



BURN RESOURCE MANUAL 2024



**COUNTY OF LOS ANGELES DEPARTMENT OF HEALTH SERVICES
EMERGENCY MEDICAL SERVICES AGENCY
DISASTER SERVICES**

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TABLE OF CONTENTS

1. BURN CARE PLAN

Introduction and Background

2. BURN RESOURCE CENTER DESIGNATION AND ACTIVATION POLICY

3. APPENDICES

Appendix A: Burn Care Resources – LA County and surrounding area

Appendix B: Trauma Centers (Burn Resource Centers)

Appendix C: Triage Decision Table for Burn Mass Casualty Disaster

Appendix D: Patient Transport Form

Appendix E: Measuring Total Body Surface Area Burn

Appendix F: Fluid Resuscitation

Appendix G: Inhalation Injury

Appendix H: Escharotomy

Appendix I: Wound Care

Appendix J: Nutrition

Appendix K: Local and Regional References & Resources



BURN CARE PLAN

INTRODUCTION AND BACKGROUND

In 2007, as participants in the United States Department of Health and Human Services Hospital Preparedness Program, Los Angeles County Emergency Medical Services Agency (EMSA) was tasked with creating a plan to surge 150 burn beds in the event of a multi-casualty burn disaster. There are currently 62 burn beds available in Los Angeles County. In the event of a burn mass casualty incident (BMCI), where the number and severity of burn victims exceed the capacity and capability of burn resources, more resources will be required in a tiered approach. A Burn Task Force was created, consisting of a multi-disciplinary group of medical directors and administrative nurses from burn centers in Los Angeles, Orange, and San Bernardino Counties.

The most viable method of surging beds was to utilize the hospitals already committed to our established trauma system. The trauma program in Los Angeles County includes 15 Level I and Level II Trauma Centers (TC). Each of these 15 hospitals are designated as a Burn Resource Center (BRC). They are prepared to accept up to twenty burn patients in the event of a burn disaster and maintain a cache of pharmaceuticals, medical supplies, and equipment.

The purpose of this manual is to provide hospital management guidelines in a multi-casualty burn disaster that can significantly overwhelm the current system and warrant health providers' attention. First, it will provide information on the activation of the multi-casualty burn disaster care plan in Los Angeles County. Secondly, it provides information for medical personnel pertaining to the triage, initial care, and early management of patients with burn injuries. This document has been reviewed and updated (2010, 2017, and 2023) to reflect current

guidelines and best practices.



BURN RESOURCE CENTER DESIGNATION AND ACTIVATION POLICY

REFERENCE NO. 1138

REVISED: 01-01-24

PURPOSE: To define the role of a Burn Resource Center (BRC) and provide guidelines for the utilization of BRCs and the management of burn patients during a burn disaster in Los Angeles (LA) County.

AUTHORITY: Pandemic and All-Hazards Preparedness Act (PAHPA) (Public Law 109-417) Hospital Preparedness Program - Trauma Center Scope of Work.

DEFINITIONS:

Administrator on Duty (AOD): Administrator on Duty with the Los Angeles County (LAC) Emergency Medical Services (EMS) Agency.

Burn Center: A specific area within the hospital that has committed the resources necessary to meeting the criteria for a burn center. This area contains beds and other equipment related to care of patients with burn injury. Hospitals are either approved by the American Burn Association (ABA) or self-designated as burn centers.

BURN INJURY:

Major/Critical:

1. Adult patients (15 years of age or older) with 2nd degree (partial thickness) and/or 3rd degree (full thickness) burns involving equal to or greater than 20% of Total Body Surface Area (TBSA)
2. Pediatric patients (14 years of age or younger) with 2nd degree (partial thickness) and/or 3rd degree (full thickness) burns involving equal to or greater than 10% of TBSA

Minor:

1. Adult patients (15 years of age or older) with 2nd degree (partial thickness) and/or 3rd degree (full thickness) burns involving less than 20% of TBSA.
2. Pediatric patients (14 years of age or younger) with 2nd degree (partial thickness) and/or 3rd degree (full thickness) burns involving less than 10% of TBSA.

Burn Resource Center (BRC): A BRC is a designated trauma center in LA County that has agreed to provide medical care for up to 20 critically burned patients for a minimum of 72 hours.

A BRC shall:



1. Be licensed by the State Department of Health Services as a general acute care hospital.
2. Maintain a special permit for basic or comprehensive emergency medicine service.
3. Be designated by LAC EMS Agency as a Trauma Center.
4. Sign a written commitment with the LAC EMS Agency to become a BRC.

Burn Surge Plan Activation: An incident resulting in 20 or more burn patients or any event that exceeds burn care resources available in LAC.

Local Burn Lead Specialist: A Medical Director (or designee) from a burn center in LA County who will be available to provide assistance to the AOD and the Medical Alert Center (MAC) in triaging and placement of critically injured burn patients, in accordance with Ref. No. 1138.2, Local Burn Lead Specialist Call Panel.

Remote Burn Lead Specialist: A Medical Director from a burn centers located outside greater LA County (Orange County, San Bernardino County, San Francisco, San Diego, and Sacramento) who can provide assistance to the AOD/MAC in triaging and placement of patients in the event that the Local Burn Lead Specialist is unavailable due to the magnitude of the incident, in accordance with Ref. No. 1138.3, Remote Burn Lead Specialist.

PRINCIPLES:

1. As a recipient of the Hospital Preparedness Program (HPP) grant, LAC must work with healthcare entities to ready hospitals and supporting healthcare systems to deliver coordinated and effective care to victims of a multi-casualty burn disaster.
2. In the event of a multi-casualty burn disaster, LAC may not have sufficient resources to manage an influx of patients; therefore, the BRC program was developed to enhance burn surge capacity through:
 - a. The provision of pharmaceuticals, medical supplies, and equipment required to manage burn patients in Ref. No. 1138.1, Burn Resource Center Required Equipment/Supplies/Pharmaceuticals.
 - b. The provision of training and resource materials to BRC staff on the management of burn patients.
3. With additional training, pharmaceuticals, medical supplies, and equipment, trauma centers have the personnel and resources to adequately manage critical burn patients.



4. Priority of transfer is determined by facility resources and the patient's probability of survival. Probability of survival is based on TBSA, patient's age, inhalation injuries, and co-morbidities.

5. Transfer of burn patients is coordinated and arranged through the MAC in consultation with a Burn Lead Specialist.

POLICY:

I. The following trauma centers have committed to and are recognized as BRCs:

- A. Antelope Valley Hospital
- B. Cedars Sinai Medical Center
- C. Children's Hospital Los Angeles
- D. Dignity Health-California Hospital Medical Center
- E. Dignity Health- Northridge Hospital Medical Center
- F. Dignity Health- St. Mary Medical Center
- G. Henry Mayo Newhall Hospital
- H. Huntington Hospital
- I. LAC Harbor/UCLA Medical Center
- J. Los Angeles General Medical Center
- K. MemorialCare Long Beach Medical Center
- L. Pomona Valley Medical Center
- M. Providence Holy Cross Medical Center
- N. Ronald Reagan UCLA Medical Center
- O. Saint Francis Medical Center

II. A BRC shall:

- A.** Have a written contractual agreement with LAC EMS Agency to meet the requirements for program participation as specified in the HPP Exhibit.
- B.** Ensure a constant state of readiness by maintaining and replacing pharmaceuticals, medical supplies and equipment listed in Reference No. 1138.1, Burn Resource Center Required Equipment/Supplies/Pharmaceuticals.
- C.** Train a team of physicians and nurses that specialize in emergency and/or intensive care medicine. This team will act as a resource to hospital personnel.
- D.** Provide for on-going training to BRC personnel to manage critically burned patients for a minimum of 72 hours. BRCs may have to provide care to major burn patients beyond 72 hours.
- E.** Provide care for up to 20 major/critical burn patients.

III. Burn Surge Plan Implementation



A. Activation: The LAC EMS Agency AOD in consultation with the Local Burn Lead Specialist, if immediately available, shall activate the BRCs and the Burn Surge Plan.

B. Destination: Burn patient destination guidelines are only in effect when BRCs are activated and include the following :

NOTE: These guidelines are in effect only when BRCs are activated.

1. Major/Critical burn patients or any burn patient meeting trauma criteria shall be transported to the most appropriate BRC. Transportation will be based on available resources during the Multi-Casualty Incident (MCI).
2. Minor burn patients not meeting trauma criteria shall be transported to the most accessible receiving (MAR) facility that is not a BRC.
3. MAC will coordinate distribution of burn patients to the most appropriate receiving facilities throughout the system to avoid inundating a single facility.

C. Transfer: Patient transfer guidelines to Burn Centers.

1. Patient transfer to Burn Centers will be coordinated through the MAC under the guidance of a Burn Lead Specialist.
2. LAC EMS Agency in conjunction with the Burn Centers, will maintain a call panel of Local Burn Lead Specialists (Ref. No. 1138.2), Local Burn Lead Specialist Call Panel who are on call to assist the LA County EMS Agency AOD prioritize and assist burn patient transfers and placement.
3. If a Local Burn Lead Specialist is unavailable, a Remote Burn Lead Specialist may be contacted as indicated in Ref. No. 1138.3, Remote Burn Lead Specialist.
4. The Local Burn Lead Specialist shall be board certified with a specialty in burn management.
5. Priority of transfers:
 - a. Major/critical burn patients at a non-BRC.
 - b. Major/critical burn patients at a BRC.
 - c. Minor burn patients at a non-BRC.
 - d. Minor burn patients at a BRC.

NOTE: BRCs may have to provide care to major burn patients beyond 72 hours.



APPENDIX A:

BURN CENTERS:

LOCAL BURN SPECIALIST

Grossman Burn Center –West Hills Hospital

7300 Medical Center Drive
West Hills, CA 91307
818-981-2050

Southern California Regional Burn Center at Los Angeles General Medical Center

2051 Marengo – Inpatient Tower – 5D
Los Angeles, CA 90033
323-409-7996 OR 323-409-7991

Torrance Memorial Burn Center – 4 East Lundquist Tower

3330 Lomita Blvd
Torrance, CA 90505
310-517-4622

REMOTE BURN SPECIALIST

Bothin Burn Center at St. Francis Medical Center

900 Hyde St.
San Francisco, CA 94109
415- 353-6255

Community Regional Medical Center

Leon S. Peters Burn Center
2823 Fresno Street
Fresno, CA 93271
559- 459-2676

Grossman Burn Center at Bakersfield Memorial Hospital

420, 34th Street
Bakersfield, CA 93301
661-323-2876

Inland Counties Regional Burn Center-Arrowhead Regional Medical Center

400 N. Pepper Ave.
Colton, CA 92324
909- 580-2100



Orange County Global Medical Center

1001 N. Tustin Ave.
Santa Ana, CA 92705
714- 953-2377

Santa Clara Valley Medical Center

751 S. Bascom Ave.
San Jose, CA 95128
408- 885-6666

Shriners Hospital for Children

2425 Stockton Blvd.
Sacramento, CA 95817
916-453-2111

University of California Davis Burn Center

2315 Stockton Blvd.
Sacramento, CA 95817
916-734-3636

University of California Irvine Regional Burn Center

101 The City Drive South
Orange, CA 92868
714- 456-5304

University of California San Diego Medical Center

Dr. Jeanne Lee
200 West Arbor Drive
San Diego, CA 92103
619-543-6502

Zuckerberg San Francisco General Hospital & Trauma Center

1001 Potrero Avenue
San Francisco, CA 94110
628- 206-8000



Contact the Medical Alert Center for all transfers at (866)-940-4401

APPENDIX B:

TRAUMA CENTERS - BURN RESOURCE CENTERS (BRC)

Antelope Valley Hospital Center

1600 West Avenue J
Pasadena, CA 91105
(661) 949-5000

Cedars-Sinai Medical Center

8700 Beverly Boulevard
Los Angeles, CA 90048
(310) 423-3277

Children's Hospital Los Angeles

4650 Sunset Boulevard
Los Angeles, CA 90027
(323) 660-2450

**Dignity Health-California Hospital
Medical Center**

1401 South Grand Avenue
Los Angeles, CA 90015
(213) 748-2411

**Dignity Health-Northridge Hospital
Medical Center**

18300 Roscoe Boulevard
Northridge, CA 91328
(818) 700-2327

**Dignity Health-St. Mary
Medical Center**

1050 Linden Avenue
Long Beach, CA 90813
(562) 491-9000

Henry Mayo Newhall Hospital

23845 West McBean Parkway
Valencia, CA 91355
(661) 253-8000

Huntington Hospital

100 West California Boulevard
Pasadena, CA 91105
(626) 397-5000

LAC Harbor-UCLA Medical Center

1000 West Carson Street
Torrance, CA 90502
(424) 306-8976

Los Angeles General Medical Center

2051 Marengo Street
Los Angeles, CA 90033
(323) 409-1000

MemorialCare Long Beach MC

2801 Atlantic Avenue
Long Beach, CA 80806
(562) 933-2000

Pomona Valley Medical Center

1798 North Garey Avenue
Pomona, CA 91767
(909) 623-8715

Providence Holy Cross

15031 Rinaldi Street
Mission Hills, CA 91345
(818) 365-8051

**Ronald Reagan UCLA Medical
Center**

757 Westwood Plaza
Los Angeles, CA 90095
(310) 825-9111

St. Francis Medical Center

3630 East Imperial Highway
Lynwood, CA 90262
(310) 900-8900



Contact the Medical Alert Center for all transfers at (866)-940-4401
APPENDIX C:

TRIAGE DECISION TABLE FOR BURN MASS CASUALTY DISASTER

The American Burn Association has provided a Triage Decision table based on Age, TBSA and survivability. This grid is intended for mass burn casualty disaster only. It should be used where responders are overwhelmed and transfer possibilities are insufficient to meet needs (*ABLS 2022 Provider Manual, Burn Disaster Management Chapter 10, page 76*).

Triage Decision Table of Benefit-to Resource ratio based on patient Age and Total Burn Size.

This survivability grid utilizes the same 4-color code scheme used for EMS personnel. Survivability will differ if the patient has also sustained an inhalation injury.

FOUR TRIAGE CATEGORIES:

Immediate /Red: immediate treatment needed to save life, limb, or sight (highest priority).

These patients have a higher probability of survival with immediate treatment.

Delayed/ Yellow: less urgent than immediate, but still potential for life or limb threatening issues.

These patients are not in danger of going into immediate cardiac or respiratory arrest. Treatment may be temporarily delayed in order to care for more critical patients.

Minimal/Green: outpatient treatment and returned to duty/home.

These are patients who are ambulatory, alert and oriented and have no life- or limb- threatening injuries. (Note: These "walking wounded" may initially refuse care at the scene, then present at the local hospital for treatment compromising capability assessments).

Expectant/Black: poor prognosis even with treatment (lowest priority).



TO BE USED BY RECEIVING HOSPITAL IN CONSULTATION WITH THE BURN LEAD SPECIALIST.

Burn Size (% TBSA)

Age, in years	Percent TBSA burn size									
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	≥ 90
0-1.9	Green	Green	Yellow	Yellow	Yellow	Red	Red	Red	Grey	Grey
2-4	Green	Green	Yellow	Yellow	Yellow	Red	Red	Red	Grey	Grey
5-19	Outpatient			Delayed		Yellow	Immediate		Grey	Grey
20-29	Green	Green	Yellow	Yellow	Yellow	Red	Red	Red	Grey	Grey
30-39	Green	Green	Yellow	Yellow	Red	Red	Red	Grey	Grey	Grey
40-49	Green	Green	Yellow	Red	Red	Red	Red	Grey	Grey	Grey
50-59	Green	Green	Yellow	Red	Red	Grey	Grey	Grey	Grey	Grey
60-69	Green	Yellow	Red	Red	Low survival, may opt for expectant management					
≥ 70	Green	Red	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey



APPENDIX D:

BURN DISASTER PLAN – PATIENT TRANSPORT FORM

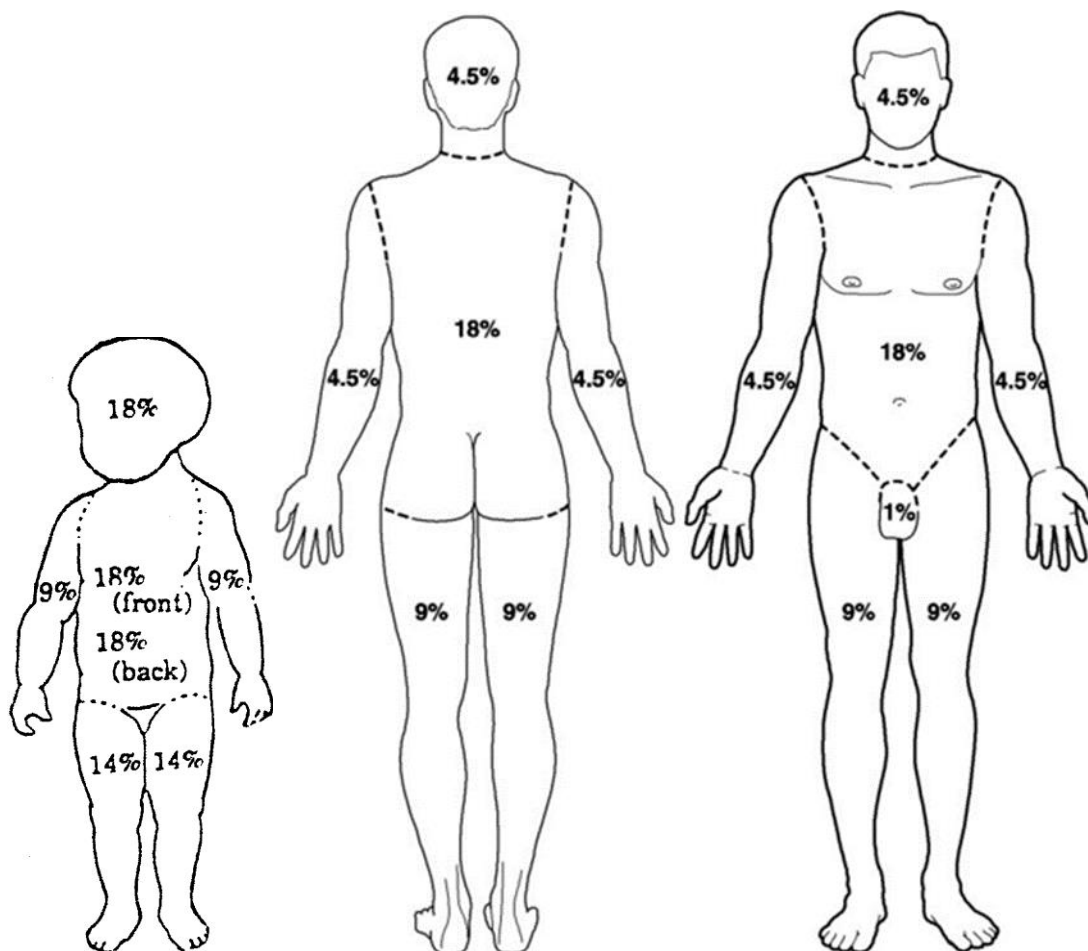
Hospital Name:															
Patient Identification	Sex: Male ___ FEMALE ___ AGE: DOB: Weight: ___ kg														
TRANSFER TO:															
Authorized by:															
Date/Time of Injury	DATE: TIME:														
TBSA Cutaneous Burn Size Total burned surface area ___ % Please mark superficial burns as dots, partial thickness burns as stripes and full thickness burns as solid areas.															
Labs <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Na</td> <td style="width: 33%;">Cl</td> <td style="width: 33%;">BUN</td> <td rowspan="2" style="width: 10%;"></td> </tr> <tr> <td>K</td> <td>CO2</td> <td>Creat Hgb</td> </tr> <tr> <td>WBC</td> <td colspan="2"></td> <td rowspan="2">Pit</td> </tr> <tr> <td>Mag ___</td> <td colspan="2">Phos ___</td> </tr> </table>	Na	Cl	BUN		K	CO2	Creat Hgb	WBC			Pit	Mag ___	Phos ___		
Na	Cl	BUN													
K	CO2	Creat Hgb													
WBC			Pit												
Mag ___	Phos ___														
INHALATION INJURY	NO: ___ POSSIBLE: ___ YES: ___														
OTHER INJURIES	Describe:														
FLUID VOLUME	Total Fluid () ml (Oral + Infused fluid) Infused () ml Fluid () (Duration of infusion) Time														
FLUID TYPE	L/R: () ml Saline: () ml Other: () ml														



Completed by:	Name:	PHONE:
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APPENDIX E:
RULE OF NINES

Estimating Total Body Surface Area (TBSA) Burned



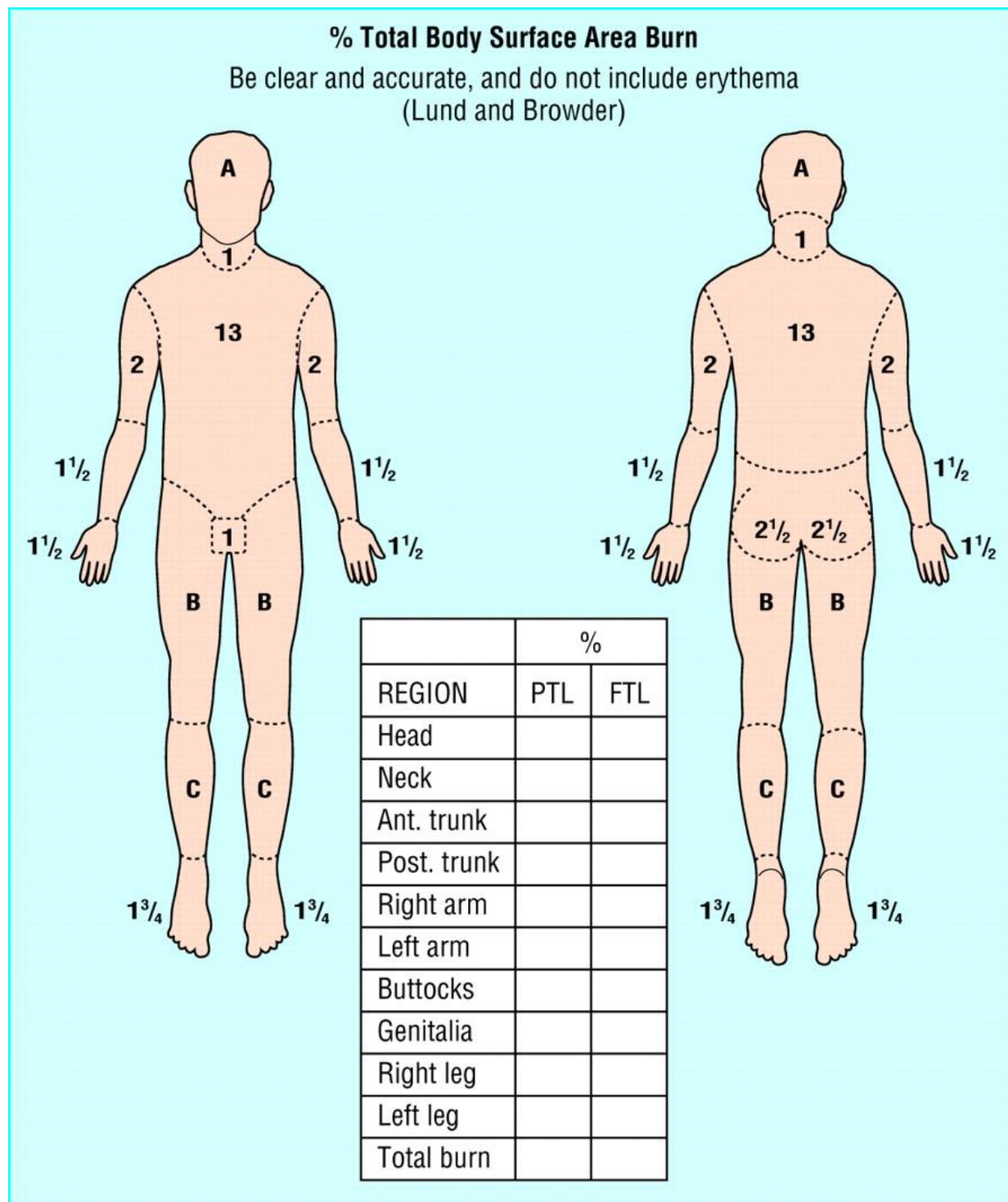
INSTRUCTIONS:

The Rule of Nines is used in the pre-hospital setting. In the adult, the large body parts are designated as either 9% or twice this – 18%.



In a child, the percentages are slightly different. The head of a child is much larger in proportion to the body than in an adult. Therefore, the head is 18%. Notice also that the legs are 14% each, not 18%.

LUND BROWDER DIAGRAM



AREA	Age 0	1	5	10	15	Adult
A = 1/2 OF HEAD	9 1/2	8 1/2	6 1/2	5 1/2	4 1/2	3 1/2
B = 1/2 OF ONE THIGH	2 3/4	3 1/4	4	4 1/2	4 1/2	4 3/4
C = 1/2 OF ONE LOWER LEG	2 1/4	2 1/4	2 3/4	3	3 1/4	3 1/4



APPENDIX F: **RESUSCITATION**

PURPOSE

The purpose of this guideline is to provide the hospital-based physician and staff with information on assessment and management of fluid resuscitation in the burn injured patient. The American Burn Association, Advanced Burn Life Support course curriculum was used as a guideline for preparation of this appendix.

VASCULAR ACCESS AND FLUID OF CHOICE

If peripheral intravenous access is not possible, a central line may be necessary. The intraosseous route may be considered if IV access is not immediately available and cannot be established.

Lactated Ringer's is the fluid of choice for burn resuscitation because it is widely available and approximates intravascular solute content.

GOAL OF RESUSCITATION

Maintain tissue perfusion and organ function. Avoid complications of excessive or inadequate fluid resuscitation.

EXCESSIVE RESUSCITATION

Edema is part of the natural history of burn injuries. Maximum edema is seen 24 – 48 hours post burn. Those particularly sensitive to excessive resuscitation are: elderly, children and persons with preexisting cardiac disease.

INADEQUATE RESUSCITATION

Prompt administration of adequate fluid is essential to a good outcome. Inadequate fluid therapy may result in shock, organ failure, acute renal failure and death.

CALCULATE PERCENT TOTAL BODY SURFACE AREA BURN

Obtain patient weight

Calculate percent burn using the Lund Browder diagram or the rule of nines (Appendix 1).

Establish peripheral IV access or central line if necessary.



FLUID RESUSCITATION

Thermal and Chemical Burns

First 24 hours:

ADULT

2 ml LR X patient's body weight in kg. X % TBSA of 2nd and 3rd degree burns
(Research indicates that resuscitation based upon using 4 ml LR per kg per %TBSA burn commonly results in excessive edema formation and over-resuscitation).

PEDIATRIC PATIENTS (14 years of age and under AND less than 40 kg.)

3 ml LR x child's weight in kg x % TBSA second and third degree burns

High Voltage Electrical Injuries

ADULTS Patients with If there is evidence of deep tissue injury or hemochromogens (red pigments) are present in the urine, begin fluid resuscitation using:

4 ml LR x patient's weight in kg x % TBSA second and third degree burns.

PEDIATRIC PATIENTS with high voltage injuries, consult a Burn Center immediately for guidance.

The most critical consideration when determining the volume of fluid to administer is the patient's urinary output and physiological response. 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 **rate of fluid administration is based on patient response.**

In the first eight hours post injury, half of the calculated amount is given. In the second eight hours, 25% is given. And in the third eight hours, the remaining 25% of



the fluid is given. The IV rate should be adjusted as needed to maintain adequate urine output.

TABLE 1: AMERICAN BURN ASSOCIATION (ABA) Formula for **ADULT** resuscitation needs:

THERMAL AND CHEMICAL BURNS	Calculated volume	Timing	Solution
	2ml X kg X % 2 nd & 3 rd degree Burns in 24 hours' time	½ of total in first 8 hours	Lactated Ringers
		Second ½ over next 16 hours	Lactated Ringers
HIGH VOLTAGE ELECTRICAL INJURIES			
	4 ml X weight in kg X % TBSA (2 ND & 3 rd degree burns)	½ of total in first 8 hours	Lactated Ringers

TABLE 2: ABA Formulas for estimating **PEDIATRIC** resuscitation needs:

THERMAL AND CHEMICAL BURNS	Calculated volume to begin resuscitation	Timing	Solution
Children ≤ 14 years or 40 kg	3 ml x kg x %TBSA burn (2 nd & 3 rd degree burns)	½ of 24 hour total infused in 1 st 8 hours	Lactated Ringers
		2 nd 8 hours	Lactated Ringer's
		3 rd 8 hours	Lactated Ringer's
Infants and Young Children ≤30kg As above for children and Supplement	Maintenance See Maintenance calculations Pg. 17.	1 st 24 hours	D5LR



with:			
HIGH VOLTAGE ELECTRICAL INJURIES	Consult Burn Center		

MAINTENANCE CALCULATIONS for adults and children:

1st 10 kg – 4 cc/kg/hr

2nd 10 kg – 2 cc/kg/hr

Each kg above 20kg – 1cc/kg/hr

Recommendations for ongoing resuscitation are from the American Burn Association, Advanced Burn Life Support course curriculum 2022 and subject to change.

Monitoring and observation should include the following:

- Measurement of urine output hourly.
- Frequent assessment of general condition including mental status.
- Baseline Hematocrit, hemoglobin, serum chemistries and arterial blood gases. Repeat as indicated.

HOURLY URINARY OUTPUT

- Obtain hourly urine output with the use of an indwelling bladder catheter.
- Adults 0.5cc/kg/hour (or 30-50cc/hour).
- Children weighing less than 30 Kg: 1cc/ Kg/hour.
- Increase or decrease fluid infusion rate by 1/3 if the output falls below or exceed this limits by one-third for 2-3 hours.

MANAGEMENT OF OLIGURIA

Oliguria is most likely due to inadequate fluid administration. In this case, diuretics are contraindicated.

The rate of fluid infusion should be increased.



HEMOCHROMOGENURIA

High voltage injury may result in high levels of myoglobin and hemoglobin in the urine.

Administer fluids at a rate to maintain 1.0-1.5 ml/Kg/Hr (75-100cc/hour) to clear the heme products without having to use a diuretic.

If not effective, add 12.5 Gm of osmotic diuretic, Mannitol to each liter of resuscitation fluid. Discontinue when pigment density decreases. Add sodium bicarbonate to maintain slightly alkaline urine.

Persistent hemochromogenuria may indicate compartment syndrome.

BLOOD PRESSURE

Misinterpretation of blood pressure can lead to massive fluid overload. Sphygmomanometric measurements may diminish as edema progresses. Intra-arterial monitoring may be unreliable as well due to peripheral vasoconstriction.

HEART RATE

HR is not a useful tool for monitoring resuscitation. A rate of 100-120 in adults is common in an adequately resuscitated patient. In children the levels of tachycardia are dependent on their normal heart rate.

HEMATOCRIT and HEMOGLOBIN

Not reliable guides to resuscitation in the first 24 hours. Whole blood or PRC are indicated for anemia associated with pre-existing disease or blood loss from concomitant trauma. RBC transfusion is not necessary in the ED for isolated cutaneous injury. Should Hg/Hct fall considerably alternative sources of blood loss should be considered.

SERUM CHEMISTRIES



Obtain baselines for significant burns or inhalation injury. Ongoing measurements as needed. Treat hyperkalemia and other electrolyte imbalances.

APPENDIX G:

INHALATION INJURY

PURPOSE

The purpose of this guideline is to provide the hospital-based physician and staff with information on assessment and management of inhalation injury. The American Burn Association, Advanced Burn Life Support course curriculum was used as a guideline for preparation of this appendix.

INTRODUCTION

There are three types of airway inhalation injury:

- Carbon monoxide poisoning
- Inhalation injury above the glottis
- Inhalation injury below the glottis

DIAGNOSIS

- 1) Supported by one or more specific points from patient history: closed space exposure to hot gases, steam or products of combustion
- 2) Physical exam (as below)
- 3) Airway visualization
- 4) Laboratory findings –Arterial blood gases to check for elevated carboxyhemoglobin, unexplained acidosis.

PHYSICAL ASSESSMENT

CO₂ INTOXICATION

- **Early signs:** Headache, tachycardia, irritability, cutaneous flushing
- **Behavioral changes:** mental confusion, vomiting, incontinence, appears intoxicated



- **Acute:** Bounding pulse, dilated pupils, cyanosis or pall

RESPIRATORY TRACT INJURY

- Soot on tongue/in pharynx
- Facial burns, singed nasal or other hair
- Coughing/wheezing
- Agitation, anxiety, stupor, cyanosis, general signs of hypoxemia
- Restless/confused
- Carbonaceous sputum
- Hoarse voice, brassy cough, grunting, guttural respiratory sounds
- Rales, rhonchi or distant breath sound
- Erythema or swelling of the tissues of the oropharynx or nasopharynx
- Inability to swallow
- Labored or rapid breathing
- Stridor
- Decreased air exchange

TREATMENT

Carbon Monoxide Poisoning:

- Treat with 100% oxygen until a level of <100% is achieved.
- Half-life of carbon monoxide on room air is 4 hours. This is reduced to 1 hour on 100% oxygen.

Injury above the Glottis:

- Because this injury progresses rapidly –
- Intubate as soon as possible.

Injury below the glottis:

- Intubate to clear secretions, relieve dyspnea and ensure adequate oxygenation and ventilation, particularly if the patient is being transferred.
- This type of injury may result in airway obstruction that develops over time – may occur 24 -72 hours post burn. Watch for:
 - Progressive hoarseness
 - Increased stridor
 - Retractions



OTHER CONSIDERATIONS:

Circumferential burns of the chest or abdomen may result in compromised ventilation. If this occurs, escharotomies may be indicated to improve ventilation.

APPENDIX H:

ESCHAROTOMY

PURPOSE

This guideline is to review the principles of monitoring burned extremities for the presence of compartmental compression or ischemia and of performing escharotomy for relief of elevated tissue pressure.

This guideline is designed to aid those physicians who are responsible for the triage and initial management of burn patients.

SIGNS AND SYMPTOMS

Monitor for the following signs and symptoms in full thickness, circumferential burn injuries, which may indicate a circulation deficit of the compromised extremity or torso:

- Cyanosis of distal unburned skin on a limb
- Unrelenting deep tissue pain
- Progressive paresthesias
- Progressive decrease or absence of pulse
- Inability to ventilate in patients with deep circumferential burns of the chest and abdomen

DIAGNOSIS and TREATMENT

- If signs and symptoms are present, treat as below.
- Escharotomy to divide the eschar is performed at the bedside.
- Utilize a clean field and electrocautery device or scalpel.
- IV narcotics, Ketamine or Propafol for analgesia.

DIAGNOSIS and TREATMENT continued



- Incise mid-lateral or mid-medial aspect of the extremity or the anterior/axillary line of the chest/abdomen with sub-clavicular and sub-costal incisions to avoid major nerves and vessels- extend through eschar into the SQ fat to permit adequate separation of the cut edges for decompression.
- Contact the Burn Lead Specialist for further assistance.

Clinical Problem

Circumferential extremity burns may lead to neurovascular compromise and tissue ischemia secondary to elevated pressure. This is particularly a problem when a full-thickness injury is present. In the presence of progressive fluid extravasation beneath an unyielding eschar, the potential exists for tissue pressure to increase to such a point that tissue ischemia can occur.

Because the process of transcapillary fluid efflux is gradual, elevated tissue pressures necessitating escharotomy are rarely observed in the immediate post injury period, and are most likely to develop gradually over the 24 hours following injury.

Hemodynamic or pulmonary abnormalities can be attributed to full thickness, circumferential burns of the chest or abdomen.



APPENDIX I:

WOUND CARE

PURPOSE

This guideline is designed to aid those physicians and clinical staff caring for burn wounds in the first 72 hours following burn injury.

POLICY

If transfer to a burn center is delayed beyond 24 hours specific burn wound care should be done.

GUIDELINE

Provide burn wound care on the burn patient daily. MAINTAIN BODY TEMPERATURE.

Keep room warm.

Bathe the patient in warm water with soap. Wound care may be very painful.

PROVIDE PAIN RELIEF: Provide-intravenously in small, frequent doses as necessary throughout treatment.

- Debride blisters > 2cm and cleanse with soap and water-
- Shampoo hair and clip facial hair
- Dry thoroughly – keep patient warm
- Apply Silver Sulfadiazine impregnated cream to all burned areas-except Silver Sulfadiazine should NOT be applied to the face! Be careful not to



constrict edematous extremities with wrapped dressings. Lay the dressings over the wound and secure with burn net dressings-

- Treat any escharotomy sites with liberal amounts of the same cream

Special Considerations by Anatomic area:

FACE

Prone to swelling – elevate the HOB to 30 degree if patient is-not hypotensive. Use water or saline to clean the face. Protect the eyes. Clip facial hair as needed. **No creams on the face, use antibiotic ointment.**

EARS

Avoid pressure on the ear. Avoid occlusive dressings and pillows under the head.

HANDS

Elevate hands on pillows to prevent edema. Avoid restrictive dressings. Promote active range of motion hourly to minimize swelling and preserve function.

Monitor vascular status and consider escharotomy if vascular compromise. Consult with a burn specialist before performing escharotomy.

FEET

Assess circulation and neuro status hourly. Elevate extremities and avoid restrictive dressings.

GENITALIA/PERINEUM

Burns of the penis with swelling require insertion of a Foley catheter. Scrotal swelling is common. No special treatment is indicated.



APPENDIX J:

NUTRITION

PURPOSE:

The purpose of these guidelines is to summarize the role of nutritional assessment and support in the early (<72 hours after injury) acute management of the burn patient.

The purpose of this guideline is to review the physiologic background and efficacy of nutritional support during the initial care of burn patients.

BACKGROUND:

Nutritional supplementation plays a key role in the support of the burn patient, supporting the immune system and blunting the hypermetabolic response.

POLICY:

Enteral feeding should be initiated as soon as practical following burn injury >20% TBSA. Goal is to feed within 24 hours of injury. Nutritional support is associated with fewer infections and better survival.

Nutritional support should be used in preference to parenteral support when possible. A calorie/nitrogen ratio of 110:1 or less with provision of adequate calories to meet energy needs should be used for patients with burn >20% TBSA.

Estimate energy requirement periodically. Patients with burns require twice as many calories as they would without thermal injuries. Encourage oral intake and assess adequacy. Most patients cannot achieve goals without supplementation with enteral or parenteral feeds.

Curreri formula – ADULT



$25\text{kcal} \times \text{weight (kg)} + 40 \text{ kcal} \times \%BSA$

Hildreth + Associates – CHILD – under 1 year of age

$2100 \text{ kcal/m}^2 \text{ BSA/day} + 1000 \text{ kcal/m}^2 \text{ burned/day}$

There are numerous formulas addressing nutritional requirements for burn patients, therefore, a nutritional consultation is advised.

Severe burn causes significant metabolic derangements that make nutritional support uniquely important and challenging for burned patients. Burn injury causes a persistent and prolonged hyper metabolic state and increased catabolism that results in increased muscle wasting and cachexia. Metabolic rates of burn patients can surpass twice normal, and failure to fulfill these energy requirements causes impaired wound healing, organ dysfunction, and susceptibility to infection. Adequate assessment and provision of nutritional needs is imperative to care for these patients. There is no consensus regarding the optimal timing, route, amount, and composition of nutritional support for burn patients, but most clinicians advocate for early enteral nutrition with high-carbohydrate formulas.

Nutritional support must be individualized, monitored, and adjusted throughout recovery.



APPENDIX K:

LOCAL AND REGIONAL REFERENCES & RESOURCES:

LOS ANGELES COUNTY POLICIES

Los Angeles County Prehospital Care Manual
<https://dhs.lacounty.gov/emergency-medical-services-agency/prehospital-care-manual/>

Burn Patient Destination
Reference No. 512

Management of Multiple Casualty Incidents
Reference No. 519

Trauma Center Emergency Preparedness
Reference No. 1130

Burn Resource Center (BRC) Designation and Activation
Reference No. 1138

Burn Resource Center Required Equipment/Supplies/Pharmaceutical
Reference No. 1138.1

Local Burn Lead Specialist Call Panel
Reference No. 1138.2

Remote Burn Lead Specialists
Reference No. 1138.3

WESTERN REGIONAL BURN DISASTER CONSORTIUM

Annette Newman (Matherly), MS, RN CCRN
Community Outreach / Burn Disaster Coordinator
University of Utah Health Burn Center



Email: Annette.Matherly@hsc.utah.edu

24/7 Disaster Line: 866-364-8824

Burn Injury Guidelines For Care

<https://crisisstandardsofcare.utah.edu/Opendocs/WRBDC%20Burn%20Injury%20Guidelines%20for%20Care.pdf>

Burn Surge Tabletop Exercise Toolkit

<https://crisisstandardsofcare.utah.edu/Opendocs/WRBDC%20Burn%20Surge%20Exercise%20Toolkit.pdf>

Burn Surge Toolkit

<https://crisisstandardsofcare.utah.edu/Opendocs/WRBDC%20Burn%20Surge%20Planning%20Toolkit.pdf>

AMERICAN BURN ASSOCIATION (ABA)

www.ameriburn.org or info@ameriburn.org

ABA Central Office – Chicago
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AMERICAN COLLEGE OF SURGEONS

Guidelines for Trauma Centers Caring for Burn Patients (pp. 100-106),
Resources for Optimal Care of the Injured Patient: 2022, Committee on
Trauma, American College of Surgeons.



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