Goal
Appropriate assessment, initial management, and medical treatment of the burn patient.

Key Aspects of Care
- Burn patients are trauma patients who have (at least) one mechanism of injury that happens to involve thermal injury
- Fluid resuscitation guidelines are determined by burn total body surface area and individual patient response.

Primary A-B-C-D-E Survey
- **Airway:** Decision to intubate should be based on physician judgment. Assess for any of these potential indications for intubation:
  - Face and neck burns
  - Singed nasal hair
  - Oral or lip burns
  - Soot in upper airway
  - Carbonaceous sputum
  - Dyspnea / stridor
  - Tachypnea
  - Hoarseness
  - Sore throat
  - Cough
  - Rhonchi
  - Decreased level of consciousness
  - Associated injuries
- **Breathing and ventilation**
- **Circulation**
- **Disability**
- **Environment:** Exposure / environmental control
  - Remove all clothing and jewelry to complete assessment
  - Aggressively avoid/treat hypothermia
  - Cover with dry sheets and blankets

Secondary Survey
- Complete head-to-toe examination
- Calculate burn total body surface area (TBSA) using [Lund Browder](#)

Fluid Resuscitation
Fluid protocols are **guidelines only**. Use as a starting point.
- Adjust fluids according to individual response
- **GOAL:** Urinary Output (U.O.) 30-50 ml/hr
- Insert urinary catheter and reliable IV access (consider placement of central line)

<table>
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<tr>
<th>Burns &lt; 20% TBSA</th>
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<tr>
<td>- Fluid resuscitation rarely needed</td>
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<td>- Consider outpatient treatment</td>
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<tr>
<th>Burns &gt; 20 TBSA</th>
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<tr>
<td><strong>Parkland Protocol</strong></td>
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<tr>
<td>- <strong>First hour,</strong> initial fluid management</td>
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<tr>
<td>- Lactated Ringers (LR) 4 ml x %TBSA x weight (kg)</td>
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<td>- <strong>After the first hour,</strong> titrate LR, based on hourly U.O. for the first 48 hours post-burn</td>
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<tr>
<td>- U.O. &lt; 15 ml/hr, Increase by 20%</td>
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<tr>
<td>- U.O. = 15-29 ml/hr, Increase by 10%</td>
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<tr>
<td>- U.O. = 30-50 ml/hr, Keep at current rate</td>
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<td>- U.O. &gt; 50 ml/hr, Decrease by 10%</td>
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<th>If Burns &gt; 40% TBSA or 30% with inhalation</th>
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<td>- Patients will receive Parkland resuscitation initially and may be switched to a colloid based resuscitation with one of the two following protocols at the discretion of the burn provider.</td>
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<th>Fresh Frozen Plasma Protocol</th>
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<td>- <strong>First 48 hours post-burn,</strong> LR at 83 ml/hr and to remain at a constant rate, <strong>DO NOT INCREASE RATE.</strong></td>
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<tr>
<td>- FFP 75 ml/kg / 24 hrs = hourly rate for initial rate</td>
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<td>- <strong>After the first hour,</strong> titrate FFP based on hourly U.O.</td>
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<td>- U.O. &lt; 15 mL/hr, Increase by 20%</td>
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<td>- U.O. = 15-29 mL/hr, Increase by 10%</td>
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<td>- U.O. &gt; 50 mL/hr, Decrease by 10%</td>
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<tr>
<td>- When total fluid rate = maintenance fluid rate, stop albumin and use LR for total fluid rate.</td>
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<th>Albumin Protocol</th>
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<td>- For the first hour, MD will indicate the rate of albumin and LR in the orders.</td>
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<tr>
<td>- The rates should always remain 2/3 LR and 1/3 albumin.</td>
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<tr>
<td>- <strong>After the first hour,</strong> titrate both LR and albumin, based on hourly U.O.</td>
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<tr>
<td>- U.O. &lt; 15 mL/hr, Increase by 20%</td>
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<tr>
<td>- U.O. = 15-29 mL/hr, Increase by 10%</td>
</tr>
<tr>
<td>- U.O. = 30-50 mL/hr, No change</td>
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<tr>
<td>- U.O. &gt; 50 mL/hr, Decrease by 10%</td>
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<tr>
<td>- When total fluid rate = maintenance fluid rate, stop albumin and use LR for total fluid rate.</td>
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<tr>
<td>- DO NOT give fluid bolus unless treating acute hypotension (SBP&lt;60) and then immediately contact Burn service.</td>
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<th>Maintenance Fluid Rate</th>
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<td>- Used after resuscitation is complete and includes enteral nutrition - 1500 mL x BSA (m²)</td>
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Baseline Pain Management

Patients with burn injury often experience an initial underlying pain associated with the injury. **Oxycodone 5-10 mg PO every 4 to 6 hours as needed is recommended for pain management.** Higher doses of oxycodone or alternate agents may be considered for patients who are not opioid naïve or who have ongoing pain despite starting doses.

In the intensive care unit, the use of early enteral methadone has been associated with decreased days on the ventilator and may be considered for patients requiring intubation or with extensive opioid requirements outside of dressing changes.

Pain Management during Wound Care: SICU, 9 West Doan

- Refer to the [SICU Pain and Anxiolysis Management Protocol](#)
- Refer to the [9WD Dressing Change Pain and Anxiolysis Management Protocol](#)
- **Note:** Should a patient require continuous infusion sedation or analgesia, follow the OSUWMC Surgical ICU, & Ross Sedation and Analgesia Protocol.

Burn Pearls and Special Situations

### Compartment Syndrome Monitoring

- Neuromuscular exam and peripheral pulses of affected extremities should be monitored hourly for the first 24 hours.
  - For patients who cannot give a reliable neuromuscular exam, peripheral pulses of affected extremities should be assessed hourly and serial measurements of compartment pressures should be considered.
- Bladder pressure should be monitored every 6 hours for patients receiving colloid resuscitation at greater than 1.5 times initial Parkland protocol calculated rate until resuscitation is completed.

### Inhalation Injury

- Bronchoscopy should be obtained in all patients requiring intubation with suspicion of inhalation injury
- Close observation is reasonable for adult patients with suspicion of inhalation injury who have not required intubation
- Patients with burn injury secondary to home oxygen are at low risk for inhalation injury unless trapped in enclosed area. Decision for intubation should be guided by potential exacerbation of underlying lung condition.

### Electrical Burn Injury

- Soft tissue damage may exceed the size of the cutaneous burn
- High voltage injuries are at risk of spinal fractures and should have trauma spinal precautions
- Calculated fluid resuscitation needs are difficult to determine. Fluid resuscitation should target a higher urine output if chromogens are present (50–100 ml/hr)
- Recommend checking CK and troponin every 8 hours for 24 hours

### Carbon Monoxide / Cyanide Toxicity

- Check carboxyhemoglobin
  - Administer oxygen
  - For patients requiring ICU level care, hyperbaric treatment is not recommended
- Cyanide levels require send out and take > 24 hours to result. For this reason, cyanide levels are not helpful in the acute setting. If cyanide toxicity is suspected empiric treatment should be initiated without respect to a level
  - Hydroxocobalamin 5g IV over 15 minutes and may consider repeating once for a total of 10 grams

### Alcohol Intoxication

- May increase volume of fluid needed for resuscitation
  - Adjust fluids to maintain U.O. = 30-50 ml/hr
- If concerns for alcohol withdrawal, see OSUWMC Alcohol Withdrawal guideline

### Frostbite

- Consult Burn Service as soon as possible once frostbite is recognized
  - Treatment for frostbite is time sensitive
- Refer to Frostbite Thrombolysis Protocol

### Oxandrolone

- Start oxandrolone 10 mg every 12 hours for patients with TBSA > 20% to decrease hospital length of stay and improve wound healing.
- Oxandrolone should not be initiated during the first 48 hours of resuscitation.

### Propranolol

- Can be considered to help attenuate the increased catecholamine release associated with burn injury to improve wound healing
- Initial dose of ~1 mg/kg/day divided and titrated to achieve heart rate reduction of 20%
Nutrition

- Begin tube feeding as soon as possible
  - **GOAL: within 6 hours of admission**
- Insert nasoduodenal (preferred) or nasogastric tube
  - Parenteral is discouraged
- Volume based enteral nutrition (EN) is utilized once patient tolerate goal rate
- Enteral nutrition order will be placed with the hourly goal rate and total volume to be infused over the course of 24 hours.
  - At the end of every 4 hour period, the nurse will assess the EN intake tolerance and will titrate the tube feed rate to achieve the 24 hour goal volume intake.
  - Maximum infusion rate will be 150 ml/hr. Change in rate should be clearly documented in the medical record.
  - The registered dietitian will evaluate nutritional goal, actual intake, wound status, EN tolerance and nutritional status.
  - The tube feeding regimen will be adjusted as indicated.

Initial Burn Wound Care in the ED

- Irrigate caustic chemicals
- Remove foreign debris from wound site
- Debridement of smaller wounds may be appropriate in conjunction with burn center
- Apply clean and dry wound dressing until definitive wound care treatment is ordered

Tetanus

- Determine date of last tetanus toxoid vaccine.
- If > 5 years or unknown, administer:
  - Tetanus toxoid vaccine: Tdap (with pertussis), or Td 0.5 ml IM x 1
- If patient has had less than 3 doses of Tdap in their lifetime or if unable to assess administer:
  - Tetanus immune globulin (250 units IM x1)
- If both are given, they should be administered in opposite limbs

Order Set

- BURN: 9 WEST DOAN PROCEDURE CARE [1684]
- BURN: ADMISSION CRITERIA CRITICAL CARE BURN [2111]
- BURN: ADMISSION NON ICU ADMISSION BURN [2109]
- BURN: FOCUSED WOUND CARE [2171]

References


Quality Measures

- Fluid resuscitation is started in the Emergency Department on arrival
- Percent of burn patients with Burn Service Consult on admission
- American Burn Association Registry Quality Measures

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Reviewed by: Burn Quality & Safety Committee

Guideline Approved

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Disclaimer: Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.