



Burn Injury Guidelines For Care



REGION VII DISASTER HEALTH RESPONSE ECOSYSTEM (R7DHRE)

BURN SPECIALTY TEAM

This document is intended as a supplement for discussion with your local burn center.

First Responders:

Considerations when transferring burn patients

For burn patient transport from the scene to the hospital, ambulance heating should be maximized to avoid cooling the patients:



- Warming pads
- Extra blankets
- Warm IV fluids if possible

Priorities for Initial Burn Care





Initial burn care priorities should include:

- Airway security
- Accurate TBSA assessment
- Initiations of fluids
- Prevention of hypothermia

SURGERY IS NOT AN IMMEDIATE NEED OF THE BURN PATIENT!

Wound Evaluation

It is not always possible to know burn depth for days.
Appearance may be deceiving and injury may deepen.

Wound	Depth of Injury	Wound Properties
<p>Superficial (1st degree) <i>These wounds are not included in the % TBSA</i></p> 	Limited damage to the epidermis, skin intact	<ul style="list-style-type: none">• Painful• Red• No initial blister formation
<p>Superficial (2nd degree)</p> 	Epidermis destroyed, minimal damage to superficial layers of dermis	<ul style="list-style-type: none">• Pink or red• Moist• Weepy• Blanching• Blisters• Painful
<p>Deep (2nd degree)</p> 	Epidermis and deeper layers of dermis involved	<ul style="list-style-type: none">• Red to pale red or pink• Painful• Drier than superficial dermal injury
<p>Full thickness (3rd degree)</p> 	All epidermis and dermis destroyed	<ul style="list-style-type: none">• Cherry red, white, black, brown• Hard and leathery• Insensate

Initial Assessment of Burn Patient

The initial assessment of the burn patient is like that of any trauma patient: recognizing and treating life/limb-threatening injuries. Many patients with burns also have associated trauma. Do not let the appearance of the burn overwhelm you! Initially assess and treat these patients as you would any other trauma patient.

The primary survey consists of the following:

- Airway maintenance with cervical spine protection
- Breathing and ventilation
- Circulation and cardiac status with hemorrhage control
- Disability, neurological deficit and gross deformity
- Exposure (completely undress the patient, examine for major associated injuries and maintain a warm environment)

The burning process must be stopped during the primary survey. Cool the burn briefly (3-5 minutes) for thermal burns, with cool, but not cold water. Never use ice or cold water. Application of cold results in systemic and localized hypothermia that may compromise acute and long-term burn recovery.

This is especially true in a pediatric patient who has limited ability to maintain core body temperature. If the patient, someone else at the scene, or EMS has already cooled the burns, immediately remove all wet dressings and cover with a clean, dry covering. Apply blankets to start re-warming the patient.

In general:

- Patients with burn injuries do not typically develop shock within 60 minutes from time of injury if left untreated, unless there are associated injuries or medical conditions in addition to the burn.
- Acute burns do not bleed! If there is bleeding, look for an associated injury.
- Patients with traumatic injuries or inhalation injuries may require additional fluid.
- Brush powdered chemicals off skin, then flush with copious amounts of water.

Primary Survey

- Airway
- Breathing
- Circulation
- Disability
- Exposure (remove clothing and jewelry)

Airway Maintenance with Cervical Spine Protection

- Access airway immediately! The airway may be controlled with a chin lift, jaw thrust or insertion of the oral airway.
- If intubation is necessary, ensure the ETT is secured well. Tape does not work to secure tubes with facial burns
- Be sure to protect the cervicospine in those patients whom cervical spine injury is suspected.

Breathing and Ventilation

- Listen to the chest and verify bilateral, equal breath sounds.
- High flow oxygen is started on each patient at 15L (100%), using a non-rebreather mask.
- Watch breathing effort closely, especially in circumferential torso burns. A chest escharotomy may be indicated.
- Recognize that respiratory distress may be due to a non-burn condition such as a pre-existing medical condition or a pneumothorax from an associated injury.

Circulation and Cardiac Status

Circulatory compromise may be indicated by progressive pain, pallor, pulselessness, paresthesia, paralysis and coolness of the extremities (5 Ps).

Placing an IV/IO through burned skin is necessary. Secure in place with Kerlixor Coban, monitor for swelling of the extremity and circulatory compromise.

Initial recommended guidelines for fluid resuscitation rates:

5 years or younger	125 ml/hour
6 – 12 years	250 ml/hour
13 years or older	500 ml/hour

Disability

Typically, burn patients are alert and oriented. If not, consider associated injury, carbon monoxide poisoning, substance abuse, hypoxia, or pre-existing medical conditions.

Begin assessment by determining the patient's level of consciousness:

AVPU Method

A – Alert	V – Responds to verbal stimuli
P – Responds only to painful stimuli	U - Unresponsive

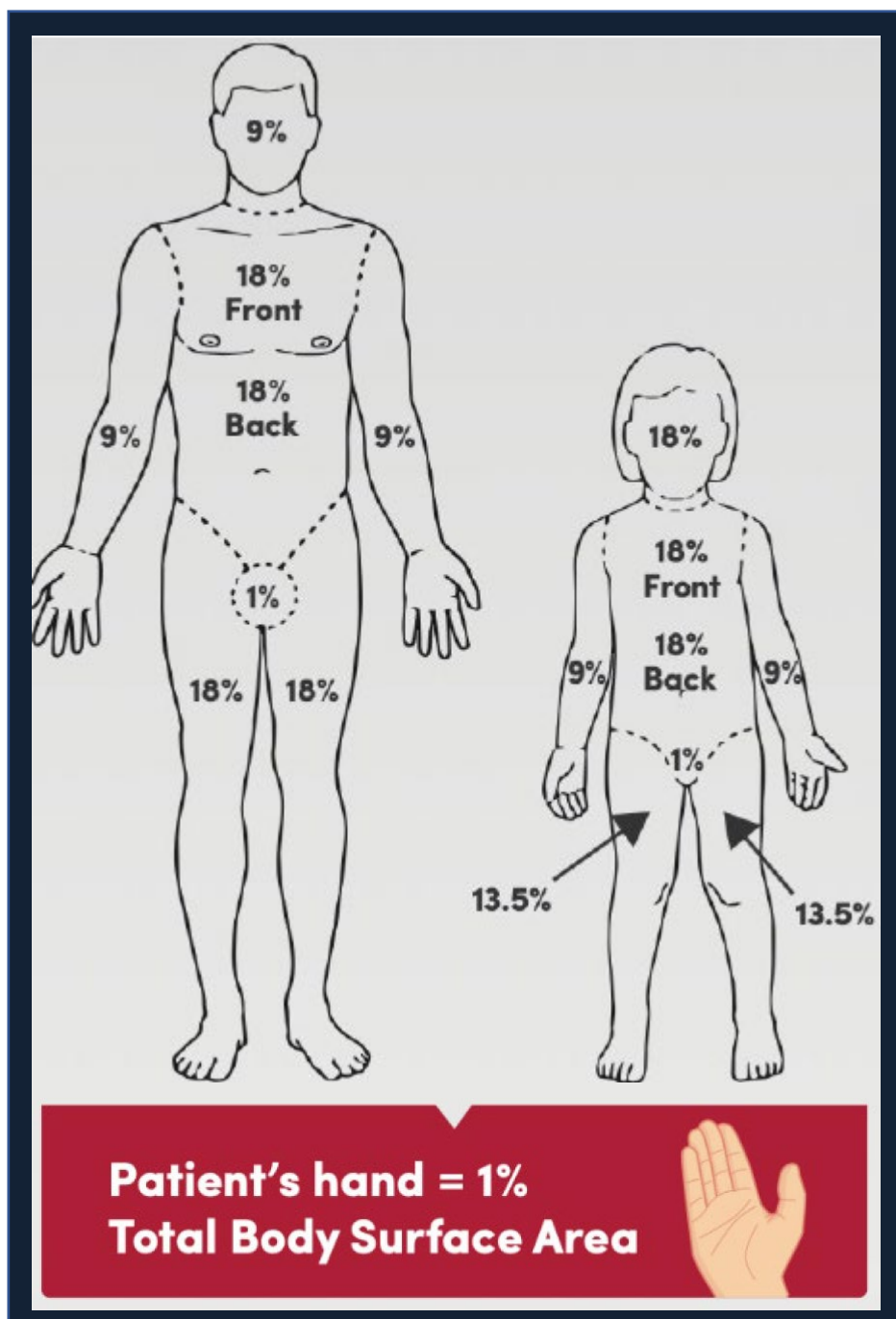
Glascowcoma scale (GCS) –more definitive tool used to assess depth and duration of coma, and used to follow the patient's level of consciousness.

Exposure and Environmental Control

- Expose and completely undress the patient, **E**xamine for major associated injuries and maintain a warm **E**nvironment.
- Remove all clothing, jewelry/body piercings, shoes and diapers to complete the primary survey. If any material is adherent to the skin, stop the burning process by cooling the adherent material, cutting around it and removing as much as possible.
- Patients who are wearing contact lenses, with or without facial burns, should have the lenses removed. Contact lenses need to be removed before facial and periorbital edema develops. Chemicals may also adhere to the lenses and present further problems.
- Maintaining the patient's core body temperature is a priority. The EMS transport vehicles and treatment room should be warmed and, as soon as the primary survey is complete, the patient should be covered with dry sheets and blankets to prevent hypothermia. Warmed intravenous fluid (37-40°C) may also be used for resuscitation.

Extent of Burn

Rule of Nines –used as a guide for making initial estimate of burn extent in 2nd and 3rd degree burns. The “Rule of Nines” is based on the fact that, in the adult, various anatomic regions represent approximately 9% -or multiple thereof –of the Total Body Surface Area (TBSA).



The size of the patient's hand –including the fingers –represents approximately one percent of his/her total body surface area. Therefore, using the patient's hand-size as a guideline, the extent of irregularly scattered burns can be estimated.

Burn Depth

The depth of tissue damage due to a burn is largely dependent on four factors:

- Temperature of the offending agent
- Duration of contact with the burning substance
- Thickness of the epidermis and dermis
- Blood supply to the area

Temperature vs. Duration

The higher the temperature of the heat source, the less time it takes to sustain a serious brain injury, **AND** The longer the time of exposure to a heat source, the deeper the tissue injury.

Secondary Survey

- Head to toe examination
- Medical history
- Mnemonic "AMPLE"
 - A**llergies
 - M**edications
 - P**ast medical history, pregnancy
 - L**ast meal or drink
 - E**vents/environment related to injury

The secondary survey does not begin until the primary survey is completed and after initial fluids are started. A secondary survey includes the following elements:

- History (injury circumstances and medical history)
- Accurate pre-injury patient weight
- Complete head-to-toe evaluation of the patient
- Determination of percent Total Body Surface Area burned
- Apply adjusted fluid rates after TBSA determination
- Obtain indicated labs and x-rays
- Monitor fluid resuscitation
- Pain and anxiety management
- Psychosocial support
- Wound care

The burn is often the most obvious injury, but other serious and even life-threatening injuries may be present. A thorough history and physical examination are necessary to ensure that all injuries and pre-existing diseases are identified.

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Category	Age and Weight	Age and Weight
Flame or scald	Adults and older children (≥14 years old)	2 ml LR x kg % TBSA
	Children (≥14 years old)	3 ml LR x kg % TBSA
	Infants and young children (≥30kg)	3 ml LR x kg % TBSA Plus D ₅ LR at maintenance rate
Electrical injury	All ages	4 ml LR x kg % TBSA Plus D ₅ LR at maintenance rate For infants and young children

Check the patient's urinary output and physiological response to decide further fluid titration. It is better to increase fluids based on response than to attempt to remove excess fluids once given.

Some patients, including those with a delayed start of fluid resuscitation, prior dehydration, chronic or acute alcohol use or abuse, methamphetamine lab injuries, high voltage electrical injuries, or inhalation injuries may require more than the estimated fluids. Again, the adjustments to fluid rates are based on patient response.

Rule of 10 Resuscitation Formula

“Rule of 10” resuscitation formula may be used as an alternative to the above formula when managing a large number of burn patients.

Simplifies fluid resuscitation by providers who possibly have to resuscitate a large number of patients at the same time and reduces potential for error with other formulas.

**For adult patients weighing between 40kg and 80kg:
Estimate burn size to the nearest 10**

$\% \text{ TBSA burned} \times 10 = \text{IV Fluid Rate}$
**Example: 35% TBSA x 10 = 350 ml/hour of LR*

For every 10kg above 80kg, increase the fluid rate by 100 ml/hour

Wound Care

Wound Care

- Does not have to be fancy or complicated!
- Burn wounds do not bleed! If there is bleeding, look for another source.
- Wound care should never take priority over ABCs.
- Clean debris from wounds with soap and water.
- Keep wounds covered with dry sheet or dressings (if delay in transfer) to minimize patient discomfort and drying out of the wounds.

Initial Wound Care/Dressings for 2nd and 3rd Degree Burns

- Silvadene cream
- Bacitracin/Adaptic/Xeroform
- Gauze
- Netting/tubing gauze/tape

Pearls:

- Avoid Silvadene on the face! Bacitracin is appropriate.
- More of a cream is not better.
- May use Silvadene topically even if Sulfa allergy in burns <30%.
- Monitor any and all extremity wraps for constriction as edema develops.

Resource Triage Diagram for Burn Injury in a Disaster

Age	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	≥90
Burn size group, % TBSA all										
0-1.99	Very high	Very high	High	High	High	Medium	Medium	Medium	Low	Low
2-4.99	Outpatient	Very high	High	High	High	Medium	Medium	Medium	Low	Low
5-19.99	Outpatient	Very high	High	High	High	High	Medium	Medium	Low	Low
20-29.99	Outpatient	Very high	High	High	High	Medium	Medium	Medium	Low	Low
30-39.99	Outpatient	Very high	High	High	Medium	Medium	Medium	Low	Low	Expectant
40-49.99	Outpatient	Very high	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
50-59.99	Outpatient	Very high	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant
60-69.99	Outpatient	High	Medium	Medium	Low	Low	Low	Expectant	Expectant	Expectant
≥70	Very high	Medium	Low	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant
Burn size group, % TBSA no inhalation injury										
0-1.99	Very high	Very high	High	High	High	High	Medium	Medium	Medium	Medium
2-4.99	Outpatient	Very high	High	High	High	High	High	Medium	Medium	Medium
5-19.99	Outpatient	Very high	High	High	High	High	High	Medium	Medium	Low
20-29.99	Outpatient	Very high	High	High	High	Medium	Medium	Medium	Medium	Low
30-39.99	Outpatient	Very high	High	High	Medium	Medium	Medium	Low	Low	Expectant
40-49.99	Outpatient	Very high	High	High	Medium	Medium	Medium	Low	Low	Expectant
50-59.99	Outpatient	Very high	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant
60-69.99	Very high	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant
≥70	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant
Burn size group, % TBSA with inhalation injury										
0-1.99	High	Medium	Medium	Medium	Medium	Medium	Low	Low	Expectant	Expectant
2-4.99	High	High	High	High	High	Medium	Medium	Medium	Low	Low
5-19.99	High	High	High	High	Medium	Medium	Medium	Medium	Low	Low
20-29.99	Very high	High	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
30-39.99	Very high	High	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
40-49.99	Very high	High	Medium	Medium	Medium	Low	Low	Low	Low	Expectant
50-59.99	High	Medium	Medium	Medium	Medium	Low	Low	Expectant	Expectant	Expectant
60-69.99	Medium	Medium	Medium	Low	Low	Low	Expectant	Expectant	Expectant	Expectant
≥70	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant	Expectant

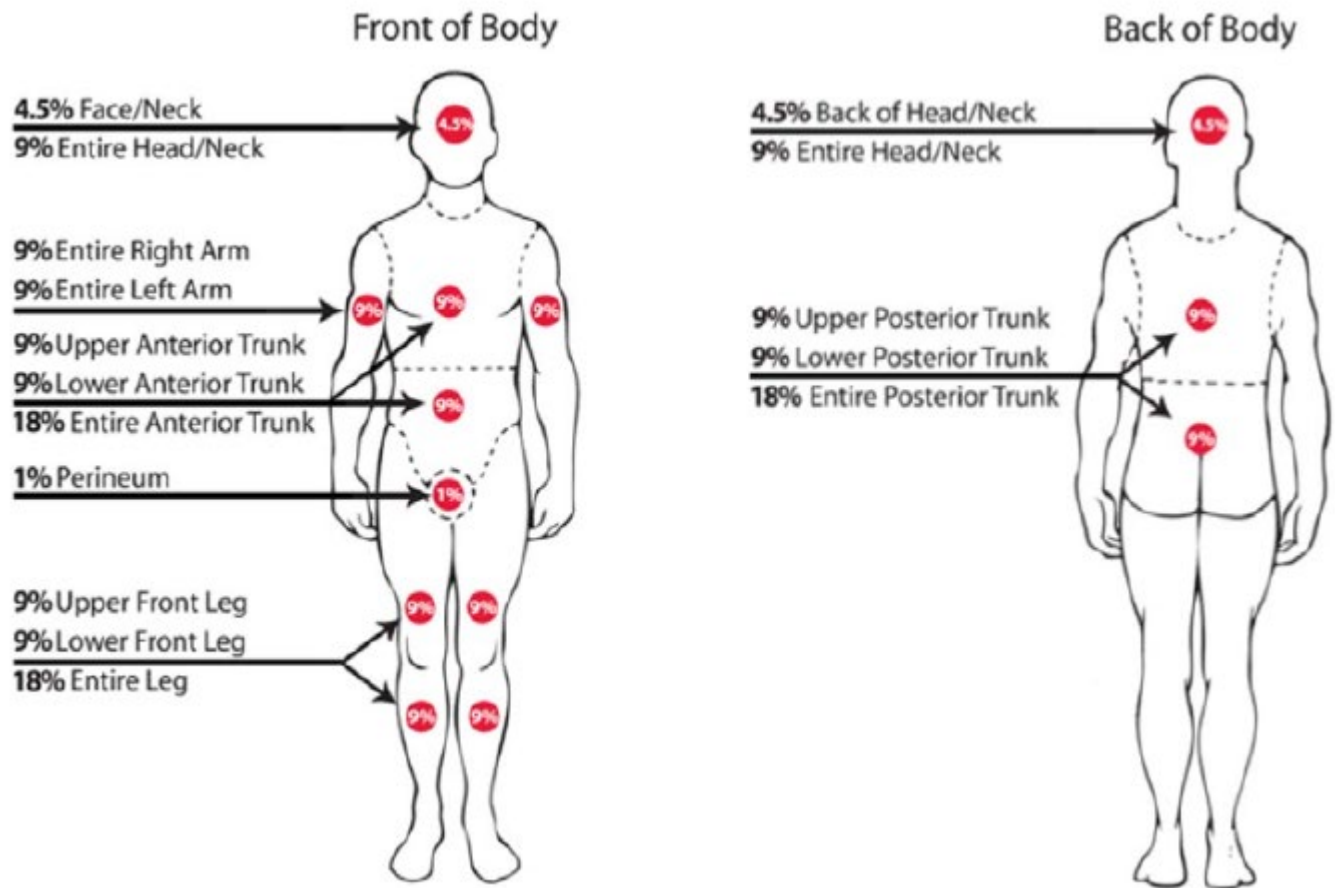


Figure 1. Depiction of the Rule of Nine's and Palmar Method of burn size estimation. For the Rule of Nine's, each body region has a surface area in a multiple of nine. In the Palmar Method, the patient's palm represents approximately 1% of that patient's BSA. Reprinted with courtesy from The Burn Center at Saint Barnabas Medical Center, Livingston, New Jersey.

Disclaimer: This guideline is intended to be an informational reference only and should not be used as a substitute for consultation with the burn center, and/or the clinical judgement of the bedside team.

DO NOT REVISE. Contact Judy Placek (juplacek@nebraskamed.com) for permission to modify or to provide suggestions for updates. Check <https://www.regionviidhre.com/burn-team> for the latest version.

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