.**

- C-spine immobilization reduces range of motion of the patient’s head and neck and prevents damage to the cervical spine.

1. Perform CPR as needed.
2. Assess for airway compromise from inhaled chemicals

3. Apply 100% oxygen (use humidified oxygen if available) by non-rebreather mask. If possible draw blood for carboxyhemoglobin at scene. Decreases the half-life of carbon monoxide by up to two-thirds. Carboxyhemoglobin values are more accurate if drawn at scene and provide a baseline for treatment.

4. Continually monitor the patient’s airway.
   a. Determine from patient’s history if injury occurred in an enclosed space. An open airway could become an obstructed airway because of swelling caused by chemical inhalation.
   b. Determine from the patient’s history if patient was at anytime unconscious, or shows signs of alcohol/drug intoxication. Can indicate long exposure to chemical and potential for inhalation injury.
   c. Note amount of facial, neck and chest burn. Anticipate edema; suspect inhalation injury.
TREATMENT | RATIONALE
--- | ---
d. Inspect mouth for erythema, blisters, edema and drooling. | Presence indicates inhalation exposure or ingestion of chemical.
e. Determine presence of hoarseness. | Indicative of laryngeal edema.
f. Assess for bronchial breath sounds, wheezing, crackles | May indicate inhalation injury.
g. Determine presence of stridor. If present **intubate patient immediately.** | Indicates imminent airway occlusion. Burn patients can progress rapidly from mild dyspnea to respiratory arrest.
h. Document level of consciousness and orientation | Mental orientation changes may indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.
i. Assess for circumferential burns of the chest and neck. | Circumferential chest burns can restrict ventilatory movement; neck burns can cause restricted airway.
j. Apply cardiac monitor and pulse oximetry. | Continuous monitoring of patient cardiac rhythm and oxygenation can identify cardio-pulmonary complications.

5. Treatment

**Consider intubation for any evidence of inhalation injury, severe facial burns or swelling – especially prior to transport.**

a. If patient assessment reveals potential for obstructed airway, intubate patient. Oral intubation preferred unless contraindicated. Consider using Rapid Sequence Intubation (RSI) techniques and pharmacological adjuncts. | To insure patent airway and access to ventilation prior to edema. Decreases possibility of sinusitis. Use succinylcholine cautiously. Succinylcholine may worsen the hyperkalemia associated with severe burns.
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. Deliver humidified $O_2$ (40-100%). Consider pre-existing medical history, i.e. COPD, asthma.</td>
<td>Improves oxygenation. CO$_2$ levels drive respiratory effort in patients with COPD.</td>
</tr>
<tr>
<td>d. Check for hemorrhage, shock and other injuries, especially head or spinal trauma; treat per existing trauma protocol.</td>
<td>These are immediate concerns that take priority over the burn wound in the pre-hospital stage.</td>
</tr>
<tr>
<td>e. Maintain C-spine immobilization when indicated.</td>
<td>C-spine immobilization reduces range of motion of the patient’s head and neck and prevents damage to cervical spine.</td>
</tr>
<tr>
<td>f. Establish IV. Select site and insert large bore peripheral IV. Consider 2 large bore IV sites. If difficulty gaining access intra osseous (IO) route can be used.</td>
<td>For administration of medication and fluids. Well balanced isotonic solution that aids in resuscitation.</td>
</tr>
</tbody>
</table>

If Lactated Ringer’s is unavailable contact Medical Command physician.

*Pediatric Consideration*

*For infants and small children*

Use D5LR for maintenance fluid *in addition* to the calculated resuscitation fluid.

For the first 10 kg of body weight:

100 ml/kg over 24 hours.

For the second 10 kg of body weight:

50 ml/kg over 24 hours.

For each kg of body weight above 20Kg: 20 ml/kg over 24 hours

- Consult burn center regarding fluid management.

Use D5LR for maintenance fluid in addition to the calculated resuscitation fluid due to inadequate glycogen stores.

**Maintenance fluid is not titrated.**
## Treatment

### D. Conduct focused and rapid trauma assessment with secondary survey.

A complete secondary survey should be conducted from head to toe — a detailed physical examination and a focused history.

**Rationale**

*Pre-existing conditions or illnesses can compound the severity of the injury and influence the patient’s care and outcome.*

### Physical Examination

<table>
<thead>
<tr>
<th>DCAP</th>
<th>Deformities, contusions, abrasions, penetrations, punctures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTLS</td>
<td>Burns, tenderness, lacerations, swelling.</td>
</tr>
<tr>
<td>Pain</td>
<td>OPQRST — onset, provocation, quality, radiation, severity, time.</td>
</tr>
</tbody>
</table>

- a. Note vital signs, Glasgow coma and trauma scores.
- b. Assess burn injury, the presence of concurring medical problems, other accompanying trauma and factors that influence severity.

*Pre-existing conditions or illnesses can compound the severity of the injury and influence the patient’s care and outcome.*

The severity of a burn injury is determined primarily by the extent of the body surface area involved and, to a lesser extent, by the depth of the burn. However, other factors must be considered such as age, the presence of concurrent medical problems, and complications that accompany certain types of body burns such as those of the face, hands, feet, genitalia, perineum and any other areas that include a joint.

1. Estimate percentage of Body Surface Area (BSA) burned. **DO NOT INCLUDE SUPERFICIAL/1ST DEGREE BURNS IN THIS PERCENTAGE.**
TREATMENT

Palmar Method: The size of the patient’s palm is equal to 0.5%-1%. Use Palmer Method for small burns.

Rule of Nines: The Rule of Nines formula divides the total BSA into 9% or multiples of 9% segments. In the infant or child, the Rule deviates because of the larger surface area of the child’s head:

RATIONAL

Palmar Method: Patient’s palm = 0.5%-1% BSA

The greater surface area of child’s head in relationship to the total body size influences the BSA estimation and calculation of the percentage of BSA of burn injury.

(2) Classify burns according to depth. Depth of burn is a factor in the decision to refer a patient to a specialized burn care facility.

Guidelines for Early Care and Transfer of Burn Patients

Pre-hospital Care of the Patient with Chemical Burns
### TREATMENT

<table>
<thead>
<tr>
<th>DEPTH CATEGORIES:</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics:</strong></td>
<td></td>
</tr>
<tr>
<td>- <strong>Superficial / 1st Degree:</strong></td>
<td></td>
</tr>
<tr>
<td>red, swelling, tender, blanches w/ pressure, painful. <strong>Do not include in BSA% estimate.</strong></td>
<td>Epidermis injured but intact.</td>
</tr>
<tr>
<td>- <strong>Partial Thickness / 2nd Degree:</strong></td>
<td></td>
</tr>
<tr>
<td>red, blisters, weeping, blanches w/ pressure, painful.</td>
<td>All epidermis and varying degrees of dermis are destroyed.</td>
</tr>
<tr>
<td>- <strong>Full Thickness / 3rd Degree:</strong></td>
<td></td>
</tr>
<tr>
<td>dry, red, white, black or brown; does not blanch w/ pressure; inelastic; hair pulls out easily; diminished pain sensation; leather-like appearance.</td>
<td>Epidermis and dermis are destroyed. Extends into subcutaneous layers or even deeper into muscles, bones, and internal organs.</td>
</tr>
</tbody>
</table>

(3) Assess the location of the burn injury.

**Special Care Areas:** Face, Hands, Feet, Major Joints, Genitalia, Perineum. Refer to Burn Center.

(4) Inspect for circumferential areas of burn. Extremities may suffer nerve and/or muscle impairment from compartment syndrome.

(5) Assess respiratory effort and chest expansion, status of distal circulation. Burns around chest may restrict respiratory movement due to increasing edema.

(6) Burns caused by the following mechanisms: chemicals, electricity or inhalation injury need Burn Center care. Chemical and electrical burns are considered occult injuries because the extent of the damage may extend far beyond what is visible on the surface.

(7) Assess for accompanying trauma. Burn injury with inhalation and/or concomitant trauma poses greatest risk of morbidity or mortality.
**Guidelines for Early Care and Transfer of Burn Patients**

**Pre-hospital Care of the Patient with Chemical Burns**

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### TREATMENT

### RATIONALE

<table>
<thead>
<tr>
<th>Obtain Patient History - Sample</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S</strong> Signs and Symptoms</td>
<td></td>
</tr>
<tr>
<td><strong>A</strong> Allergies (food, medication, latex)</td>
<td></td>
</tr>
<tr>
<td><strong>M</strong> Medications</td>
<td></td>
</tr>
<tr>
<td><strong>P</strong> Past/present health/medical history: Pre-existing medical disorders may complicate burn treatment, prolong recovery or affect mortality.</td>
<td></td>
</tr>
<tr>
<td>- preexisting illnesses (diabetes, hypertension, cardiac or renal disease, etc.) Does patient have advance directives, living will or donor card?</td>
<td></td>
</tr>
<tr>
<td><strong>L</strong> Last meal, including liquids</td>
<td></td>
</tr>
<tr>
<td><strong>E</strong> Events prior to burn injury:</td>
<td></td>
</tr>
<tr>
<td>* Cause of burn</td>
<td></td>
</tr>
<tr>
<td>* Did the injury occur in a closed space?</td>
<td></td>
</tr>
<tr>
<td>* Is there a possibility of smoke inhalation?</td>
<td></td>
</tr>
<tr>
<td>* Were there hazardous chemicals involved?</td>
<td></td>
</tr>
<tr>
<td>* Was patient thrown by an explosion?</td>
<td></td>
</tr>
<tr>
<td>* Did the patient jump or fall from any height?</td>
<td></td>
</tr>
<tr>
<td><strong>Age of the patient.</strong></td>
<td></td>
</tr>
<tr>
<td>Be aware of high risk groups:</td>
<td></td>
</tr>
<tr>
<td>- Under 10 years of age</td>
<td></td>
</tr>
<tr>
<td>- Over 50 years of age</td>
<td></td>
</tr>
<tr>
<td>Individuals under the age of 10 and over the age of 50 are considered at greater risk for burn complications. Therefore, smaller percentages of BSA burns to someone in these age groups may be considered a major or critical injury.</td>
<td></td>
</tr>
</tbody>
</table>

### E. Pain Management

Administer pain medication as per Medical Command physician. Morphine is indicated for pain. (0.1 mg morphine/kg body weight is recommended dosage.) Narcotics should only be given **intravenously** in small doses and only enough to control pain. Do not use the intramuscular or subcutaneous route. Excessive and frequent administration of narcotics leads to compromised respiratory status. Because fluid volume and circulation changes occur in burn injury, absorption of pain medication given intramuscularly or subcutaneously may be ineffective and unpredictable.
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. Provide emotional support.</td>
<td></td>
</tr>
<tr>
<td>G. Transport patient as directed by Medical Command.</td>
<td><em>Transport patient to the nearest hospital or specialized burn care facility according to Medical Command.</em></td>
</tr>
<tr>
<td>H. Provide information on disposition of patient to family members.</td>
<td><em>Provide directions to Burn Center as needed.</em></td>
</tr>
</tbody>
</table>
Guidelines for Early Care and Transfer of Burn Patients

Emergency Care of the Patient with Chemical Burns
EMERGENCY DEPARTMENT GUIDELINES
CHEMICAL BURNS

TREATMENT

Many of the procedures listed will be provided simultaneously. Initiate in order of priority.

All chemical and electrical burns regardless of the percentage of body surface areas involved, meet the American Burn Association’s criteria for burn center admission.

THE BURN PATIENT MAY BE A MULTI-TRAUMA PATIENT AND SHOULD RECEIVE A RAPID BUT FULL EXAMINATION TO RULE OUT OTHER TRAUMA.

A. Stop the burning process. Assure that this has occurred in the pre-hospital stage. Implementation in ED dependent upon treatment at scene, length of transport, and burn type.

CHEMICAL BURNS

The following treatment guidelines apply to virtually all chemical burn injuries. Certain classes of chemicals which may be used in industrial settings require specific antidotes and precautions (e.g. water-reactive chemicals such as lithium, sodium, magnesium, calcium and phenol).

For information on specific chemicals, refer to resources listed in Attachment A. For Hazmat response guidelines, refer to the most recently-published North American Emergency Response Guidebook or Firefighters Hazmat Handbooks (Geniums).

Dry Chemical

1. Remove clothing (rescuer should protect self). To contain chemicals place clothing in bags.

2. Brush chemical off body. Remove as much dry powder from the patient as possible before flushing; otherwise, it may be diluted and splashed on the patient. Turn patient’s face away from the affected area to prevent further inhalation and lye sensitive reactions. Reduces the amount of chemical and minimizes chemical concentration during flushing.

3. Proceed as per liquid chemical.
<table>
<thead>
<tr>
<th><strong>TREATMENT</strong></th>
<th><strong>RATIONALE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquid Chemicals:</strong></td>
<td></td>
</tr>
<tr>
<td>1. Individuals caring for patient should wear gloves and protective clothing.</td>
<td><em>Avoids contact with chemical and personal injury</em></td>
</tr>
<tr>
<td>2. Institute hospital policy for Hazmat products.</td>
<td></td>
</tr>
<tr>
<td>3. For occupational accidents, request copy of “<strong>Material Safety Data Sheet</strong> (MSDS) from safety personnel, which provides information on the characteristics of the chemical(s) involved.</td>
<td></td>
</tr>
<tr>
<td>4. Arrange transfer to burn center.</td>
<td><em>Chemical burns have potential for major complications.</em></td>
</tr>
<tr>
<td>5. Flush all areas with copious amounts of room temperature water for at least 30 minutes, or until burning stops; and follow Hazmat decontamination procedure. Avoid cold water it at all possible to prevent hypothermia.</td>
<td><em>Running water carries the chemical away.</em></td>
</tr>
<tr>
<td>6. Remove saturated clothing (including underwear and shoes). To contain chemical place clothing in bags.</td>
<td><em>Chemical burns are influenced by duration of contact.</em></td>
</tr>
<tr>
<td>Remove all clothing and jewelry, including all rings, earrings, bracelets, and piercings.</td>
<td><em>Metal retains heat and may extend the burn. Rings may restrict circulation when swelling occurs.</em></td>
</tr>
<tr>
<td>7. Remove contact lenses and provide continuous irrigation. Irrigation should continue throughout transport (eyes can be irrigated with NSS IV solution connected to a nasal cannula pointed at the eyes).</td>
<td><em>Prevents further burning. The severity of a chemical burn is related to the duration of contact.</em></td>
</tr>
</tbody>
</table>
TREATMENT

8. Do not neutralize chemical.

9. Cover patient immediately after flushing with clean, dry sheet and blankets.

10. Do not use ice or cold water.

11. Measure body temperature on arrival and every 30 minutes thereafter. Keep patient at comfortable temperature. Do not allow the patient to become hypothermic.

12. Identify and document chemical that caused the injury. For household chemical injuries instruct EMS to bring household chemical container along to hospital.

Hydrofluoric Acid
Rinse off rapidly.

If less than 1% body surface area (BSA) burned, apply calcium gluconate gel; or inject 10% calcium gluconate into affected areas after administering local anesthetic.

If greater than 1% BSA burned or if Hydrofluoric Acid known to be concentrated greater than 30% solution and administer 10% calcium gluconate.

For inhalation of HF, 2.5-3% calcium gluconate by nebulizer. All patients should receive 100% oxygen.

For eye contact, continuously irrigate with 1% calcium gluconate. For additional specific HF treatment information, contact Burn Center.

RATIONALE

Wastes precious time. Use of neutralizing agent may produce heat. Neutralizing agents often react violently with the contaminants they neutralize. They may ultimately increase the heat of reaction and induce thermal burns.

Ice or cold water may damage tissue and lower core temperature.

The loss of body heat through open wounds may intensify shock. Hypothermia can occur in the burn patient even in warm weather.

Knowledge of chemical helps to determine the severity of injury and course of treatment.

The fluoride iron is very active and binds with calcium in large burns. This can cause hypocalcemia.
Hydrocarbon Exposure

Remove clothing and follow Liquid Chemical Procedure.

Prolonged contact with unignited petroleum products such as gasoline or diesel fuel may cause a deep chemical burn. (For example: Prolonged contact in boots or with soaked clothing.)

Prolonged contact can cause a full thickness burn that initially may appear to be only partial thickness or second degree. Systemic toxicity may be evident within 6 to 24 hours, as indicated by pulmonary insufficiency, hepatic and renal failure. Within 24 hours, hepatic enzymes are elevated and urinary output diminished.

Lead toxicity can occur if the gasoline contains tetraethyl lead. Immediately transfer these patients to a burn center.

Caution should be exerted by the resuscitation team to prevent ignition of gasoline or diesel fuel.

Phenols - flush with water and call burn center.

Sulfuric Acid - flush with water and call burn center.

Cement burns - flush with water and call burn center.

B. Provide and maintain an open airway.

1. Airway management. The first step in the care of any trauma patient is to establish an open airway and adequate ventilation. Ventilation and respiration is adversely affected by edema, carbon monoxide poisoning, chemical inhalation, smoke inhalation and circumferential trunk burn.
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Assess for airway compromise caused by inhaled chemicals.</td>
<td>Airway obstruction may occur due to swelling caused by smoke or chemical inhalation.</td>
</tr>
<tr>
<td>a. Determine from patient's history if injury occurred in an enclosed space</td>
<td>Mental orientation changes may indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.</td>
</tr>
<tr>
<td>b. Determine the patient’s history, if the patient was unconscious at any time, or shows signs of alcohol/drug intoxication.</td>
<td>Mental orientation changes may indicate carbon monoxide (CO) poisoning or head trauma - signs include headache, confusion, irritability, poor judgment, dim vision, hallucinations, coma.</td>
</tr>
<tr>
<td>c. Document level of consciousness and orientation.</td>
<td>Change in level of consciousness may indicate long exposure to smoke and potential for inhalation injury.</td>
</tr>
<tr>
<td>d. Note amount of facial, neck and chest burn.</td>
<td>Anticipate edema; suspect inhalation injury.</td>
</tr>
<tr>
<td>e. Inspect mouth for carbon, erythema, edema or carbonaceous sputum.</td>
<td>Presence indicates inhalation injury.</td>
</tr>
<tr>
<td>f. Determine presence of hoarseness.</td>
<td>Indicative of laryngeal edema.</td>
</tr>
<tr>
<td>g. Assess for bronchial breath sounds, wheezing, crackles.</td>
<td>Can indicate inhalation injury.</td>
</tr>
<tr>
<td>h. Determine presence of stridor. If present <strong>Intubate patient immediately.</strong></td>
<td>Indicates imminent airway occlusion.</td>
</tr>
<tr>
<td>i. Assess for circumferential burns of the chest and neck.</td>
<td>Circumferential chest burns may restrict ventilatory movement; neck burns may cause restricted airway.</td>
</tr>
<tr>
<td>j. Obtain ABG and carboxyhemoglobin (CO Hgb) levels. Continue pulse oximetry.</td>
<td>For aid in diagnosis of inhalation injury and carbon monoxide poisoning.</td>
</tr>
<tr>
<td>k. Consider testing for cyanide poisoning.</td>
<td>Cyanide is a by-product of burning synthetics.</td>
</tr>
<tr>
<td>l. Obtain chest x-ray.</td>
<td>Provides baseline for future assessment.</td>
</tr>
</tbody>
</table>
### TREATMENT RATIONALE

#### 3. Treatment

**CONSIDER INTUBATION FOR ANY EVIDENCE OF INHALATION INJURY, SEVERE FACIAL BURNS OR SWELLING - ESPECIALLY PRIOR TO TRANSPORT TO BURN CENTER.**

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>a.</td>
<td>If patient assessment reveals potential for obstructed airway, have patient intubated.</td>
</tr>
<tr>
<td></td>
<td><strong>Insures access to ventilation prior to formation of edema.</strong></td>
</tr>
<tr>
<td></td>
<td>Oral intubation is preferred, unless contraindicated.</td>
</tr>
<tr>
<td></td>
<td><strong>Decreases possibility of sinusitis.</strong></td>
</tr>
<tr>
<td></td>
<td>Secure tube to prevent dislodgement. Avoid tape over facial burns; use cotton ties.</td>
</tr>
<tr>
<td>b.</td>
<td>Suction tracheal-bronchial tree thoroughly.</td>
</tr>
<tr>
<td></td>
<td><strong>Removes soot and prevent atelectasis.</strong></td>
</tr>
<tr>
<td>c.</td>
<td>Deliver 100% humidified O₂. Titrate O₂ after carboxyhemoglobin (COHgb) equals less than 10%.</td>
</tr>
<tr>
<td></td>
<td><strong>Provides adequate oxygenation. Carbon monoxide binds hemoglobin robbing the blood of oxygen.</strong></td>
</tr>
<tr>
<td>d.</td>
<td>Use mechanical ventilation if needed.</td>
</tr>
<tr>
<td></td>
<td><strong>Optimal ventilatory control.</strong></td>
</tr>
<tr>
<td>e.</td>
<td>Steroids are contraindicated in inhalation injury.</td>
</tr>
<tr>
<td></td>
<td><strong>Steroid use may result in immuno-suppression and compromise wound healing.</strong></td>
</tr>
<tr>
<td>f.</td>
<td>Prophylactic antibiotics are not recommended.</td>
</tr>
</tbody>
</table>

#### C. Circulatory Management

1. Provide CPR as needed.

2. Assess for hemorrhage. **Concurrent injury from the burn incident may cause external or internal bleeding.**

3. Fluid management

   a. Draw blood for CBC, electrolytes, osmolality, BS, carboxyhemoglobin, ABG, PT/PTT, and cardiac enzymes. **Establishes baseline values and guides treatment.**
<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Select site and insert large bore peripheral IV if burn is under 10% BSA. If necessary, insert through burned surface and secure with suture. Consider 2 large bore IV sites. Suture prior to transfer. If unable to find a suitable peripheral line, insert a central line and obtain a chest x-ray for placement.</td>
<td>Large volumes required to prevent or correct hypovolemic shock.</td>
</tr>
<tr>
<td>c. Use Lactated Ringers except in pediatric patients less than one year old.</td>
<td>Well balanced isotonic solution that aids in resuscitation.</td>
</tr>
</tbody>
</table>

**Pediatric Considerations**  
For Children less than 1 year old

- Use D5LR
- Consult burn center regarding fluid management.
- Check the patient’s glucose level at the bedside.

| d. Calculate fluid requirements for first 24-hours post injury following the Consensus Formula: \(2-4 \text{ ml x wt. in Kg} \times \% \text{ of Body Surface Area burned.}\) | Replaces circulatory volume as fluid shifts from intravascular compartment to interstitial space. |
|                                                                                     |                                                                                           |
| Give ½ in first 8 hrs. post-burn (i.e. time injury occurred, not time of admission); remainder next 16 hrs. |                                                                                           |

| e. Insert Foley catheter for local perineal burns and burns requiring resuscitation. Monitor output hourly. | Helps to assess resuscitation efficacy.                                                      |

| 4. Assess and monitor the following parameters for adequate fluid resuscitation and cardio vascular function. Vital Signs Cardiac monitor | The patient’s individual response is the most important factor in determining fluid requirements. |
TREATMENT | RATIONALE
---|---
Urine output: Maintain hourly output at least 50cc/hr. in adults; 1cc/kg./hr in children. | Hourly urine output is the single most important factor in assessing the patient’s response to fluid resuscitation.

5. Perform neurovascular check. | Increased edema will compromise perfusion to extremities.

6. Evaluate for presence of circulatory compromise by checking peripheral pulses with Doppler. Absence of pulses indicates a medical emergency: contact Burn Center immediately. | Decreased or absent peripheral pulses indicate decreased perfusion that may result in ischemic changes and possible limb loss.

D. Review for major trauma.

1. The burn patient should receive a full examination to assess for trauma. | Head and spinal trauma may be overlooked in burn injuries accompanying falls, motor vehicle crashes (MVC), electrical injury.

2. Treat per existing Advanced Trauma Life Support (ATLS) protocols.

3. Immobilize cervical spine and log-roll patient until spine is cleared with x-rays or CT scan. | Avoids further injury to spine.

E. Maintain body temperature.

1. Use dry clean sheets and blankets to avoid systemic hypothermia. | Prolonged hypothermia causes respiratory acidosis.

2. Monitor body temperature every 30 minutes. Consider using warming devices such as heat lamp, warming blankets, warm fluids, warm humidifier and/or initiate hypothermia protocols if indicated. | Burn injury decreases the skin’s ability to regulate body temperature.
F. Assess burn injury and complications

1. Determine date, time, agent and circumstance of burn.

2. Estimate percentage of BSA using Rule of Nines. **Do not include superficial/1st Degree Burns in this percentage.**

   The Rule of Nines formula divides the total BSA into 9% or multiples of 9% segments. In the infant or child, the Rule deviates because of the larger surface area of the child’s head:

   **Rule of Nines:**

3. Classify burns according to depth.

   **Passage of time and mechanism of injury may influence injury severity and dictate assessment and treatment priorities. Delay of time before initiation of emergency care increases risks of complications.**

   **The percentage of Body Surface Area (BSA) burned is one of the indicators of severity and used to determine fluid resuscitation needs.**

   **Depth of burn is a factor in the decision whether to refer a patient to a specialized burn care facility.**
TREATMENT

DEPTH CATEGORIES:
Characteristics:

- **Superficial / 1st Degree:**
  red, swelling, tender, blanches w/pressure, painful. **Do not include in BSA% estimate.**
  Epidermis injured but intact.

- **Partial Thickness / 2nd Degree:**
  red, blisters, weeping, blanches w/pressure, painful.
  All epidermis and varying degrees of dermis are destroyed.

- **Full Thickness / 3rd Degree:**
  dry, red, white, black or brown; does not blanch w/pressure; inelastic; hair pulls out easily; diminished pain sensation; leather-like appearance.
  Epithelium and dermis are destroyed.
  Extends into sub-cutaneous layers or even deeper into muscles, bones, and internal organs.

4. Obtain summary of pre-hospital treatment, including time of burn injury, past medical history, and events leading to the injury.
   May contain data useful for medical, social and legal history, and for epidemiological analysis.

5. Obtain past medical history including prior tetanus immunization and allergies.
   Patient is at risk for tetanus due to contaminated and potentially deep wounds.

6. Inspect for circumferential areas of burn.
   Chest burns may restrict adequate ventilation; neck burns may cause restricted airway; extremities may suffer nerve and muscle impairment.

   - Assess respiratory effort and chest expansion.
   - Obtain baseline chest x-ray if indicated.
   - Note ABG results.
   - Assess status of distal circulation.
   - Use Doppler if peripheral pulses are not palpable. Absence of pulses indicates a medical emergency; contact Burn Center immediately.

   Decreased or absent peripheral pulses indicate decreased profusion that results in ischemic changes and possible limb loss.

G. Treat Burn Wound
## TREATMENT

<table>
<thead>
<tr>
<th></th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Stabilize other injuries (fractures, etc.).</td>
</tr>
<tr>
<td>2.</td>
<td>Relieve pain. IV pain medication:</td>
</tr>
<tr>
<td></td>
<td>Morphine sulfate preferred medication unless contradicted by allergy or past</td>
</tr>
<tr>
<td></td>
<td>medical history (0.1 mg/kg body weight or equivalent to achieve desired effect).</td>
</tr>
<tr>
<td></td>
<td>Narcotics should only be given intravenously in small doses and only enough to control pain.</td>
</tr>
<tr>
<td>3.</td>
<td>Transferring Patient to a Burn Center:</td>
</tr>
<tr>
<td></td>
<td>Extensive cleaning of burn wounds not necessary. DO NOT apply any topical agents.</td>
</tr>
<tr>
<td></td>
<td>Initial burn center assessment and care requires extensive wound cleansing.</td>
</tr>
<tr>
<td></td>
<td>Remove any wet dressings and cover patient with clean, dry sheet and blankets.</td>
</tr>
<tr>
<td></td>
<td>Helps maintain body heat</td>
</tr>
<tr>
<td>4.</td>
<td>For treatment of minor burns:</td>
</tr>
<tr>
<td></td>
<td>Gently cleanse wounds with soap and water or saline. Apply topical agents and/or dressing per existing ED protocols.</td>
</tr>
<tr>
<td></td>
<td>Minimizes infection.</td>
</tr>
</tbody>
</table>

### H. Other Treatment Considerations

<table>
<thead>
<tr>
<th></th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Maintain patient NPO.</td>
</tr>
<tr>
<td>2.</td>
<td>Assess for bowel function</td>
</tr>
<tr>
<td>3.</td>
<td>Oralgastric tube: for burns under 20% BSA, facial or inhalation injury, nausea, vomiting, expected air transport. Avoid tape over facial burns. Use cotton ties to secure tubes.</td>
</tr>
<tr>
<td></td>
<td>Prevents gastric distention and vomiting. Provides route for antacid therapy and potential feeding tube.</td>
</tr>
<tr>
<td>4.</td>
<td>Tetanus prophylaxis.</td>
</tr>
<tr>
<td>5.</td>
<td>IV antibiotics for associated trauma with contaminated wounds.</td>
</tr>
<tr>
<td></td>
<td>As per CDC (Centers for Disease Control) protocol.</td>
</tr>
</tbody>
</table>
6. Explanation, information and emotional support to patient and family.

**BURN CENTER TRANSFER CRITERIA:**


1. Partial thickness burns (2nd degree burns) greater than 10% total body surface.
2. Full thickness burns (3rd degree burns) in any age group.
3. Burns that involve the face, hands, feet, genitalia, perineum or major joints.
4. Chemical burns.
5. Electrical burns including lightning injury.
6. Inhalation injury.
7. Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality.
8. Patients with concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn center. Physician judgment will be necessary in such situations and should be in concert with any applicable medical control plans and triage protocols.
10. Patients who require special social, emotional, or long-term rehabilitative intervention.
BURN CENTER TRANSFER
GUIDELINES

Role of Referring Hospital

The Burn Center staff member receiving the call will normally accept the patient referred, pending contact with the Burn Center attending physician. Data from the “Burn Foundation Burn Referral Data Sheet” (attached) will be collected at this time. If the Burn Center receiving the call is at capacity, the center will call one or more other Burn Centers to obtain placement and follow-up to confirm that a representative of the receiving facility has made contact with the referring hospital.

FOR CONSULTATION, ADMISSION TO BURN CENTER, OR OUTPATIENT FOLLOW-UP CARE:

- Crozer-Chester Medical Center
  610-447-2800
- Lehigh Valley Hospital
  610-402-BURN (1-800-710-BURN)
- St. Christopher’s Hospital for Children
  215-427-5323
- Temple University Hospital
  215-707-2876

1. Transportation Arrangement.

Transfer of patient will be arranged between the burn center and referring hospital. Patient condition, distance, weather conditions and availability of vehicles and personnel will determine the transport mode.

2. Preparation of Patient for Transfer.

- Complete “Burn Foundation Burn Referral Data Sheet” (Attachment ).

The Burn Center will confirm ETA and assist with transfer arrangements if needed.
– Prepare record of intake/output. Accurate intake/output records provide guidelines for determining adequacy of fluid resuscitation measures.

– Record all medication.

– Maintain full C-spine control.

– Secure all IV sites and ET tubes prior to transport. Avoid tape over facial burns; use cotton ties to secure tubes. Prevent dislodgement of tubes during transfer.

– Record size and location of all inserted lines and catheters (Foley, IV, NG, ET).

– Copy complete ED chart, along with prehospital record if available, including lab data. Send original x-rays.

3. Preparation of Family for Transfer.

– Provide information and emotional support.

– Provide directions to Burn Center.

– Provide Burn Center Informational Guide for Families (Attachment ). If unavailable in ED, contact burn center to fax a copy of Family Guide.
Outpatient Management of Burned Patients
Outpatient Burn Care

The four Burn Centers affiliated with the Burn Foundation provide a multidisciplinary team of specialists solely dedicated to the care and recovery of burn survivors. In addition to offering pediatric and adult inpatient services, these Centers provide:

- comprehensive burn and wound care
- advanced reconstructive surgery
- outpatient management of minor wounds
- scar management
- long-term rehabilitation services

Please call for further information or to make an outpatient appointment.

Nathan Speare Regional Burn Center
Crozer-Chester Medical Center
1 Upland Blvd.
Chester, PA 19013
Phone: 610-447-2821
Fax: 610-447-2808
Burn Center: 1-610-447-2800 (24 hrs)

Lehigh Valley Burn Recovery Center
1210 S. Cedar Crest Blvd., Suite 3000
Allentown, PA 18103
Phone: (610) 402-8355
Fax: (610) 402-2877

Stuart J. Hulnick Burn Center
St. Christopher’s Hospital for Children
Erie Avenue at Front Street
Philadelphia, PA 19134
Phone: 215 427-6502

Temple University Hospital Burn Center
TUH Outpatient Building (Zone B),
5th Floor
Broad & Tioga Streets
Philadelphia, PA 19140
Outpatient Referrals: (215) 952-0792
Burn Center Referral Criteria

A burn center may treat adults, children, or both. Burn injuries that should be referred to a burn center include:

1. Partial thickness burns greater than 10% total body surface area (TBSA).
2. Burns that involve the face, hands, feet, genitalia, perineum, or major joints.
3. Third degree burns in any age group.
4. Electrical burns, including lightning injury.
5. Chemical burns.
6. Inhalation injury.
7. Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality.
8. Any patient with burns and concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols.
9. Burned children in hospitals without qualified personnel or equipment for the care of children.
10. Burn injury in patients who will require special social, emotional, or rehabilitative intervention.

Excerpted from Guidelines for the Operation of Burn Centers (pp. 79-86), Resources for Optimal Care of the Injured Patient 2006, Committee on Trauma, American College of Surgeons
Guidelines for Early Care
and
Transfer of Burn Patients

References
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   Surgery, 27(1), 133-143.

   Outpatient burn management. Nursing Clinics of North 
   America, 32(2), 343-364.

Milner, S., Mottar, R., & Smith, C. E. (2001). The burn wheel: 
   An innovative method for calculating the need for fluid 
   resuscitation in burned patients. American Journal of 
   Nursing, 101(11), 35-37.

   and emotional recovery. Baltimore: Johns Hopkins University 
   Press.

   Journal of Trauma, 48(1), 171-172.

Nagy, S. (1999). Strategies used by burn nurses to cope with the 
   infliction of pain on patients. Journal of Advanced 
   Nursing, 29(6), 1427-1433.

   Obstetric and Gynecologic Surgery, 53(1), 50-56.


Websites

American Burn Association
625 N. Michigan Ave., Suite 2550
Chicago, Ill 60611
(800) 548-2876
www.ameriburn.org

Burn Foundation
1520 Locust St., Suite 401
Philadelphia, PA 19102
(215)545-3816
www.burnfoundation.org

Burn Prevention Foundation
5000 Tilghman St., Suite 215
Allentown, PA 18104
(610) 481-9810
www.burnprevention.org

National Center for Injury Prevention and Control
Centers for Disease Control and Prevention
Atlanta, GA
www.cdc.gov/ncipc/duip/burn.htm

National SAFE KIDS Coalition
www.safekids.org
Chemical Resources

CHEMTREC – 1-800-424-9300 – provides emergency response information to callers

CHEM-TEL, INC. – 1-800-255-3924 – provides emergency response information to callers

A third resource to consider regarding chemicals and chemical burn injuries is your LOCAL POISON CONTROL CENTER.
ASSESSMENT AND INITIAL CARE OF BURN INJURED PATIENTS
For HOSPITAL EMERGENCY DEPARTMENTS

1. ADMINISTER CPR AS NEEDED

2. STOP BURNING PROCESS
   Remove or cool hot clothing
   Cool thermal burns for 10 minutes
   Extensive lavage of chemical burns

3. MAINTAIN VENTILATION
   Look for signs of inhalation injury
     (cough, singed nasal hair, soot,
      hoarseness or edema in upper airway)
   Establish open airway
   **FOR RESPIRATORY INSUFFICIENCY:**
   Use ventilator or administer high
   concentration of humidified oxygen
   until carbon monoxide is proven below
   toxic level
   Monitor ABG’s
   ETT ≥ 7.5 mm in adults

4. ESTABLISH CIRCULATION
   **ADULTS:** Insert IV line (#16 or 18 peripheral
   catheter)
   Use Ringer’s Lactate, without glucose.
   For burns > 20% BSA, 2-4 ml X kg body
   weight X % BSA
   Objective: At least 30-50 ml urine/hour
   - (75-100 ml urine/hour for electrical
   injury)
   **CHILDREN:** Use large-bore IV suited to
   patient’s age.
   Use Ringer’s lactate for ages > 1 year
   For burns >20% BSA, 2-4 cc X kg body wt
   X % BSA plus maintenance fluids per
   24 hrs
   Objective: At least 0.5-1 ml urine/kg./hour.
   Determine fluid resuscitation needs for
   children < 1 year in consultation with
   burn center
   **FOR BURNED EXTREMITY:**
   Elevate, remove all rings and jewelry.
   Monitor pulse in circumferentially burned
   limb

5. REVIEW FOR MAJOR TRAUMA
   Assess for head or spinal trauma, blunt and
   penetrating injuries;
   Stabilize spine.

6. MAINTAIN BODY TEMPERATURE
   Obtain temperature
   Avoid systemic hypothermia or chill, use
   dry blankets
   Take measures to keep warm

7. HISTORY AND PHYSICAL
   Type, area and depth of burn
   Other injuries (fractures, lacerations,
   etc.)
   Details of accident
   Pre-existing illness (e.g., diabetes)
   Use of alcohol, tobacco, drugs
   Allergies, medications
   Last food intake

8. PREVENT ILEUS COMPLICATIONS
   Keep patient N.P.O.
   Nasogastric tube to suction / drainage
   - for nausea, vomiting or distension
   - any burn ≥ to 20% BSA

9. RELIEVE PAIN
   Give narcotics, 2-4 mg. morphine or
   equivalent, I.V. only, to achieve
   desired effect
   For children, give narcotics 0.1 mg/kg
   morphine sulfate I.V.

10. TREAT BURN WOUND
    Maintain irrigation of eye wounds
    Stabilize other injuries (fractures, etc.)
    For patients being transferred to burn
    center, remove wet dressing and
    cover with clean dry sheet.
    Do not apply topical agents or dressings
    For all other burn patients, cleanse
    gently with soap and water or saline

11. TETANUS PROPHYLAXIS/HYPERTET

12. COMFORT PATIENT AND FAMILY
    Give family directions to the Burn Center
FOR TRANSFER TO A REGIONAL BURN CENTER CALL:

Crozer-Chester Medical Center ~ 610/447-2800
Lehigh Valley Hospital ~ 800/280-5524
St. Christopher’s Hospital for Children ~ 215/427-6900
Temple University Hospital ~ 215/707-2876 (BURN)

ESTIMATING PERCENT OF BURNS:
Rule of Nines

AMERICAN BURN ASSOCIATION CRITERIA FOR REFERRAL TO BURN CENTER

- Partial thickness burns > 10% Total Body Surface
- 3° burns in any age group
- Burns that involve: the face, hands, feet, genitalia, perineum, or major joints
- Chemical burns
- Electrical burns including lightning injury
- Inhalation injury
- Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
- Patients with concomitant trauma (such as fractures) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be initially stabilized in a trauma center before being transferred to a burn center.

Physician judgment will be necessary in such situations and should be in concert with any applicable medical control plans and triage protocols.

- Burned children in hospitals without qualified personnel or equipment for care of children
- Elderly burn patients
- Patients who will require special social, emotional, or long-term rehabilitative intervention

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