Primary A-B-C-D-E Survey

- **Airway:** Decision to intubate should be based on physician judgment. Assess for any of these 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
  - Maintain temperature
  - Cover with dry sheets and blankets to prevent hypothermia

Secondary Survey

- Complete head-to-toe examination
- Calculate burn total body surface area (TBSA)

Fluid Resuscitation

Fluid protocols are **guidelines only**. Use as a starting point.

- Adjust fluids according to individual response
- **GOAL:** Urinary output (U.O.) 0.5–1.0 ml/kg/hr (actual body weight)
- Insert urinary catheter; consider placement of central line.

Burns < 15% TBSA

- Fluid resuscitation rarely needed
- Consider outpatient treatment

Burns 15-40% TBSA without Inhalation Injury

**Parkland Formula**

- **Initial Fluids**
  - LR 4 ml x % TBSA x weight (kg)
  - **For the first hour only**, calculate infusion rate, based on one-half the total fluid over 8 hrs.
  - **After the first hour**, titrate LR, based on hourly U.O. for the first 48 hours post-burn
    - U.O. < 0.5 ml/kg/hr, increase by 30%
    - U.O. 0.5–1 ml/kg/hr, keep at current rate
    - U.O. > 1 ml/kg/hr, decrease by 30%

**West Penn Formula**

- **Initial Fluids**
  - LR at 83 ml/hr at a constant rate.
  - **DO NOT INCREASE** for the first 48 hours post-burn
  - FFP 75 ml/kg / 24 = hourly rate for initial rate, then titrate. FFP titration based on hourly U.O. for the first 48 hours
    - U.O. < 0.5 ml/kg/hr, increase by 30%
    - U.O. 0.5–1 ml/kg/hr, no change
    - U.O. > 1 ml/kg/hr, decrease by 30%

**DO NOT** give fluid bolus unless directed by Burn Attending.

Burns > 40% TBSA or 30% with Inhalation Injury

**West Penn Formula**

- **Initial Fluids**
  - LR at 83 ml/hr at a constant rate.
  - **DO NOT INCREASE** for the first 48 hours post-burn
  - FFP 75 ml/kg / 24 = hourly rate for initial rate, then titrate. FFP titration based on hourly U.O. for the first 48 hours
    - U.O. < 0.5 ml/kg/hr, increase by 30%
    - U.O. 0.5–1 ml/kg/hr, no change
    - U.O. > 1 ml/kg/hr, decrease by 30%

**DO NOT** give fluid bolus unless directed by Burn Attending.

Pain Management during Wound Care: SICU

Consider lower doses for opioid-naïve and elderly patients.

**Analgesia:**

- **Morphine sulfate** 4-12 mg IV every 15 minutes prn for pain score > 4/10 during dressing change
  - Initial dose 10 minutes before treatment to start
- **Hydromorphone** 1-2 mg IV every 15 minutes prn for pain score > 4/10 during dressing change
  - Initial dose 10 minutes before treatment to start
• Ketamine should be considered as an additive analgesic for patients who are refractory to standard management of burn dressing changes using morphine with midazolam or hydromorphone with midazolam
  o Administer ketamine 50-100 mg IVP, over at least 1 minute, immediately prior to dressing change
    ▪ Ketamine has a very fast onset (1–2 minutes)
    ▪ If needed, may administer 50 mg IV every 15 minutes prn pain score > 4/10 during dressing change
    ▪ Max dose 200 mg IVP per dressing change
  o Ketamine MUST be given as a slow IVP over at least 1 minute in order to prevent emergence phenomenon (e.g., vivid dreams, hallucinations, delirium)
    ▪ In addition, ketamine MUST always be given with a benzodiazepine (e.g., midazolam, lorazepam) in order to prevent emergence phenomenon

Anxiolysis:
• For initial dressing change dose titration:
  o **Midazolam** 2–5 mg IV
    ▪ **10 minutes before start of treatment**
    ▪ Wait at least 2 minutes to evaluate for effect
  o If necessary, continue to titrate to maximum total dose of 5 mg using 1 mg increments to the appropriate level of patient comfort
  o Document total amount given during titration phase for future use during dressing change
  o May repeat total titration dose every 1 hour prn during dressing change if duration > 60 minutes
• For subsequent dressing changes:
  o **Midazolam** dose based on titration during initial dressing change
    ▪ Review dose documented for previous dressing changes
    ▪ Administer dose 10 minutes prior to start of treatment
    ▪ May repeat dose every 1 hour prn during dressing change if duration > 60 minutes

Note: Should a patient require continuous infusion sedation or analgesia, follow the **OSUWMC Surgical ICU, Neurocritical Care, & Ross Sedation and Analgesia protocol**.

Pain Management During Wound Care: Burn Center

Analgesia:
• **Oxycodone/acetaminophen** 5/325 mg 1-2 tabs PO 60 minutes prior to dressing change
  o May repeat during dressing change if duration greater than 1 hour
• **Fentanyl citrate (Actiq)** 400 mcg transmucosal lozenge every 15 minutes for 2 doses prn for pain score > 8/10 during dressing change
  o **Initial dose 10 minutes before treatment to start**
  o If patient has had previous dressing changes, initial dose can be altered (contact prescriber to update orders) based on prior opioid tolerance
    ▪ If patient does not tolerate dressing change with transmucosal fentanyl, IV analgesia with hydromorphone or morphine can be considered

Anxiolysis
• For initial dressing change dose titration:
  o **Midazolam** 1-3 mg IV (**10 minutes before start of treatment**)
    ▪ Give midazolam 1 mg and wait at least 2 minutes to evaluate for effect
    ▪ If necessary, may administer up to maximum total dose of 3 mg using 0.5 mg increments based on patient's level of anxiety
    ▪ Document total amount given during initial dressing change for future use during dressing change
    ▪ May repeat total dose every 1 hour prn during dressing change if duration > 60 minutes
• For subsequent dressing changes:
  o **Midazolam** dose based on total dose used during initial dressing change
  o Patients receiving IV midazolam on the burn center floor are required to have specific monitoring per protocol

Special Burn Populations

Major Burns, Inhalation Injury, Shock, or Elderly
• Monitor U.O. and peripheral pulses to affected extremities hourly
  o Goal for U.O. is 0.5–1.0 ml/kg/hr
• Add arterial line to monitor BP and blood gases

Carbon Monoxide / Cyanide Toxicity
• Monitor carboxyhemoglobin
• Administer oxygen
• Consider administration of sodium thiosulfate as cyanide antidote if not already given by EMS
• Consult Hyperbaric Medicine
Electrical Injury
- Monitor U.O. hourly, urine myoglobin x 1
- Obtain serial CK and troponin x 24 hrs
- If port-wine-colored urine, titrate IV fluids to U.O. 1.0−2.0 ml/kg/hr until urine clears
- After urine clears, adjust fluids to maintain IV fluids to U.O. 0.5−1.0 ml/kg/hr

Alcohol Intoxication
- May increase volume of fluid
  - Adjust fluids to maintain U.O. 0.5−1.0 ml/kg/hr.
- If symptoms of 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

Nutrition
- Begin tube feeding as soon as possible
  - GOAL: within 6 hours from admission
- Insert nasoduodenal (preferred) or nasogastric tube
- Enteral better than parenteral
- May be proportional to TBSA involved
- Immune modulating nutrition with glutamine

Burn Wound Care
- Clean and debride wound
- 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 both:
  - Tetanus toxoid vaccine: Tdap (with pertussis), or Td 0.5 ml IM x 1, and
  - Tetanus immune globulin (250 units IM x 1)

Reference

Quality Measures
- Average time from admission to first tube feeding
  - Percent of patients who received first feeding within 6 hours of admission
- Average time from admission to fluid resuscitation
  - Parkland Formula
  - West Penn Formula
- Percent of patients admitted to services other than Burn
  - Appropriateness of off service admission based on ABA criteria
  - Percent with a Burn Service Consult upon admission

Guideline Authors
- Larry Jones, MD
- Rebecca Coffey, RN, CNP
- Claire Murphy, PharmD, BPS
- Andrea Bigley, RN

Guideline Approved

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.