

UTAH BURN DISASTER CRISIS STANDARDS OF CARE

Prepared by the Utah Hospital Association in cooperation with
University of Utah Health Care, Burn Center
for the Utah Department of Health
Version 3, June 1, 2013

Purpose

The state of Utah, because of our location, natural hazards and economy, has the potential to experience a mass casualty incident resulting in a large surge of burn patients. There are 15 verified burn beds at the University of Utah Health Care Burn Center that are normally at 90% or more capacity and there are less than 1,900 burn center beds nationwide.

This burn surge plan must work in cooperation with existing disaster and emergency operations plans and must consider the long distance between rural community hospitals and urban tertiary referral hospitals. This burn plan is intended to provide all hospitals a toolkit of resources for reference in treating both adult and pediatric burn patients in addition to patients sustaining radiation injury. This will allow for the best care for burn patients in the event of a burn disaster. **The ultimate objective is to maximize good outcomes for the greatest number of people along with fair and equitable allocation of scarce resources.**

This plan is intended to be used for mass burn casualty disasters where local facilities and responders are overwhelmed and transfer possibilities are insufficient to meet immediate needs. It can also be used as a reference when a hospital is unable to transfer a burn patient to a tertiary care facility or while waiting for transportation to transfer a patient to a higher level of care.

This plan includes treatment guidelines from triage to definitive care and from immediate response with local resources to long-term response utilizing external resources as needed. **If at all possible, burn patients requiring hospitalization should be transported to the Burn Center,** because the Burn Center provides critical care as well as rehabilitation and follow-up care.

Every hospital should be prepared for the possibility that they may need to care for a burn patient(s) for an extended period of time (up to 3 to 5 days).

This plan provides for all facilities to have:

- A toolkit of burn care resources;
- Pre-incident training onsite, or via the telehealth network;
- *Just in time video training*, available online, and
- Real time telemedicine consults with burn specialists, either at the University of Utah or another verified Burn Center.

The use of real time telemedicine (including the use of live streaming or the use of store and forward of digital images) is listed as a resource for attending physicians who feel the need for specialist consultation. It is not intended for every patient. The process and equipment for telemedicine is continuing to improve and updated directions will be added to this document over time.

Beginning in July, 2013, the University of Utah Burn Center will have two websites online. One will provide video training and copies of the toolkit and the other will be specifically designed to expedite telemedicine.

Triage Overview

Initial patient distribution must be determined by the on scene Incident Commander or Transportation Officer, in consultation with the receiving hospital personnel. The receiving hospital can then consult with the University of Utah Burn Center.

The guidelines included in this document are meant as resources for attending medical staff. It is assumed that a large influx of injured patients will result in emergency department staff following their familiar trauma triage protocols, although there will be improved patient outcomes by adhering to initial (TBSA) fluid infusion rates. Detailed, burn specific care, will be implemented either on the ward or ICU, or in the ED after the patient initial influx has been dealt with.

Because of the differences between regions in Utah, it will be necessary for each Regional Coalition to develop protocols to follow in case of a Burn Surge Emergency. These plans should include:

- Processes to alert Regional Coalition/ESF 8:
- Coordination with EMS for patient movement;
- Requests for assistance from Regional healthcare partners for personnel and supplies, and
- Processes to maximize the use of scarce medical resources.

If Regional efforts to coordinate become overwhelmed, the Utah Department of Health, Bureau of Emergency Medical Services and Preparedness has a 24/7 hotline (866 -DOH- UTAH/866-364-8824). UDOH, in cooperation with Regional Coalitions, will help hospitals locate available beds, deploy EMS Strike Teams, assist with patient movement and tracking and other tasks as

needed. UDOH should be notified as soon as possible to avoid delay in the arrival of State resources.

In cooperation with the University of Utah Burn Center , UDOH may coordinate assistance to the receiving facility(s) and the transfer and transport of patients from the initial receiving facility to the most appropriate treatment center including transfer to Burn Centers in other States, if necessary.

As of 9/1/12, Utah has 18 trauma centers designated by the Utah Department of Health, Bureau of Emergency Medical Services and Preparedness (UDOH-BEMSP). There are three Level I trauma centers, three Level II centers, two Level III centers, and nine Level IV trauma centers. In addition, there are 34 non-trauma centers (community hospitals) in the state, 11 of which are Critical Access Hospitals (CAH).

- Red patients will be sent to either the Burn Center or a Level I or II Trauma Center.
- Yellow patients will be divided amongst the Level II and III Trauma Centers.
- Green patients will either remain at the receiving facility or be transferred to a Level III, IV or V Trauma Center or be triaged to outpatient treatment.

Work in Progress

(Estimated completion date 12/13)

Comfort Care Guidelines

Blast Burn Guidelines

Western States Transfer Agreement

Thanks to the following individuals for sharing their burn disaster plans:

- **Randy D. Kearns, D.H.A., M.S.A., C.E.M.,** University of North Carolina, North Carolina Burn Surge Disaster Program.
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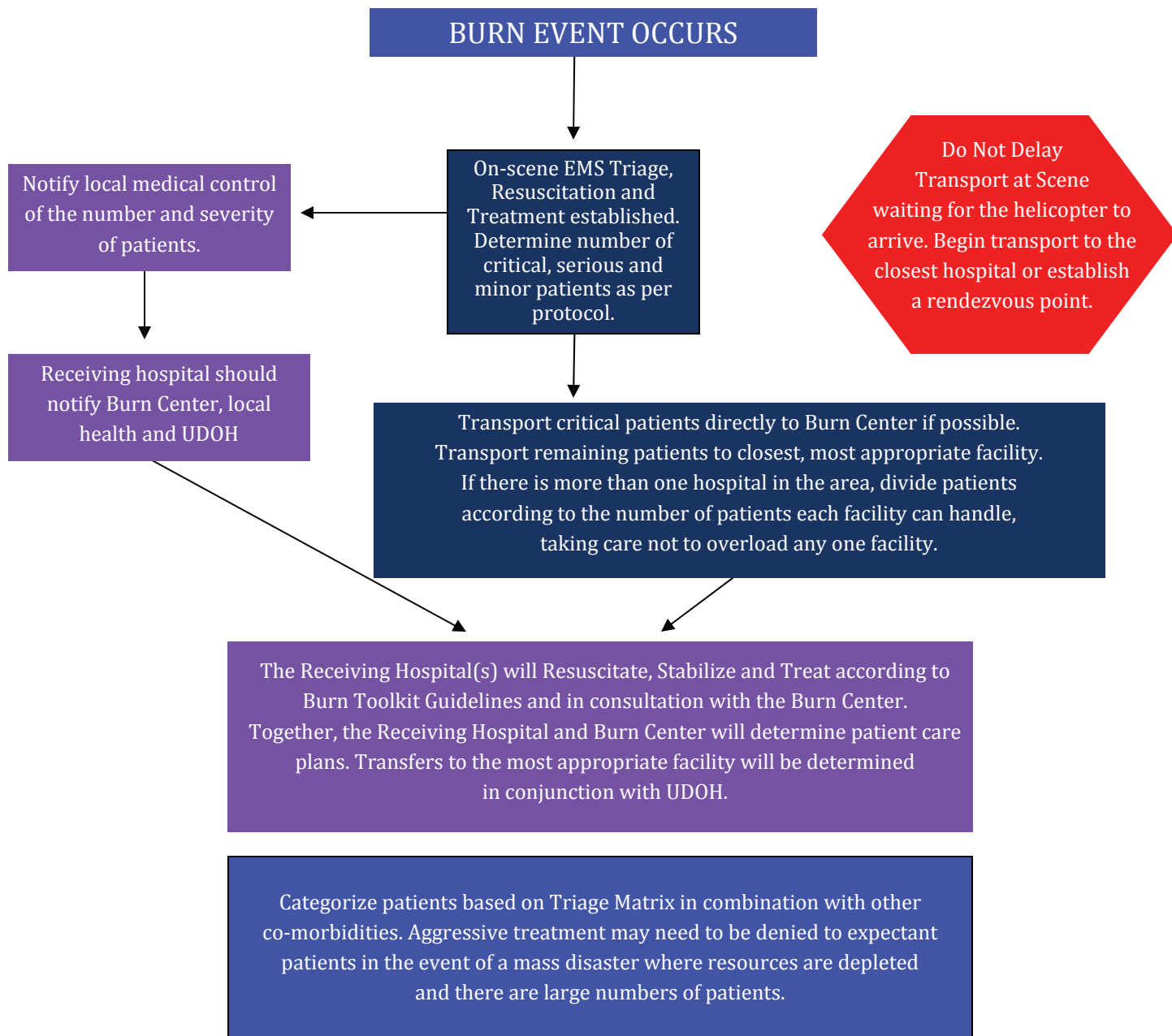
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Burn Surge Toolkit

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Hospital Burn Surge Triage Flowsheet

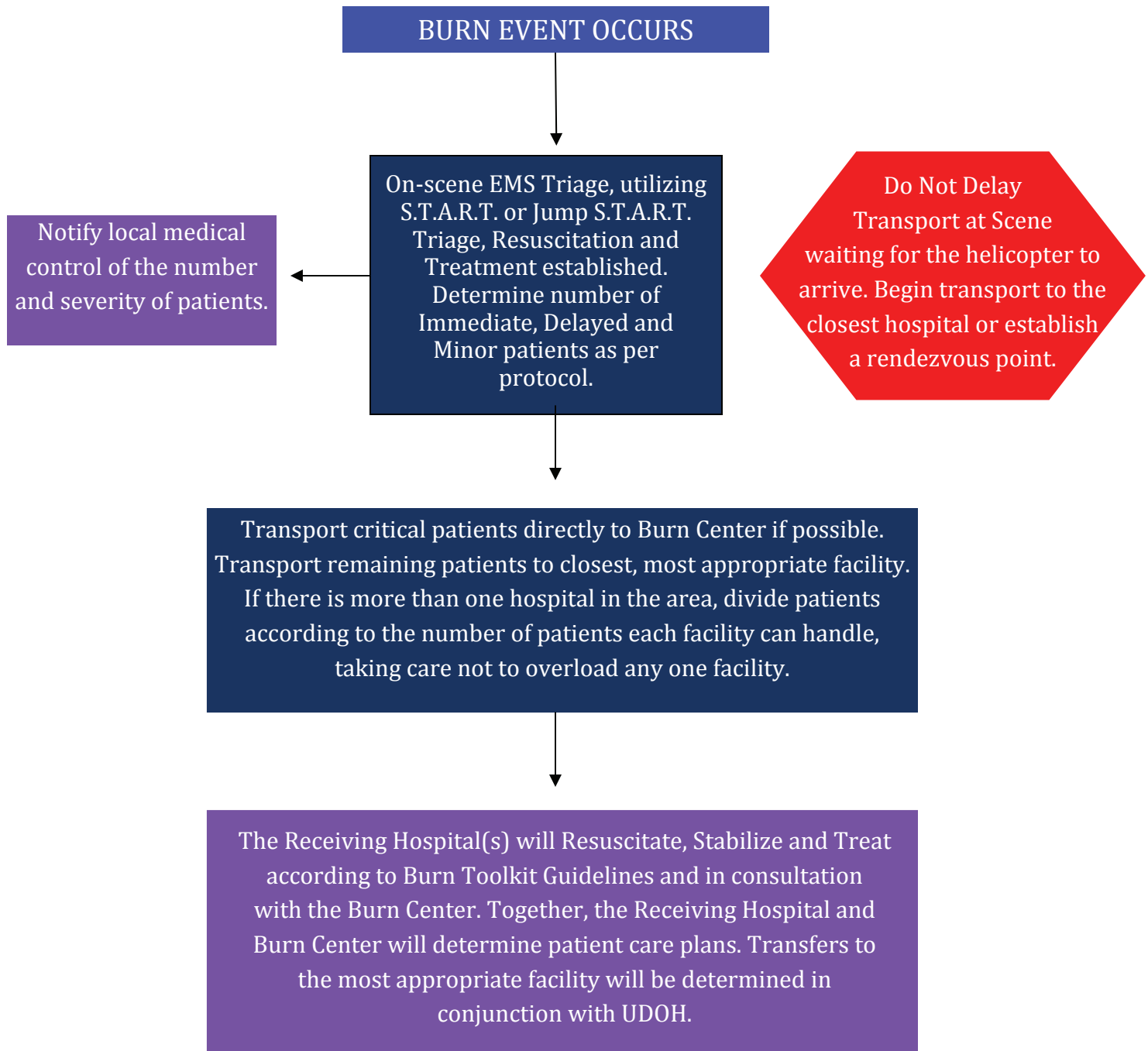


Immediate	Delayed	Minor	Expectant
If Burn Center can handle all RED patients, transfer to the Burn Center (via air ambulance, if available.) Otherwise, divide patients between Burn Center and Level 1 or 2 Trauma Centers.	Consider transferring patients (via air or ground ambulance) to closest Level 2 or 3 Trauma Center.	Consider transferring patients (via ground ambulance or other available transport) to Level 3, 4 or 5 Trauma Center or closest available hospital.	Provide comfort care, preferably in a designated area separated from other patients. Provide psychological support to the patient and family.

EMS Burn Disaster Crisis Standard of Care

Burn Disaster Crisis Standards of Care

EMS Burn Surge Triage Flowsheet



EMS Treatment Guidelines

Burn Disaster Crisis Standards of Care

Evaluate Airway and Breathing

Maintain Airway	Administer high flow O ₂ using a non-rebreather mask if possible/appropriate
Indication for Intubation	History of being burned in a closed space Burns to the face and neck Greater than 40% TBSA Circumferential torso burn
Consider Rapid Sequence Intubation	
Access for Breathing	Auscultate Breath Sounds Bilaterally

Maintain Circulation/Resuscitation Formula

Monitor Pulse Rate, and Blood Pressure

Circulatory Compromise	Indicated by progressive pain, pallor, pulselessness, paresthesia, and paralysis of the extremities.
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One IV/IO line should be inserted until it is determined that adequate resources are available for all patients. Priority should be given to patients with burns >20% TBSA (adults) and burns >10% TBSA (children) and /or with associated trauma with blood loss.

Starting points for fluid resuscitation rates:	5 years or younger : 125 ml LR/NS/hr
	6-13 years : 250 ml LR/NS/hr
	14 years or older : 500 ml LR/NS/hr

After TBSA has been calculated, fluid rate will be as follows:

Body weight in kg x % TBSA burns x 4mL of NS/Lactated Ringers over 24 hours (Administer 50% during the first 8 hours following the burn). **See Fluid Infusion Rate Chart.** If fluid management begins hours after the burn, infuse sufficient fluid to catch up to the total infusion of fluid for the first 8 hours. Patients with traumatic injuries may require additional fluid.

Disability, Neurological Deficit

Typically alert & oriented	A- Alert V- Responds to verbal stimuli P- Responds only to painful stimuli U- Unresponsive
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*If deficits exist consider CO, history of anoxia, chemical exposure, or traumatic injury.

*In addition to the AVPU scale, the Glasgow Coma scale can also be used.

Exposure

Remove all clothing & jewelry	Keep patient covered and dry Keep emergency vehicle warm Warm IV fluids if possible Do not use wet dressings or wet blankets
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Burn Patients are Trauma Patients; Evaluate for Associated Injuries

Follow local protocols to perform a typical secondary survey for traumatic injuries

Electrical Injuries:	Falls are common in electrical injuries; assess points of contact and monitor EKG
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Chemical Burns/injury to the Eyes:	Rule out corneal injuries, often associated with flash fires or explosions, irrigate potential chemical burns with copious amounts of fluids
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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. Initially burns do not bleed; if there is bleeding there is an associated injury. **All agencies will adhere to their own pharmacological standards for medication administration.**

Fluid Infusion Rate > 30kg

Burn Disaster Crisis Standards of Care

*Fluid of choice LR/NS, DO NOT use dextrose containing fluids

Wt (lbs)	Wt (kg)	% TBSA	/Hr for 1 st 8 Hrs of care	60 gtt set, gtt/min	20 gtt set, gtt/min	15 gtt set, gtt/min	10 gtt set, gtt/min
66	30	10	75	75	25.0	18.8	12.5
66	30	20	150	150	50.0	37.5	25.0
66	30	30	225	225	75.0	56.3	37.5
66	30	40	300	300	100.0	75.0	50.0
66	30	50	375	375	125.0	93.8	62.5
66	30	60	450	450	150.0	112.6	75.0
88	40	10	100	100	33.3	25.0	16.7
88	40	20	200	200	66.7	50.0	33.3
88	40	30	300	300	100.0	75.0	50.0
88	40	40	400	400	133.3	100.0	66.7
88	40	50	500	500	166.7	125.00	83.3
88	40	60	600	600	200.0	150.0	100.0
110	50	10	125	125	41.7	31.3	20.8
110	50	20	250	250	83.3	62.5	41.7
110	50	30	375	375	125.0	93.8	62.5
110	50	40	500	500	166.7	125.0	83.3
110	50	50	625	625	208.3	156.3	104.2
110	50	60	750	750	250.0	187.6	125.0
132	60	10	150	150	50.0	37.5	25.0
132	60	20	300	300	100.0	75.0	50.0
132	60	30	450	450	150.0	112.5	75.0
132	60	40	600	600	200.0	150.0	100.0
132	60	50	750	750	250.0	187.5	125.0
132	60	60	900	900	300.0	225.0	150.0
154	70	10	175	175	58.3	43.8	29.2
154	70	20	350	350	116.7	87.5	58.3
154	70	30	525	525	175.0	131.3	87.5
154	70	40	700	700	233.3	175.0	116.7
154	70	50	875	875	291.7	218.8	145.8
154	70	60	1050	1050	350.0	262.6	175.0
176	80	10	200	200	66.7	50.0	33.3
176	80	20	400	400	133.3	100.0	66.7
176	80	30	600	600	200.0	150.0	100.0
176	80	40	800	800	266.7	200.0	133.3
176	80	50	1000	1000	333.3	250.0	166.7
176	80	60	1200	1200	400.0	300.0	200.0
198	90	10	225	225	75.0	56.3	37.5
198	90	20	450	450	150.0	112.5	75.0
198	90	30	675	675	225.0	168.8	112.5
198	90	40	900	900	300.0	225.0	150.0
198	90	50	1125	1125	375.0	281.3	187.5
198	90	60	1350	1350	450.0	337.6	225.0
220	100	10	250	250	83.3	62.5	41.7
220	100	20	500	500	166.7	125.0	83.3
220	100	30	750	750	250.0	187.5	125.0
220	100	40	1000	1000	333.3	250.0	166.7
220	100	50	1250	1250	416.7	312.5	208.3
220	100	60	1500	1500	500.0	375.0	250.0
242	110	10	275	275	91.6	68.7	45.9
242	110	20	550	550	183.4	137.5	91.6
242	110	30	825	825	275	206.2	137.5
242	110	40	1100	1100	366.6	275.0	183.4
242	110	50	1375	1375	458.4	343.7	229.1
242	110	60	1650	1650	550.0	412.4	275
264	120	10	300	300	99.9	74.9	50.1
264	120	20	600	600	200.1	150.0	99.9
264	120	30	825	825	300.0	224.9	150.0
264	120	40	1200	1200	399.9	300.0	200.1
264	120	50	1500	1500	500.1	374.9	249.9
264	120	60	1650	1650	600.0	449.8	300

*Patients with traumatic injuries may require additional fluids.

Fluid Infusion Rate < 30kg

Burn Disaster Crisis Standards of Care

*Fluid of choice LR/NS, DO NOT use dextrose containing fluids

Wt (lbs)	Wt (kg)	% TBSA	/Hr for 1 st 8 Hrs of care	60 gtt set, gtt/min	20 gtt set, gtt/min	15 gtt set, gtt/min	10 gtt set, gtt/min
11	5	10	12.5	12.5	4.2	3.2	2.1
11	5	20	25	25	8.3	6.3	4.2
11	5	30	37.5	37.5	12.5	9.5	6.3
11	5	40	50	50	16.7	12.5	8.3
11	5	50	62.5	62.5	20.8	15.7	10.5
11	5	60	75	75	25	18.7	12.5
22	10	10	25	25	8.4	6.4	4.1
22	10	20	50	50	16.6	12.5	8.4
22	10	30	75	75	25	18.9	12.5
22	10	40	100	100	33.3	25	16.6
22	10	50	125	125	41.6	31.4	20.9
22	10	60	150	150	50	37.4	25
27.5	12.5	10	31.3	31.3	10.5	7.5	5.2
27.5	12.5	20	62.5	62.5	20.8	15.7	10.5
27.5	12.5	30	93.8	93.8	31.3	23.6	15.7
27.5	12.5	40	125	125	41.7	31.7	21
27.5	12.5	50	156.2	156.2	52.1	39.8	26.3
27.5	12.5	60	187.4	187.4	62.5	47.9	31.6
33	15	10	37.5	37.5	12.6	8.5	6.2
33	15	20	75	75	25	18.8	12.6
33	15	30	112.5	112.5	37.5	28.3	18.8
33	15	40	150	150	50	37.5	25
33	15	50	187.5	187.5	62.5	46.7	31.2
33	15	60	225	225	75	55.9	37.4
38.5	17.5	10	43.8	43.8	14.7	10.6	7.3
38.5	17.5	20	87.5	87.5	29.2	21.9	14.7
38.5	17.5	30	131.3	131.3	43.8	33	21.9
38.5	17.5	40	175	175	58.3	44.2	29.2
38.5	17.5	50	218.7	218.7	72.8	55.4	36.5
38.5	17.5	60	262.4	262.4	87.3	66.6	43.8
44	20	10	50	50	16.7	12.6	8.3
44	20	20	100	100	33.3	25	16.7
44	20	30	150	150	50	37.6	25
44	20	40	200	200	66.7	50	33.3
44	20	50	250	250	83.3	62.6	41.7
44	20	60	300	300	100	75	50
49.6	22.5	10	56.3	56.3	18.8	14.2	9.4
49.6	22.5	20	112.5	112.5	37.5	28.1	18.8
49.6	22.5	30	168.8	168.8	56.3	42.3	28.2
49.6	22.5	40	225	225	75	56.4	37.6
49.6	22.5	50	281.2	281.2	93.7	70.5	47
49.6	22.5	60	337.4	337.4	112.5	84.6	56.4
55.1	25	10	62.5	62.5	20.9	15.7	10.4
55.1	25	20	125	125	41.7	31.2	20.9
55.1	25	30	187.5	187.5	62.5	47	31.3
55.1	25	40	250	250	83.4	62.5	41.8
55.1	25	50	312.5	312.5	104.2	78	52.3
55.1	25	60	375	375	125	93.5	62.8
60.6	27.5	10	68.8	68.8	23	17.3	11.5
60.6	27.5	20	137.5	137.5	45.9	34.4	23
60.6	27.5	30	206.2	206.2	68.8	51.7	34.4
60.6	27.5	40	274.9	274.9	91.7	79.7	53.3
60.6	27.5	50	343.6	343.6	114.6	96.9	64.8
60.6	27.5	60	412.4	412.4	137.5	114.1	76.3
66	30	10	75	75	25.0	18.8	12.5
66	30	20	150	150	50.0	37.5	25.0
66	30	30	225	225	75.0	56.3	37.5
66	30	40	300	300	100.0	75.0	50.0
66	30	50	375	375	125.0	93.8	62.5
66	30	60	450	450	150.0	112.6	75.0

Burn Triage Decision Table

Burn Disaster Crisis Standards of Care

BURN TRIAGE TABLE: This table illustrates the anticipated ratio of resources to benefit from the treatment of burns of various sizes in various aged patients. Each category reflects both the volume of resources necessary to care for the patients in each group, and the expected outcome.

	Burn Size Group, % TBSA All									
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
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

Palmieri TL et al.

Triage/Resource Table for a Burn Disaster
Developed from the American Burn Association NBR

Categories are defined as follows:

OUTPATIENT: Survival and good outcome expected without requiring initial admission.

VERY HIGH: Mortality ≤10%, anticipated length of stay ≤ 14-21 days, 1-2 surgical procedures.

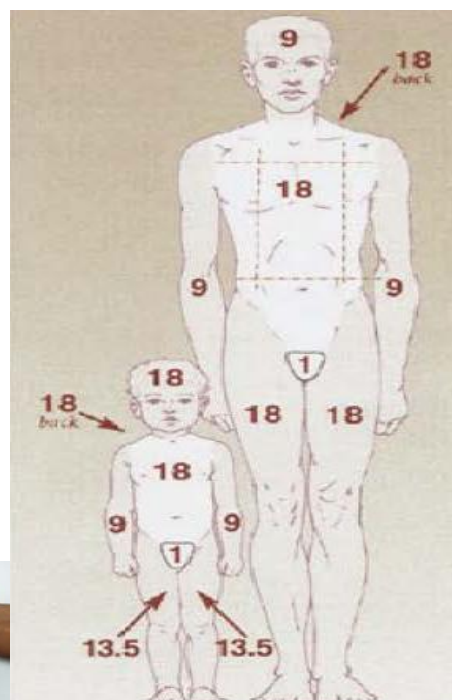
HIGH: Mortality ≤ 10%, anticipated length of stay ≥ 14-21 days, multiple surgical procedures.

MEDIUM: Mortality 10 – 50%, with provision of aggressive treatment which may require prolonged hospitalization and multiple surgical procedures.

LOW: Mortality 50 – 90%, even with provision of prolonged, intensive resources.

EXPECTANT: Mortality ≥ 90%, even with prolonged aggressive care.

Patients palm inclusive of fingers = 1%
Total Body Surface Area



Adult Hospital Burn Disaster Crisis Standards of Care

Initial Management Guidelines for the Adult Burn Patient

Burn Disaster Crisis Standards of Care

If transfer to University of Utah Health Care Burn Center is not feasible, consider Burn Center consultation at (801) 581-2700.

Prior to initiating care of the patient with wounds it is critical that healthcare providers take measures to reduce their own risk of exposure to potentially infectious substances and/or chemical contamination. In addition, patients with burns/wounds are at high risk for infection and potential cross contamination. Body substance precautions are the most effective way to do this. The level of protection utilized will be determined by patient presentation. Patients with burns > 20% TBSA are most at risk.

Primary Assessment

Intervention /Care	Key Points
Airway maintenance with C-Spine Protection Consider inhalation injury with : • History of closed space fire • Hypoxia • Facial Burns • Stridor • Carbonaceous sputum • Nasal Singe • Hoarseness Treatment • High flow oxygen using a non-rebreather mask, wean as appropriate. • Early intubation (Assess Glasgow prior to intubation) • Secure the ETT with ties passed around the head, do not use tape as it will not adhere to burned tissue. • A nasogastric tube should be inserted on all patients who are intubated.	• Airway edema increases significantly after fluids are started. • Stridor or noisy breath sounds are indicators of impending upper airway obstruction. • Prophylactic intubation is often preferred because the ensuing edema obliterates the landmarks needed for successful intubation. • An endotracheal tube that becomes dislodged may be impossible to replace due to obstruction of the upper airway by edema. Comfort Care Patients • Patients placed in the comfort care category should not be intubated. Oxygen should be administered to aid comfort and prevent air hunger.
Breathing and Ventilation • Assess for appropriate rate and depth of respirations in addition to breath sounds. • Monitor pulse oximetry and obtain ABGs • Check CO level if indicated • In circumferential torso burns monitor chest expansion closely. Chest/abdominal escharotomy may be necessary; consider burn center consult.	An escharotomy is an incision performed longitudinally through burned tissue down to subcutaneous tissue over the entire involved area of full thickness circumferential (or nearly circumferential burn) that is causing constriction and loss of peripheral perfusion or airway constriction. Finger escharotomies are rarely indicated.
Circulation with Hemorrhage Control • Heart Rate • Blood Pressure • Pulses and capillary refill • Skin color of unburned skin	• Due to the increased circulating catecholamines and hypermetabolism associated with burn injuries, a normal heart rate for an adult is 100-120 bpm.

• Cardiac monitoring as appropriate and available • One large bore IV or IO line should be inserted until it is determined that adequate resources are available for all patients. Secure well. • IV/IO Priority should be given to patients with burns >20% TBSA. Starting points for fluid resuscitation rates are as follows : 5 years or younger: 125 ml LR/NS/hr 6-13 years of age: 250 ml LR/NS/hr 14 years or older: 500 ml LR/NS/hr • More definitive calculation is performed during the secondary survey when TBSA is known. • Patients with burns usually do not 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. Manage any bleeding as soon as possible.	• Heart rates above this may indicate hypovolemia, inadequate oxygenation, unrelieved pain or anxiety. • Heart rates below this level may be due to an underlying cardiac abnormality. Dysrhythmias may be the result of an electrical injury and are abnormal. • The B/P in the early stages of burn resuscitation should be the individuals pre-injury B/P. • IV's may be placed through burned skin if necessary, suture to secure in place or use coban or kerlix roll. • Oral resuscitation should be considered for awake alert pediatric patients with burns < 10% TBSA and adult patients with burns < 20% TBSA using flavored sport drinks and/or an equal electrolyte maintenance solution. Have the family monitor the quality and quantity of urinary output and watch for signs of dehydration. • When supplies of LR are depleted, fluid resuscitation may continue using NS, ½ NS or colloids. Do not use fluid containing glucose. Comfort Care Patients IVs should be started for administration of medication to manage pain and anxiety. Do not administer large volumes of fluid. Excessive fluid will result in decreased circulation and increased pain due to edema.
Disability • Consider using the "AVPU" method: -A – Alert -V – Responds to verbal stimuli -P – Responds to painful stimuli -U – Unresponsive	Typically the burn patient is alert and oriented If altered neurological status, consider associated injury, CO poisoning, substance abuse, hypoxia, medications administered or pre-existing medical conditions.
Exposure • Check temperature • Remove all clothing and jewelry • Keep patient and environment warm	Localized hypothermia causes vasoconstriction to the damaged area reducing blood flow and tissue oxygenation and may deepen the injury. Systemic hypothermia (core temp less than 95° F / 35° C) induces peripheral vasoconstriction that may increase the depth of the burn and interfere with clotting mechanisms and respiration in addition to causing cardiac arrhythmias.

Initial Management Guidelines for the Adult Burn Patient

Burn Disaster Crisis Standards of Care

If transfer to University of Utah Health Care Burn Center is not feasible, consider Burn Center consultation (801)-581-2700.

Secondary Assessment

History:

- Consider the use of “Ample” to aid in obtaining information
 - A- Allergies
 - M - Medications
 - P – Previous illness, past medical history
 - L – Last meal or fluid intake
 - E – Events/environment related to the injury
- Do not use silver sulfadiazine on a patient with a sulfa allergy; instead use another topical or wound coverage product.

Intervention /Care

Burn Specific Physical Examination:

Airway and Breathing

- Supportive therapy and O₂; wean as appropriate.
- Unless contraindicated by the patient’s medical condition or associated trauma, the head of bed should be elevated 30° to minimize facial and airway edema.
- Use reverse Trendelenburg for patients with C-spine precautions.
- Chest X-ray if intubated, inhalation injury suspected or underlying pulmonary condition.
- Chest X-ray will usually be clear on admit. If inhalation injury is present the X-ray will show infiltrates around the second day correlating with a deteriorating oxygen status.
- Frequent suctioning is necessary to prevent occlusion of the airway and endotracheal tube. Anyone with an inhalation injury is subject to increased respiratory secretions and may have a large amount of carbonaceous debris in the respiratory tract.

Estimate Burn Size and Depth:

- Determine the extent of the burn using the Rule of Nines, Rule of the Palm or Lund-Browder chart.
See Burn Estimate and Diagram.

Initiate Fluid Resuscitation:

Initiate fluid resuscitation for a patient with a TBSA >20% (adult) or >10%TBSA (child).

- 4ml (LR) x body weight (kg) x TBSA % burn = Lactated Ringers solution (LR) fluid in first 24 hours post burn (calculate from time of burn).
- Give half the fluid (LR) in the first 8 hours then the next half (LR) over the next 16 hours.

See Fluid Infusion Rate

Resuscitation Guidelines:

- Insert a foley. Priority should be given to adult burn patients with burn injuries greater than 20% and pediatric patients with burn injuries greater than 10% TBSA.
- Burns of the penis may require insertion of a foley catheter to maintain patency of the urethra.
- Titrate IV rate to maintain a urine output: 0.5ml/kg for adults (30-50ml/hr).

See Adult Fluid Resuscitation Order

Eyes

- Remove contacts prior to eyelid swelling if facial involvement.
- Fluorescein should be used to identify corneal injury.
- If eye involvement consider consulting an ophthalmologist.

Circulation

- Elevate burned extremities on pillows or blankets to improve circulation and minimize edema.
- Monitor pulses with a Doppler, if necessary.
- Circumferential chest injuries may become life threatening; an escharotomy may be necessary.
- Verify that pulselessness is not due to profound hypotension.
- Scrotal swelling, though often significant, does not require specific treatment.

Monitor for the following signs and symptoms in full thickness, circumferential burn injuries which may indicate circulatory compromise:

- Pallor or cyanosis of distal unburned skin on limb.
- Capillary refill > 5 seconds.
- Unrelenting deep tissue pain.
- Progressive loss of sensation or motor function.
- Inability to ventilate in patients with deep circumferential burns of the chest.

Body Temperature

- Keep patient normo-thermic, especially during wound care.
- Keep patient covered. When supplies of blankets are depleted, patients can be wrapped in plastic wrap or aluminum foil for insulation and warmth.
- Warm the room.
- Warm IV fluid if possible, especially if patient is very hypothermic.

Labs

- Labs on admission and as dictated by medical condition:
 - Arterial Blood Gases if inhalation injury is suspected
 - Serum Chemistries/Electrolytes
 - Complete Blood Count (CBC)
 - Glucose Levels, especially in children and diabetics
 - EKG for electrical injury or cardiac history
 - Type and Screen if additional trauma is suspected
- Tetanus prophylaxis unless given in last five years.

Comfort:

- Frequent pain/sedation assessment; minimum every four hours.
- Assess patient pain score before and after pain/sedation medication given.
- Emotional support and education is essential.
- IV analgesia is the preferred route during the initial post injury period.
- Administer opioids in frequent small to moderate bolus doses.

See Pain Medication Guidelines

Adult Pain Medication Guidelines

Burn Disaster Crisis Standards of Care

*When possible, try to give patient oral pain medications. Please consider renal function before initiating any pain regimen, especially NSAIDs. With IV medications, titrate to effect and patient vital signs. **It is best to give smaller doses more frequently until the provider is comfortable with giving larger doses.** Patients will never be pain free; educate them about the burn injury and ask them what pain level is tolerable for them.

Mild to Moderate Pain:

Oral	IV
Acetaminophen 650-1000 mg	Acetaminophen 1000 mg
Ibuprofen 600-800 mg	Ketorolac 15-60 mg
Naproxen 250-500 mg	Fentanyl 25-50 mcg
Tramadol 50-100 mg	Morphine 0.5-2 mg
Acetaminophen with codeine 30/300 1-2 tablets	
Hydrocodone with acetaminophen 5/500 1-2 tablets	
Oxycodone with acetaminophen 5/325 1-2 tablets	

Moderate to Severe Pain:

Oral	IV
Hydrocodone with acetaminophen 7.5/500 1-2 tablets	Fentanyl 25-100 mcg
Oxycodone with acetaminophen 10/325 1-2 tablets	Morphine 2-4 mg
Oxycodone 5-15 mg	Hydromorphone 0.5-2 mg
Morphine 15-45 mg	Ketamine 0.3mg/kg /dose
Hydromorphone 2-6 mg	Ketamine 0.05-0.1mg/kg/hr (use as an adjunct)

For Moderate to Severe pain with around-the-clock use of oral pain meds, consider adding extended release products:

Methadone 5-10 mg PO twice daily
Oxycontin 10 mg PO twice daily
MsContin 15 mg PO 3 times daily

Burn Estimate and Diagram

Burn Disaster Crisis Standards of Care

Area	Birth-1 yr.	1-4 yr.	5-9 yr.	10-14 yr.	15 yr	Adult	2nd	3rd	TBSA% Total
Head	19	17	13	11	9	7			
Neck	2	2	2	2	2	2			
Ant. Trunk	13	13	13	13	13	13			
Post. Trunk	13	13	13	13	13	13			
R. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
L. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
Genitalia	1	1	1	1	1	1			
R. U. Arm	4	4	4	4	4	4			
L. U. Arm	4	4	4	4	4	4			
R. L. Arm	3	3	3	3	3	3			
L. L. Arm	3	3	3	3	3	3			
R. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
L. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
R. Thigh	5.5	6.5	8	8.5	9	9.5			
L. Thigh	5.5	6.5	8	8.5	9	9.5			
R. Leg	5	5	5.5	6	6.5	7			
L. Leg	5	5	5.5	6	6.5	7			
R. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
L. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
TOTAL									

Cause of Burn _____

Additional injuries _____

Date of Burn _____

Time of Burn _____

Age _____

Sex _____

Weight _____ kg

Height _____ cm

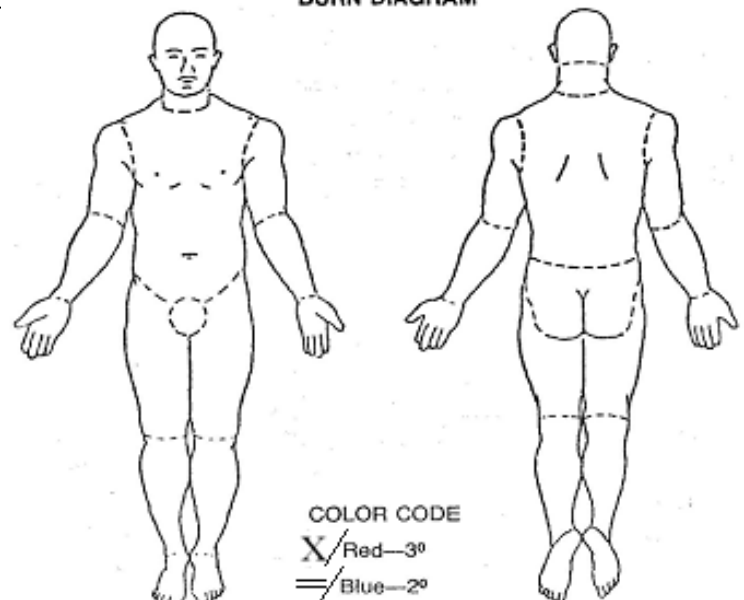
Date of assessment _____

Time of assessment _____

Assessed by _____

Triage Color: R Y G B

BURN DIAGRAM



Fluid Infusion Rate > 30kg

Burn Disaster Crisis Standards of Care

*Fluid of choice LR/NS, DO NOT use dextrose containing fluids

Wt (lbs)	Wt (kg)	% TBSA	/Hr for 1 st 8 Hrs of care	60 gtt set, gtt/min	20 gtt set, gtt/min	15 gtt set, gtt/min	10 gtt set, gtt/min
66	30	10	75	75	25.0	18.8	12.5
66	30	20	150	150	50.0	37.5	25.0
66	30	30	225	225	75.0	56.3	37.5
66	30	40	300	300	100.0	75.0	50.0
66	30	50	375	375	125.0	93.8	62.5
66	30	60	450	450	150.0	112.6	75.0
88	40	10	100	100	33.3	25.0	16.7
88	40	20	200	200	66.7	50.0	33.3
88	40	30	300	300	100.0	75.0	50.0
88	40	40	400	400	133.3	100.0	66.7
88	40	50	500	500	166.7	125.00	83.3
88	40	60	600	600	200.0	150.0	100.0
110	50	10	125	125	41.7	31.3	20.8
110	50	20	250	250	83.3	62.5	41.7
110	50	30	375	375	125.0	93.8	62.5
110	50	40	500	500	166.7	125.0	83.3
110	50	50	625	625	208.3	156.3	104.2
110	50	60	750	750	250.0	187.6	125.0
132	60	10	150	150	50.0	37.5	25.0
132	60	20	300	300	100.0	75.0	50.0
132	60	30	450	450	150.0	112.5	75.0
132	60	40	600	600	200.0	150.0	100.0
132	60	50	750	750	250.0	187.5	125.0
132	60	60	900	900	300.0	225.0	150.0
154	70	10	175	175	58.3	43.8	29.2
154	70	20	350	350	116.7	87.5	58.3
154	70	30	525	525	175.0	131.3	87.5
154	70	40	700	700	233.3	175.0	116.7
154	70	50	875	875	291.7	218.8	145.8
154	70	60	1050	1050	350.0	262.6	175.0
176	80	10	200	200	66.7	50.0	33.3
176	80	20	400	400	133.3	100.0	66.7
176	80	30	600	600	200.0	150.0	100.0
176	80	40	800	800	266.7	200.0	133.3
176	80	50	1000	1000	333.3	250.0	166.7
176	80	60	1200	1200	400.0	300.0	200.0
198	90	10	225	225	75.0	56.3	37.5
198	90	20	450	450	150.0	112.5	75.0
198	90	30	675	675	225.0	168.8	112.5
198	90	40	900	900	300.0	225.0	150.0
198	90	50	1125	1125	375.0	281.3	187.5
198	90	60	1350	1350	450.0	337.6	225.0
220	100	10	250	250	83.3	62.5	41.7
220	100	20	500	500	166.7	125.0	83.3
220	100	30	750	750	250.0	187.5	125.0
220	100	40	1000	1000	333.3	250.0	166.7
220	100	50	1250	1250	416.7	312.5	208.3
220	100	60	1500	1500	500.0	375.0	250.0
242	110	10	275	275	91.6	68.7	45.9
242	110	20	550	550	183.4	137.5	91.6
242	110	30	825	825	275	206.2	137.5
242	110	40	1100	1100	366.6	275.0	183.4
242	110	50	1375	1375	458.4	343.7	229.1
242	110	60	1650	1650	550.0	412.4	275
264	120	10	300	300	99.9	74.9	50.1
264	120	20	600	600	200.1	150.0	99.9
264	120	30	825	825	300.0	224.9	150.0
264	120	40	1200	1200	399.9	300.0	200.1
264	120	50	1500	1500	500.1	374.9	249.9
264	120	60	1650	1650	600.0	449.8	300

*Patients with traumatic injuries may require additional fluids.

Burn Triage Decision Table

Burn Disaster Crisis Standards of Care

BURN TRIAGE TABLE: This table illustrates the anticipated ratio of resources to benefit from the treatment of burns of various sizes in various aged patients. Each category reflects both the volume of resources necessary to care for the patients in each group, and the expected outcome.

	Burn Size Group, % TBSA All									
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
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

Palmieri TL et al.

Triage/Resource Table for a Burn Disaster
Developed from the American Burn Association NBR

Categories are defined as follows:

OUTPATIENT: Survival and good outcome expected without requiring initial admission.

VERY HIGH: Mortality ≤10%, anticipated length of stay ≤ 14-21 days, 1-2 surgical procedures.

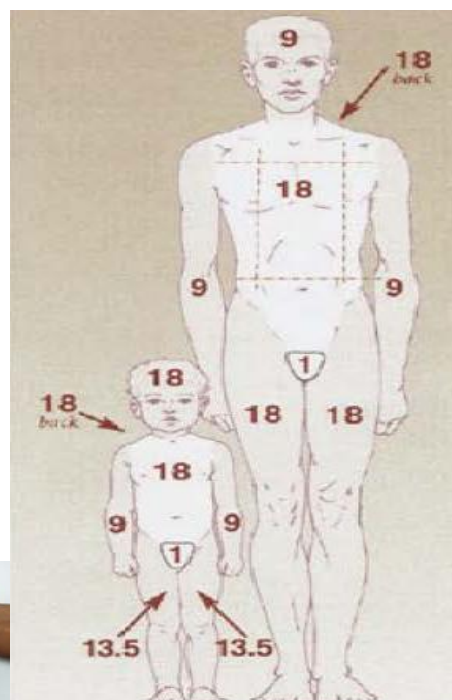
HIGH: Mortality ≤ 10%, anticipated length of stay ≥ 14-21 days, multiple surgical procedures.

MEDIUM: Mortality 10 – 50%, with provision of aggressive treatment which may require prolonged hospitalization and multiple surgical procedures.

LOW: Mortality 50 – 90%, even with provision of prolonged, intensive resources.

EXPECTANT: Mortality ≥ 90%, even with prolonged aggressive care.

Patients palm inclusive of fingers = 1%
Total Body Surface Area



Burn Triage Decision Table

Burn Disaster Crisis Standards of Care

BURN TRIAGE TABLE: This table illustrates the anticipated ratio of resources to benefit from the treatment of burns of various sizes in various aged patients. Each category reflects both the volume of resources necessary to care for the patients in each group, and the expected outcome.

	Burn Size Group, % TBSA WITH Inhalation Injury									
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
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

Palmieri TL et al.

Triage/Resource Table for a Burn Disaster
Developed from the American Burn Association NBR

	Burn Size Group, % TBSA NO Inhalation Injury									
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
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

Fluid Resuscitation Calculation Sheet for the Adult Burn Patient > 30 kg

Burn Disaster Crisis Standards of Care

Fluid Resuscitation Formulas

Body surface area calculation equals (m²):

$$\frac{\sqrt{\text{height(cm)} \times \text{weight(kg)}}}{3600}$$

Fluid resuscitation calculation

4 ml x weight (kg) x Burn Area (%TBSA)

Basal Fluid Requirement.

1500 ml / 24 hours x Body Surface Area

1. Fluid Resuscitation and Basal Requirement

Calculated fluid resuscitation and basal requirement

A. (4ml x _____ kg x _____ %TBSA) + (1500 ml x _____ m²) = _____ ml/ 24 hours

B. Resuscitation Fluid for the First 24 Hours

Give half the calculated volume in the first 8 hours. Then the other half in the next 16 hours.

- i. 1st 8 hours = _____ ml = _____ ml/hr
- ii. 2nd 8 hours = _____ ml = _____ ml/hr
- iii. 3rd 8 hours = _____ ml = _____ ml/hr

The resuscitation fluid will be titrated hourly based on the patients urine output until the calculated maintenance rate goal is reached. **See fluid resuscitation order sheet for the burn patient >30 kg**

2. Maintenance fluids = Basal Fluid Requirement and Evaporative Water Loss

A. Basal Fluid Requirement = 1500ml x _____ m²

- i. Total body surface area _____ m²
- ii. 24 hours = _____ ml
- iii. Hourly rate = _____ ml/hr

B. Evaporative Water Loss

Burn Patient > 30kg = (25 + %TBSA) x _____ m² = ml/hr

i. Calculated evaporative water loss

$$(25 + \text{_____ \%TBSA}) \times \text{_____ m}^2 = \text{_____ ml/hr}$$
$$= \text{_____ ml/ 24 hrs}$$

ii. **Total maintenance fluids** including basal requirement and evaporative water loss

- 1. **24 hours** = _____ ml
- 2. **Hourly rate** = _____ ml/hr

Fluid Resuscitation Order for the Adult Burn Patient > 30kg

STEP ONE

Use the Fluid Resuscitation Calculation Sheet for initial LR rate

Begin fluid resuscitation

LR @ _____ ml/hr

Then measure urine output hourly

Vital Signs Stable: HR<140, MAP >60

Vitals unstable:HR>140 or MAP < 60

CALL ATTENDING

Patients Admit Wt: _____ KG

Urine Output
< 15 ml
(If < 15cc/hr for 2 hrs
see 3 boxes down)

Urine Output
15-29 ml

Urine Output
30-50 ml

Urine Output
> 50 ml

Urine Output
> 200 ml

Increase
IV rate by
20% or 200 cc/hr
(which ever is
greater)

Increase
IV rate by
10% or 100 cc/hr
(which ever is
greater)

Leave IV at
current rate

Decrease
IV rate by
10% or 100 cc/hr
(which ever is
greater)

Consider decreasing IV rate every 1/2 hr by
10% Be sure to assess patients Blood Sugar,
BP, HR, Lactic Acid, Hemoglobin, **before**
decreasing IV Rate. CALL M.D./
CONSIDER BURN CENTER CONSULT

REPEAT STEP ONE EVERY HOUR UNTIL:

Urine Output < 15cc/hr
for two hours
despite an increase in
fluid

Calculated Maintenance Rate
_____ ml/hr
is reached and held for two
hours AND the pt. is at least 24
hours post burn

**CALL M.D./CONSIDER
BURN CENTER CONSULT**
and discuss beginning
ALBUMIN PROTOCOL

Fluid resuscitation is
COMPLETE:

If patient again develops oliguria or
hemodynamic instability

**CALL MD/CONSIDER BURN
CENTER CONSULT**

And restart patient on LR
Repeat **STEP ONE**

Switch to
D5 0.45 NS with 20 mEq KCL
Run IV @ Calculated maintenance
rate

**GOAL RATE =ALL FLUIDS/HR
(INCLUDING TUBE FEEDS)**

ALBUMIN PROTOCOL

If patient requires > Calculated Maintenance
Rate or has complications related to edema
consider albumin protocol

Patient may need colloid resuscitation:
Call M.D./consider Burn Center Consultation to
discuss starting 5% albumin at one-third current
hourly rate, LR at two-thirds current rate.
Example (If Current Rate of LR is 900 cc/hr,
it should be changed to 600 cc/hr LR, and
300 cc/hr 5% Albumin.

Repeat step one until patient maintains
Calculated Maintenance Rate with Urine output
Greater than 30 cc/hr

When combined LR and Albumin rates reach the
Calculated Maintenance Rate change to
LR for two hours

If patient maintained Urine Output for two hours on
LR and is 24 hrs post burn
FLUID RESUSCITATION IS COMPLETE
Change to
D5 0.45 NS with 20 mEq KCL/L
At Calculated Maintenance Rate

M.D.
Signature _____

Date _____

RN Co-Sign _____

Date _____

Pediatric Hospital Burn Disaster Crisis Standards of Care

Initial Management Guidelines for the Pediatric Burn Patient

Burn Disaster Crisis Standards of Care

If transfer to the University of Utah Health Care Burn Center is not feasible, consider Burn Center Consultation at (801) 581-2700.

For patients with >15% total body surface area burn, consider ICU or step-down unit. Recommend using Broselow tape for equipment and medication dosages.

Prior to initiating care of the patient with wounds, it is critical that healthcare providers take measures to reduce their own risk of exposure to potentially infectious substances and/or chemical contamination. In addition, patients with burns/wounds are at high risk for infection and potential cross contamination. Body substance precautions are the most effective way to do this. The level of protection utilized will be determined by patient presentation. Patients with burns > 20% TBSA are most at risk.

Primary Assessment

Intervention/Care	Key Points
Airway maintenance with C-Spine Protection Consider inhalation injury with : • History of closed space fire • Hypoxia • Facial Burns • Stridor • Carbonaceous sputum • Nasal Singe • Hoarseness Treatment • High flow oxygen using a non-rebreather mask, wean as appropriate. • Early intubation (Assess Glasgow prior to intubation) • Secure the ETT with ties passed around the head; do not use tape as it will not adhere to burned tissue. • A nasogastric tube should be inserted on all patients who are intubated.	• Airway edema increases significantly after fluids are started. • Stridor or noisy breath sounds are indicators of impending upper airway obstruction. • Younger children and those with larger burns are more likely to require intubation due to the smaller diameter of the child's airway and the need for significant fluid volumes during resuscitation. • Prophylactic intubation is preferred because the ensuing edema obliterates the landmarks needed for successful intubation. • An endotracheal tube that becomes dislodged may be impossible to replace due to obstruction of the upper airway by edema. • It is critical that the ETT is secured well. Comfort Care Patients Patients placed in the comfort care category should not be intubated. Oxygen should be administered to aid comfort and prevent air hunger. In addition, pain management should also be considered.
Breathing and Ventilation • Assess for appropriate rate and depth of respirations in addition to breath sounds. • Monitor pulse oximetry and obtain ABGs. • Check CO level if indicated. • In circumferential torso burns, monitor chest expansion closely. Chest/abdominal escharotomy may be necessary; consider burn center consult.	An escharotomy is an incision performed longitudinally through burned tissue down to subcutaneous tissue over the entire involved area of full thickness circumferential (or nearly circumferential burn) that is causing constriction and loss of peripheral perfusion or airway constriction. Finger escharotomies are rarely indicated.

Abnormal Pediatric Vital Sign Ranges

Age of Patient	HR		RR		Systolic BP	Temp	
0 days - <1 mo	< 80	>205	< 30	> 60	< 60	< 36	> 38
≥ 1 mo - < 3 mos	< 80	> 205	< 30	> 60	< 70	< 36	> 38
≥ 3 mos - < 1 yrs	< 75	> 190	< 30	> 60	< 70	< 36	> 38.5
≥ 1 yr - < 2 yrs	< 75	> 190	< 24	> 40	< 70 + (age x 2)	< 36	> 38.5
≥ 2 yrs - <4yrs	< 75	> 190	< 24	> 40	< 70 + (age x 2)	< 36	> 38.5
≥ 4 yrs - 6 yrs	< 60	>140	< 22	> 34	< 70 + (age x 2)	< 36	> 38.5
≥ 6yrs - < 10 yrs	< 60	>140	< 18	> 30	< 70 + (age x 2)	< 36	> 38.5
≥ 10 yrs - < 13 yrs	< 60	> 100	< 18	> 30	< 90	< 36	> 38.5
≥ 13 yrs - < 18 yrs	< 60	> 100	< 12	> 16	< 90	< 36	> 38.5

Circulation with Hemorrhage Control

- Heart Rate
- Blood Pressure
- Pulses and capillary refill
- Skin color of unburned skin
- Cardiac monitoring as appropriate and available
- One large-bore Intraosseous or IV line should be inserted until it is determined that adequate resources are available for all patients. **Secure well.**

- IV/IO Priority should be given to pediatric patients with burns >10% TBSA.
- Starting points for fluid resuscitation rates are as follows:

5 years or younger: 125ml LR/NS/hr

6-13 years of age: 250ml LR/NS/hr

14 years or older: 500ml LR/NS/hr

- More definitive calculation is performed during the secondary survey when TBSA is known.
- Patients with burns usually do not 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.

- Due to the increased circulating catecholamines and hypermetabolism associated with burn injuries, the HR will be increased. Sustained high heart rates may indicate hypovolemia, inadequate oxygenation, unrelieved pain or anxiety.
- Dysrhythmias may be the result of an electrical injury and are abnormal.
- The B/P in the early stages of burn resuscitation should be the individuals pre-injury B/P.
- IVs may be placed through burned skin if necessary; suture to secure in place.
- Oral resuscitation should be considered for awake alert pediatric patients with burns < 10% TBSA and adult patients with burns < 20% TBSA using flavored sport drinks and/or an equal electrolyte maintenance solution. Have the family monitor the quality and quantity of urinary output and watch for signs of dehydration.
- When supplies of LR are depleted, fluid resuscitation may continue using NS, ½ NS or colloids. Do not use fluid containing glucose as a resuscitation fluid. A maintenance dextrose fluid may be required for very young children. See pediatric resuscitation orders

Comfort Care Patients

IVs should be started for administration of medication to manage pain and anxiety. Do not administer large volumes of fluid. Excessive fluid will result in decreased circulation and increased pain due to edema.

Disability • Consider using the “AVPU” method: -A – Alert -V – Responds to verbal stimuli -P – Responds to painful stimuli -U – Unresponsive	Typically the burn patient is alert and oriented. If altered neurological status, consider associated injury, CO poisoning, hypoxia, medications administered or pre-existing medical conditions. In infants, hypoglycemia may develop due to limited glycogen reserves; therefore, blood glucose levels should be closely monitored. Hypoglycemia and hypoxia often present as agitation and confusion.
Exposure • Check temperature • Remove all clothing and jewelry • Keep patient and environment warm	• Localized hypothermia causes vasoconstriction to the damaged area reducing blood flow and tissue oxygenation and may deepen the injury. Systemic hypothermia (core temp less than 95° F / 35° C) induces peripheral vasoconstriction that may increase the depth of the burn and interfere with clotting mechanisms and respiration, in addition to causing cardiac arrhythmias.

Initial Management Guidelines for the Pediatric Burn Patient

Burn Disaster Crisis Standards of Care

If transfer to a University of Utah Health Care Burn Center is not feasible, consider Burn Center consultation (801) 581-2700.

Secondary Assessment

History:

- Consider the use of “Ample” to aid in obtaining information
 - A- Allergies
 - M - Medications
 - P – Previous illness, past medical history
 - L – Last meal or fluid intake
 - E – Events/environment related to the injury
- Do not use silver sulfadiazine on a patient with a sulfa allergy; instead use another topical or wound coverage product.

Intervention /Care

Burn Specific Physical Examination:

Airway and Breathing

- Supportive therapy and O₂; wean as appropriate.
- Unless contraindicated by the patient’s medical condition or associated trauma, the head of bed should be elevated 30° to minimize facial and airway edema, maintain sniffing position.
- Use reverse Trendelenburg for patients with C-spine precautions.
- Chest X-ray if intubated, inhalation injury suspected or underlying pulmonary condition.
- Chest X-ray will usually be clear on admit. If inhalation injury is present the X-ray will show infiltrates around the second day, correlating with a deteriorating oxygen status.
- Frequent suctioning is necessary to prevent occlusion of the airway and endotracheal tube. Anyone with an inhalation injury is subject to increased respiratory secretions and may have a large amount of carbonaceous debris in the respiratory tract.

Estimate Burn Size and depth:

- Determine the extent of the burn using the Rule of Nines, Rule of the Palm or Lund-Browder chart.
See Burn Estimate and Diagram.

Initiate Fluid Resuscitation:

Initiate fluid resuscitation for a patient with a TBSA >20% (adult) or >10%TBSA (child)

- 4ml (LR) x body weight (kg) x TBSA % burn = Lactated Ringers solution (LR) fluid in first 24 hours post burn (calculate from time of burn).
- Give half the fluid (LR) in the first 8 hours then the next half (LR) over the next 16 hours.
See Fluid Infusion Rate

Resuscitation Guidelines:

- Insert a foley. Priority should be given to adult burn patients with burn injuries greater than 20% and pediatric patients with burn injuries greater than 10% TBSA.
- Burns of the penis may require insertion of a foley catheter to maintain patency of the urethra.
- Titrate IV rate to maintain a urine output of 1ml/kg.
See Pediatric Fluid Resuscitation Order

Eyes

- Remove contacts prior to eyelid swelling if there is facial involvement.
- Fluorescein should be used to identify corneal injury.
- If eye involvement consider consulting an ophthalmologist.

Circulation

- Elevate burned extremities on pillows or blankets to improve circulation and minimize edema.
- Monitor pulses with a Doppler if necessary.
- Circumferential chest injuries may become life threatening; an escharotomy may be necessary.
- Verify that pulselessness is not due to profound hypotension.
- Scrotal swelling, though often significant, does not require specific treatment.

Monitor for the following signs and symptoms in full thickness, circumferential burn injuries which may indicate circulatory compromise:

- Pallor or cyanosis of distal unburned skin on limb.
- Capillary refill > 5 seconds.
- Unrelenting deep tissue pain.
- Progressive loss of sensation or motor function.
- Inability to ventilate in patients with deep circumferential burns of the chest.

Body Temperature

- Keep patient normo-thermic, especially during wound care.
- Keep patient covered. When supplies of blankets are depleted, patients can be wrapped in plastic wrap or aluminum foil for insulation and warmth.
- Warm the room.
- Warm IV fluid if possible, especially if the patient is very hypothermic.

Labs

- Labs on admission and as dictated by medical condition:
 - Arterial Blood Gases if inhalation injury is suspected
 - Serum Chemistries/Electrolytes
 - Complete Blood Count (CBC)
 - Blood Glucose
 - EKG for electrical injury
 - Type and Screen if additional trauma is suspected
- Tetanus prophylaxis unless given in last five years.

Comfort:

- Frequent pain/sedation assessment; minimum every four hours.
- Assess patient pain score before and after pain/sedation medication given.
- Emotional support and education is essential.
- IV analgesia is the preferred route during the initial post injury period.
- Administer opioids in frequent small to moderate bolus doses.

See Pain Medication Guidelines

Pediatric Pain Medication Guidelines

Burn Disaster Crisis Standards of Care

*When possible try to give patient oral pain medications and start with the smallest dose possible. Please consider renal function before initiating any pain regimen, especially NSAIDs. With IV medications titrate to effect and patient vital signs. **It is best to give smaller doses more frequently until the provider is more comfortable with giving bigger doses.** Patients will never be pain free, educate them about the burn injury and ask them what pain level is tolerable for them.

Mild to Moderate Pain:

Oral
Acetaminophen 10-15 mg/kg per dose not to exceed 75 mg/kg/day
Ibuprofen 10 mg/kg per dose
Codeine with acetaminophen 0.5-1 mg/kg dose of codeine component

Moderate to Severe Pain:

Oral	IV
Hydrocodone with acetaminophen 0.2 mg/kg/dose of hydrocodone component	Morphine 0.05-0.1 mg/kg/dose
Oxycodone with acetaminophen 0.05-0.15 mg/kg/dose of oxycodone component	Fentanyl 1-2 mcg/kg/dose
Oxycodone 0.05-0.15 mg/kg/dose	Ketamine 0.3mg/kg/dose
	Ketamine 0.05-1mg/kg/hr(use as an adjunct)
	Nasal Fentanyl with atomizer 1-2mcg/kg/dose

Burn Estimate and Diagram

Burn Disaster Crisis Standards of Care

Area	Birth-1 yr.	1-4 yr.	5-9 yr.	10-14 yr.	15 yr	Adult	2nd	3rd	TBSA% Total
Head	19	17	13	11	9	7			
Neck	2	2	2	2	2	2			
Ant. Trunk	13	13	13	13	13	13			
Post. Trunk	13	13	13	13	13	13			
R. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
L. Buttock	2.5	2.5	2.5	2.5	2.5	2.5			
Genitalia	1	1	1	1	1	1			
R. U. Arm	4	4	4	4	4	4			
L. U. Arm	4	4	4	4	4	4			
R. L. Arm	3	3	3	3	3	3			
L. L. Arm	3	3	3	3	3	3			
R. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
L. Hand	2.5	2.5	2.5	2.5	2.5	2.5			
R. Thigh	5.5	6.5	8	8.5	9	9.5			
L. Thigh	5.5	6.5	8	8.5	9	9.5			
R. Leg	5	5	5.5	6	6.5	7			
L. Leg	5	5	5.5	6	6.5	7			
R. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
L. Foot	3.5	3.5	3.5	3.5	3.5	3.5			
TOTAL									

Cause of Burn _____

Additional injuries _____

Date of Burn _____

Time of Burn _____

Age _____

Sex _____

Weight _____

Height _____ cm

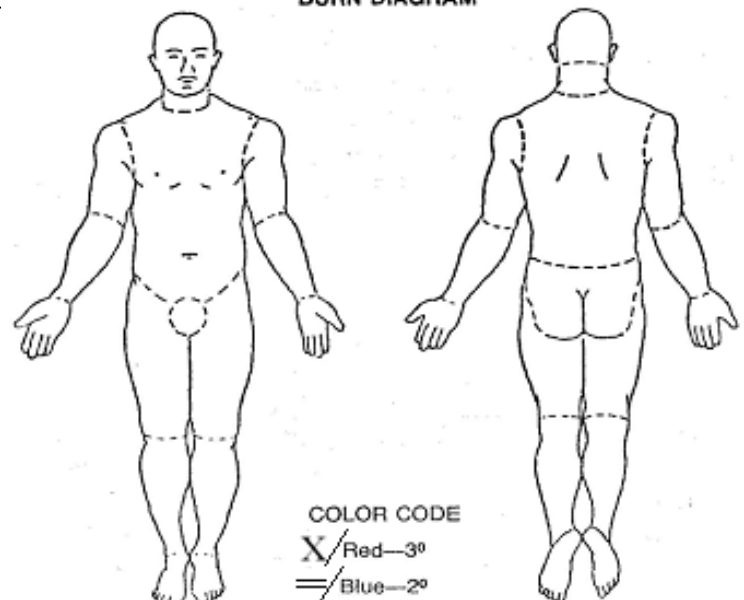
Date of assessment _____

Time of assessment _____

Assessed by _____

Triage Color: R Y G B

BURN DIAGRAM



Fluid Infusion Rate < 30kg

Burn Disaster Crisis Standards of Care

*Fluid of choice LR/NS, DO NOT use dextrose containing fluids

Wt (lbs)	Wt (kg)	% TBSA	/Hr for 1 st 8 Hrs of care	60 gtt set, gtt/min	20 gtt set, gtt/min	15 gtt set, gtt/min	10 gtt set, gtt/min
11	5	10	12.5	12.5	4.2	3.2	2.1
11	5	20	25	25	8.3	6.3	4.2
11	5	30	37.5	37.5	12.5	9.5	6.3
11	5	40	50	50	16.7	12.5	8.3
11	5	50	62.5	62.5	20.8	15.7	10.5
11	5	60	75	75	25	18.7	12.5
22	10	10	25	25	8.4	6.4	4.1
22	10	20	50	50	16.6	12.5	8.4
22	10	30	75	75	25	18.9	12.5
22	10	40	100	100	33.3	25	16.6
22	10	50	125	125	41.6	31.4	20.9
22	10	60	150	150	50	37.4	25
27.5	12.5	10	31.3	31.3	10.5	7.5	5.2
27.5	12.5	20	62.5	62.5	20.8	15.7	10.5
27.5	12.5	30	93.8	93.8	31.3	23.6	15.7
27.5	12.5	40	125	125	41.7	31.7	21
27.5	12.5	50	156.2	156.2	52.1	39.8	26.3
27.5	12.5	60	187.4	187.4	62.5	47.9	31.6
33	15	10	37.5	37.5	12.6	8.5	6.2
33	15	20	75	75	25	18.8	12.6
33	15	30	112.5	112.5	37.5	28.3	18.8
33	15	40	150	150	50	37.5	25
33	15	50	187.5	187.5	62.5	46.7	31.2
33	15	60	225	225	75	55.9	37.4
38.5	17.5	10	43.8	43.8	14.7	10.6	7.3
38.5	17.5	20	87.5	87.5	29.2	21.9	14.7
38.5	17.5	30	131.3	131.3	43.8	33	21.9
38.5	17.5	40	175	175	58.3	44.2	29.2
38.5	17.5	50	218.7	218.7	72.8	55.4	36.5
38.5	17.5	60	262.4	262.4	87.3	66.6	43.8
44	20	10	50	50	16.7	12.6	8.3
44	20	20	100	100	33.3	25	16.7
44	20	30	150	150	50	37.6	25
44	20	40	200	200	66.7	50	33.3
44	20	50	250	250	83.3	62.6	41.7
44	20	60	300	300	100	75	50
49.6	22.5	10	56.3	56.3	18.8	14.2	9.4
49.6	22.5	20	112.5	112.5	37.5	28.1	18.8
49.6	22.5	30	168.8	168.8	56.3	42.3	28.2
49.6	22.5	40	225	225	75	56.4	37.6
49.6	22.5	50	281.2	281.2	93.7	70.5	47
49.6	22.5	60	337.4	337.4	112.5	84.6	56.4
55.1	25	10	62.5	62.5	20.9	15.7	10.4
55.1	25	20	125	125	41.7	31.2	20.9
55.1	25	30	187.5	187.5	62.5	47	31.3
55.1	25	40	250	250	83.4	62.5	41.8
55.1	25	50	312.5	312.5	104.2	78	52.3
55.1	25	60	375	375	125	93.5	62.8
60.6	27.5	10	68.8	68.8	23	17.3	11.5
60.6	27.5	20	137.5	137.5	45.9	34.4	23
60.6	27.5	30	206.2	206.2	68.8	51.7	34.4
60.6	27.5	40	274.9	274.9	91.7	79.7	53.3
60.6	27.5	50	343.6	343.6	114.6	96.9	64.8
60.6	27.5	60	412.4	412.4	137.5	114.1	76.3
66	30	10	75	75	25.0	18.8	12.5
66	30	20	150	150	50.0	37.5	25.0
66	30	30	225	225	75.0	56.3	37.5
66	30	40	300	300	100.0	75.0	50.0
66	30	50	375	375	125.0	93.8	62.5
66	30	60	450	450	150.0	112.6	75.0

Burn Triage Decision Table

Burn Disaster Crisis Standards of Care

BURN TRIAGE TABLE: This table illustrates the anticipated ratio of resources to benefit from the treatment of burns of various sizes in various aged patients. Each category reflects both the volume of resources necessary to care for the patients in each group, and the expected outcome.

	Burn Size Group, % TBSA All									
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
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

Palmieri TL et al.

Triage/Resource Table for a Burn Disaster
Developed from the American Burn Association NBR

Categories are defined as follows:

OUTPATIENT: Survival and good outcome expected without requiring initial admission.

VERY HIGH: Mortality ≤10%, anticipated length of stay ≤ 14-21 days, 1-2 surgical procedures.

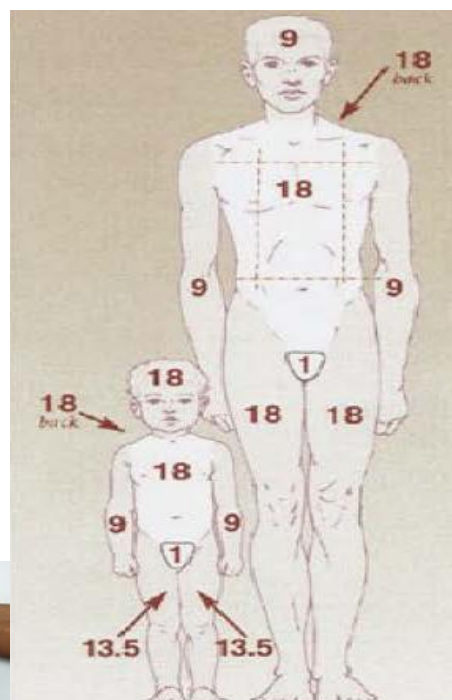
HIGH: Mortality ≤ 10%, anticipated length of stay ≥ 14-21 days, multiple surgical procedures.

MEDIUM: Mortality 10 – 50%, with provision of aggressive treatment which may require prolonged hospitalization and multiple surgical procedures.

LOW: Mortality 50 – 90%, even with provision of prolonged, intensive resources.

EXPECTANT: Mortality ≥ 90%, even with prolonged aggressive care.

Patients palm inclusive of fingers = 1%
Total Body Surface Area



Burn Triage Decision Table

Burn Disaster Crisis Standards of Care

BURN TRIAGE TABLE: This table illustrates the anticipated ratio of resources to benefit from the treatment of burns of various sizes in various aged patients. Each category reflects both the volume of resources necessary to care for the patients in each group, and the expected outcome.

	Burn Size Group, % TBSA WITH Inhalation Injury									
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
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

Palmieri TL et al.

Triage/Resource Table for a Burn Disaster
Developed from the American Burn Association NBR

	Burn Size Group, % TBSA NO Inhalation Injury									
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
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

Fluid Resuscitation Calculation Sheet for the Pediatric Burn Patient < 30 kg

Burn Disaster Crisis Standards of Care

Fluid Resuscitation Formulas

Body surface area calculation equals (m²):

$$\frac{\sqrt{\text{height(cm)} * \text{weight(kg)}}}{3600}$$

Fluid resuscitation calculation

4 ml x weight (kg) x Burn Area (%TBSA)

Basal Fluid Requirement.

1500 ml / 24 hours x Body Surface Area

1. Fluid Resuscitation and Basal Requirement

Calculated fluid resuscitation and basal requirement

A. (4ml x _____ kg x _____ %TBSA) + (1500 ml x _____ m²) = _____ ml/ 24 hours

B. Resuscitation Fluid for the First 24 Hours

Give half the calculated volume in the first 8 hours. Then the other half in the next 16 hours.

- i. 1st 8 hours = _____ ml = _____ ml/hr
- ii. 2nd 8 hours = _____ ml = _____ ml/hr
- iii. 3rd 8 hours = _____ ml = _____ ml/hr

The resuscitation fluid will be titrated hourly based on the patients urine output until the calculated maintenance rate goal is reached. **See fluid resuscitation order sheet for the burn patient >30 kg**

2. Maintenance fluids = Basal Fluid Requirement and Evaporative Water Loss

A. Basal Fluid Requirement = 1500ml x _____ m²

- i. Total body surface area _____ m²
- ii. 24 hours = _____ ml
- iii. Hourly rate = _____ ml/hr

B. Evaporative Water Loss

Burn Patient < 30kg = (35 + %TBSA) x _____ m² = ml/hr

i. Calculated evaporative water loss

$$(35 + \text{_____ \%TBSA}) \times \text{_____ m}^2 = \text{_____ ml/hr}$$
$$= \text{_____ ml/ 24 hrs}$$

ii. **Total maintenance fluids** including basal requirement and evaporative water loss

- 1. **24 hours** = _____ ml
- 2. **Hourly rate** = _____ ml/hr

Burn Disaster Crisis Standards of Care

Fluid Resuscitation Order for the **PEDIATRIC** Burn Patient < 30kg

STEP ONE:

Use the Fluid Resuscitation Calculation Sheet for initial LR rate

Begin LR fluid resuscitation

LR @ _____ ml/hr, & D5LR @ 25ml/hr

****D5LR is not extra fluid on top of LR, Only titrate LR****
Measure urine output hourly

Vitals unstable: HR>180 or Systolic BP < 80

Call Attending

Vital Signs Stable: HR<180, Systolic BP > 80

Pt. Wt _____ Kg's on admission

UOP
< 0.9ml/kg/hr
Flush Foley with 10ml
sterile H₂O
Check UOP again

Increase
IV rate by
10%

UOP
1-1.9ml/kg/hr
_____ ml/hr

Leave IV at
current rate

UOP
> 2ml/kg/hr
_____ ml/hr

Decrease
IV rate by
10%

UOP
> 4ml/kg/hr
_____ ml/hr

Consider decreasing IV rate every 1/2 hr
by 10% Be sure to assess patients
Blood Sugar, BP, HR, Lactic Acid,
Hemoglobin, **before**
decreasing IV rate Consult with MD/consider Burn
Center consult.

REPEAT STEP ONE EVERY HOUR UNTIL:

UOP < 0.5ml/kg/hr
_____ ml/hr
for two hours
despite an increase in fluid

**CALL M.D./CONSIDER
BURN CENTER CONSULT**
and discuss beginning
ALBUMIN PROTOCOL

If patient again develops oliguria or he-
modynamic instability

**CALL MD/CONSIDER BURN
CENTER CONSULT**

And restart patient on LR /D5 LR
Repeat **STEP ONE**

Total Maintenance Fluid Rate
of LR/D5LR _____ ml/hr
is reached and held for two
hours AND the pt. is at least 24
hours post burn

Fluid resuscitation is
COMPLETE:

Switch to
D5 0.45 NS with 20 mEq KCL

Run IV @ Calculated
Total Maintenance Fluid Rate
@ _____ ml/hr

STOP LR/D5LR NOW

**GOAL RATE =ALL FLUIDS/HR
(INCLUDING TUBE FEEDS)**

ALBUMIN PROTOCOL

If patient requires > calculated fluids or has
complications related to edema,
consider albumin protocol

Patient may need colloid resuscitation:
Call MD/consider Burn Center consult to discuss
starting 5% albumin at one-third current hourly rate,
LR/D5LR at two-thirds current rate.
Example: If Current Rate of LR/D5LR is 90ml/hr, it
should be changed to 60 ml/hr
LR/D5LR, and 30 ml/hr 5% Albumin.

Repeat **STEP ONE** until patient maintains
Total Maintenance Fluid Rate with UOP
Greater than 1ml/kg/hr

**When combined LR and Albumin rates reach the Total
Maintenance Fluid Rate change to LR for two hours**

If patient maintained UOP for two hours on
LR/D5LR and is 24 hrs post burn
FLUID RESUSCITATION IS COMPLETE
Change to
D5 0.45 NS with 20 mEq KCL/L (if available)
At Goal Rate

M.D.
Signature

Date

RN Co-sign

Date

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Burn Disaster Crisis Standards of Care Crucial Points

Crucial Points

Burn Disaster Crisis Standards of Care

* Items in bold are action items

Airway Management

- Those with Inhalation injury will do worse than those without inhalation injury.
- Tracheobronchitis with severe spasm and wheezing may occur in the first minutes to hours post-injury.
- The onset of symptoms is so unpredictable that the patient with possible inhalation should be observed for 24 hours.
- Stridor or noisy breath sounds are indicators of impending upper airway obstruction.
- An endotracheal tube that becomes dislodged may be impossible to replace due to obstruction of the upper airway by edema.
- **Secure the ETT with ties passed around the head; do not use tape, as it will not adhere to burned tissue.**
- **A nasogastric tube should be inserted on all patients who are intubated.**
- In unresuscitated patients, supraglottic edema may be delayed in onset until fluid resuscitation is well underway. **Prophylactic intubation is preferred because the ensuing edema obliterates the landmarks needed for successful intubation.**
- Supraglottic edema may occur without direct thermal injury to the airway but secondary to the fluid shifts associated with the burn injury and fluid resuscitation.
- Noxious chemicals are adherent to smoke particles and cause damage to the epithelium of the large airways. Smaller airways and terminal bronchi are usually affected by prolonged smoke exposure.
- Pathophysiology changes associated with injury below the glottis include:
Sloughing of the epithelial lining of the airway, mucus hyper secretion, impaired ciliary activity, inflammation, surfactant inactivation, pulmonary edema, ventilation/perfusion mismatch, increased blood flow, spasm of bronchi and bronchioles and impaired immune defenses.
- Chest X-rays are often normal upon admission of patients with inhalation injuries.
- The presence of inhalation injury markedly worsens prognosis of cutaneous burns, especially if the burn is large and the onset of respiratory distress occurs in the first few hours post-injury.
- Mucosal sloughing may occur as late as 4-5 days following an inhalation injury.
- Anyone with an inhalation injury is subject to increased respiratory secretions and may have a large amount of carbonaceous debris in the respiratory tract. **Frequent and adequate suctioning is necessary to prevent occlusion of the airway and endotracheal tube.**

Fluid Management

- One large bore Intraosseous or IV line should be inserted until it is determined that adequate resources are available for all patients.
- IV priority should be given to adult patients with burns > 20% TBSA, pediatric patients with burns > 10% TBSA, and/or with associated trauma with blood loss.
- Oral resuscitation should be considered for awake, alert pediatric patients with burns < 10% TBSA and adult patients with burns < 20% TBSA using flavored sport drinks and/or an equal electrolyte maintenance solution. Have the family monitor the quality and quantity of urinary output and watch for signs of dehydration.

- When supplies of LR are depleted, fluid resuscitation may continue using NS, ½ NS or colloids. Do not use fluid containing glucose.
- Unless blood loss has occurred or the patient is extremely anemic, packed red blood cells should not be given.
- Fluid loss associated with burn injuries is slow and progressive. Patients with burns usually do not 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.
- Initially burns do not bleed; if there is bleeding there may be associated trauma.
- For more detailed fluid management instructions refer to the **Initial Fluid Infusion rate chart, or the Adult and pediatric fluid resuscitation orders.**

Eating and Drinking

- During IV fluid resuscitation, patients are not given anything to drink or eat because the stress on the body as a result of the burn affects the stomach's ability to digest. If food or fluids are given before normal stomach activity returns, the patient may become sick and vomit.
- After two to three days the body begins to use energy at a very rapid rate. This increased use of energy is characterized by an increase in heart rate, respiratory rate and body temperature. Due to these changes, the body requires a large amount of calories and protein to heal.
- **In large burns, an IV alone provides inadequate nutrition, so it may be necessary to place a feeding tube.** This tube can be removed when patients are able to eat enough on their own.
- **Patients should be encouraged to drink fluids containing calories and protein instead of water.**
- There are many drinks available to add calories and protein; milk is the easiest and least expensive. Other options include supplements such as Carnation Instant Breakfast, Ensure, etc.

Wound Management

- Prior to initiating care of the patient with wounds, it is critical that healthcare providers take measures to reduce their own risk of exposure to potentially infectious substances and/or chemical contamination. In addition, patients with burns/wounds are at high risk for infection and potential cross contamination. Body substance precautions are the most effective way to do this. The level of protection utilized will be determined by patient presentation. Patients with burns > 20% TBSA are most at risk.
- In a disaster situation, wound care can be performed once per day or less frequently depending on product guidelines.
- Any clean, non-sterile dressings may be used on a burn patient.
- In the event that dressings supplies are exhausted, burn wounds can be placed in a topical ointment and dressed with clean cotton t-shirts, socks, gloves, biker shorts, onesies, maxi pads, or diapers.
- Burned scalps and faces should be shaved daily if possible.
- Genitalia and perineal burns may require a foley to maintain patency.
- Wrap fingers and toes separately if possible when burned.
- Be sure to check for sulfa allergy prior to applying silver sulfadiazine cream to a patient.
- Elevate burned extremities above the level of the heart on pillows or blankets.
- The layer of silver sulfadiazine should be thick enough to prevent the wound from drying out prior to the next dressing change.
- Other appropriate dressing coverage includes silver-impregnated or any broad spectrum antimicrobial.

- The purpose of a dressing is to keep the cream from rubbing off before the next dressing change.
- **Do not use silver sulfadiazine cream on the face and keep all topical creams out of the eyes.**
- If silver sulfadiazine or silver products are not available, consider using another antibiotic ointment such as Bacitracin/Neomycin/Polysporin.
- For more detailed dressing instruction refer to the **Outpatient Wound Care Instruction Sheet.**

Pain Control

- Burn pain is excruciating because of the exposed nerve endings and patients will require large doses of narcotics.
- **For patients with < 20% TBSA consider using oral narcotics and anxiolytics.**
- Education to the patient regarding why the burn hurts is important; this will alleviate some of their anxiety and make them feel better.
- For more detailed pain control instructions refer to the **Adult and Pediatric Pain Medication Guidelines.**

Temperature Control

- Because burn patients are unable to regulate their own body temperature, blankets need to be used in order to keep the patient warm.
- **When supplies of blankets are depleted, patients can be wrapped in plastic wrap or aluminum foil for insulation and warmth.**
- Hypothermia causes vasoconstriction of the blood vessels and will decrease blood flow to already compromised areas of burn injury.

Comfort Care

Aggressive treatment may need to be denied to those patients with severe burn injuries in the event of a mass disaster where resources are depleted and there are large numbers of patients. This will ensure the greatest number of people benefit from the limited care and resources available.

Patients who may be triaged into the comfort care category include the following:

- Patients who have no pulse or breathing after airway positioning on scene.
- Massive burns > 60% TSBA
- Advanced age
- Serious co-morbidities
- Critical inhalation injury when resources for ventilatory management are limited.

Patients placed in the comfort care category should not be intubated but oxygen should be administered to aid comfort and prevent air hunger. IVs should be started for administration of medication to manage pain and anxiety. Do not administer large volumes of fluid. Excessive fluid will result in decreased circulation and increased pain due to edema and constriction of circumferential burns of the torso or neck and changes in sensorium due to cerebral edema. Psychological support should be provided to the patient and to their families.

Comfort care patients may need to wait for provider and resource availability. These patients may also need to wait for transfer until all other patients have been moved.

Burn Disaster Crisis Standards of Care : Wound Management

Wound Care Supply Guideline

Burn Disaster Crisis Standards of Care

*Suggested wound care supplies for the treatment of ten patients with 50% TBSA burns for three dressing changes

Description	Quantity	Notes
Wound Veil (24in x 36in)	30 packets Recommend adding an additional 5 packets when possible	Two sheets per pack. If Wound Veil is unavailable, Adaptic can be substituted. There are approximately six-9x16 Adaptics to one package of veil, equaling 180 packages.
Mesh Gauze (18 in x 18 in)	30 boxes Recommend adding an additional 5 packets when possible	6 gauze per pack
Fluff roll or Kerlix (4.5 x 4.1 yd)	150 rolls Recommend adding an additional 5 rolls when possible	Estimated at 5 rolls per dressing
Kerlix sponges (4 in x 4 in)	30 boxes Recommend adding an additional 5 boxes if possible	10 sponges per box
Tubular elastic dressing retainer # 1 (otherwise known as netting)	2 boxes	50 yds per box
Netting # 3	2 boxes	50 yds per box
Netting # 5	2 boxes	50 yds per box
Netting # 8	2 boxes	50 yds per box
Netting # 11	2 boxes	50 yds per box
Betasept 4 % (960 ml) or a mild, non-perfumed soap. Baby shampoo could also be used.	15 bottles of Betasept. 30 bars of soap, 1 per patient per day. 30-1 fluid oz bottles of baby shampoo, 1 bottle per dressing change.	Can use 5 bottles of Betasept per day for the 10 patients and pour at a central location; NOT in the patient's room due to cross-contamination risk.
Basin (large)	15	This number includes 5 extra in case additional are needed.
Scissors sharp/blunt	30 pairs	Could decrease this number to 20
Tape (1 in x 10 yds)	30 rolls	
Elastic bandage 4 in x 4.5 yds (Ace wrap)	4 bundles (total of 40 Aces)	10 bandages per bundle

This is a simplified list containing only burn-specific supplies. Other items that could be required would include personal protective equipment, IV tubing, LR (suggest 100 liter bags), topical ointments or silver-impregnated products, warming blankets, heater unit (3 units with 10 blankets), IV / blood warmers with tubing (3 units and 30 sets of tubing). Optimally, supply carts are locked and burn wound care fast reference cards are laminated and tied to the cart. In the event that dressing supplies are exhausted, burn wounds can be placed in a topical ointment/wound product and dressed with clean cotton t-shirts, socks, gloves, biker shorts, onesies, maxi pads or diapers.

Wound Management Treatment Guidelines

Burn Disaster Crisis Standards of Care

It is not always possible to know burn depth for several days as burn appearance may be deceiving or burn injury may deepen.	Depth of injury	Wound Characteristics	Course	Intervention/Care
First Degree 	Limited damage to epidermis, skin intact	• Painful • No immediate blister formation • Red	Heals completely in 3-5 days, without scarring	*Give pain medications as necessary. Open to air. Wash with mild soap, water and wash cloth twice per day.
Superficial/Partial Thickness (Second-degree) 	Epidermis destroyed, minimal damage to superficial layers of dermis	• Pink or red • Moist • Weepy • Blanching • Blisters • Painful	Usually heals completely within 5-21 days with little or no scarring. Grafting not usually required.	*Give pain medications. Wash with mild soap, water and wash cloth. Dress wound with topical ointment; change daily. If silver-impregnated dressing is used, follow manufacturer's guidelines.
Deeper (Second-degree) 	Epidermis and dermis involved	• May be red or pearly white • Drier in appearance than superficial injury. • Painful	May take 3-8 weeks to heal, sometimes with heavy scarring. May require a skin graft.	*Give pain medications. Wash with mild soap, water and wash cloth. Dress wound with topical ointment; change daily. If silver-impregnated dressing is used, follow manufacturer's guidelines.
Full Thickness (Third degree) 	All epidermis and dermis destroyed	• White, cherry red, brown or black in color • Hard and leathery • Insensitive to pinprick	Prolonged healing; will require a skin graft.	*Give pain medications. Wash with mild soap, water and wash cloth. Dress wound with topical ointment; change daily. If silver-impregnated dressing is used, follow manufacturer's guidelines.

Outpatient Wound Care Instructions

Burn Disaster Crisis Standards of Care

These wound care guidelines are to be used only in the event of a burn disaster in which state resources are depleted. When normal operations resume, these guidelines for care will change. If you have questions, please call the University of Utah Health Care Burn Center at (801)581-2700 or, in the event of a disaster, your local care provider.

SILVER SULFADIAZINE DRESSING (THERMAZENE OR SILVADENE)

Your burn has been dressed in Silver Sulfadiazine. This is to be changed once a day. This is very important to promote healing and prevent infection.

Follow these guidelines as your care provider has instructed you:

- a. Wash the burn with mild soap, water, and a washcloth, removing all old ointment and any loose skin.
- b. Blot dry.
- c. Apply a thick coat of Silver Sulfadiazine (like icing on a cake) and cover with a minimal amount of gauze netting. Silver Sulfadiazine tends to work better when some air can get through the dressings.
- d. If you do not have gauze netting, a clean t-shirt, socks, glove, bike shorts, maxi pad, or diaper will work.

BACITRACIN/NEOSPORIN/POLYSPORIN AND NON-STICK GAUZE

Your burn has been dressed in a topical ointment with non-stick gauze. This dressing is changed once a day. This is very important to promote healing and prevent infection.

Follow these guidelines as your care provider has instructed you:

- a. Wash the burn with mild soap, water, and a washcloth, removing all old ointment and any loose skin.
- b. Blot dry.
- c. Apply a thin layer of ointment, only to the injured areas.
- d. Place non-stick dressing over the ointment. Do not overlap excessively.
- e. Cover with a minimal amount of gauze followed by netting.
- f. If you do not have gauze or netting, a clean tight t-shirt, socks, gloves, bike shorts, maxi pad, or diapers will work.

SILVER IMPREGNATED DRESSING

Your burn has been dressed in a Silver Impregnated Dressing. This dressing is **NOT** to be changed until your next clinic visit.

Follow these guidelines as your care provider has instructed you:

- a. Keep dressing clean, dry and intact. If your dressing becomes wet, please contact your care provider. You may change the outer gauze wrap and netting if there is excessive drainage or it becomes dirty. Do NOT remove silver-impregnated dressing.
- b. If you do not have gauze or netting, a clean t-shirt, socks, gloves, bike shorts, maxi pad, or diapers will work.

General Wound Care Guidelines

MOISTURIZER AND SUN BLOCK

Oil glands, which provide natural oils to keep the skin moisturized, become damaged as a result of the burn injury. Frequent application of moisturizer to healed areas can help skin stay hydrated and therefore less dry. Healed skin is pink and shiny with no drainage.

As the skin heals it relearns its natural pigmentation, although it may never completely return to its original color. During this time it is important to protect your skin from the sun. If the skin is sunburned or tanned while healing, pigmentation can change long term. During the first year, or as long as your skin is pink, red or purple, you should use sunscreen and protect your skin with clothing or compression garments.

FACE AND NECK BURN

Face and neck burns should be washed at least twice a day, removing old ointment and any loose skin. Apply topical ointment to all open areas. If this ointment is rubbed off during the course of the day, reapply topical ointment as often as needed to keep wounds moist.

INFECTION

A low-grade fever associated with burn injuries is normal. Cellulitis, however, is a localized infection of the burn wound and would benefit from simple treatment. If there is redness spreading out from the burn wound and the surrounding skin is warm and swollen, you should contact the care provider immediately.

BATHING

***DO NOT BATHE IF IN SILVER IMPREGNATED DRESSINGS.** A sponge bath to other areas is fine as long as the wounds dressed in the silver product remain dry. *

A daily bath is helpful in wound management. Shampoo and other chemicals involved in bathing will not contaminate your burn injury. Before getting out of the tub/shower, wash your wounds as described above.

DIET

Fluid intake is very important. Increasing your normal fluid intake with juices and drinks high in protein and calories will help speed healing. If available, flavored sports drinks are a great option. Be sure to eat well-balanced, nutritious meals.

ACTIVITY

Maintaining function of a burned extremity decreases pain and swelling as well as promotes healing. Therefore, we encourage normal activity except when otherwise instructed by your care provider.

PAIN CONTROL

Dressing changes are often very painful and medication cannot take all the pain away. It may be helpful for you to take pain medication 30 minutes before doing the dressing change. Please talk with your care provider about appropriate pain medication and any required refills.

ITCHING

Your dry skin, combined with sensory nerves growing back, causes itching. Although uncomfortable at times it will lessen over the next few months. Talk to your care provider about medications that might ease itching.

TIGHT TOUGH SKIN

Continued physical therapy and stretching will soften the skin over time. It will not feel that way forever.

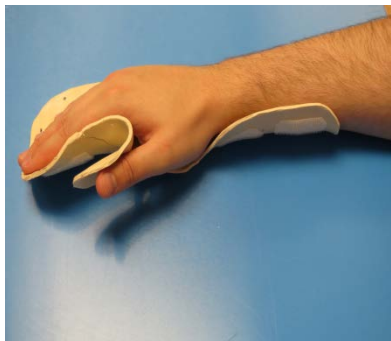
Burn Disaster Crisis Standards of Care: Physical Therapy

Physical Therapy Guidelines

Burn Disaster Crisis Standards of Care

Positioning

Burn-injured extremities should be elevated with pillows. Upper extremities should be positioned with the shoulders abducted to 90°, elbows extended, palms up. If the hands are involved, the patient should have a resting hand splint. This can be fabricated out of gauze wraps, casting material, splinting material or purchased (see illustrations). The lower extremities should be positioned with the knees in extension and the feet supported in neutral. If the burn is partial thickness, the feet can be supported with pillows. If the burn is deep, the feet should be in a foot splint, if possible. It is important to keep the heels protected with gel pads and limit weight bearing on the heels while the patient is on bed rest. In addition, patients with neck and ear burns should not be allowed to use pillows with the exception of a donut head pillow. Gel pads can be used on the back of the head to help prevent pressure sores.



Activity/ROM

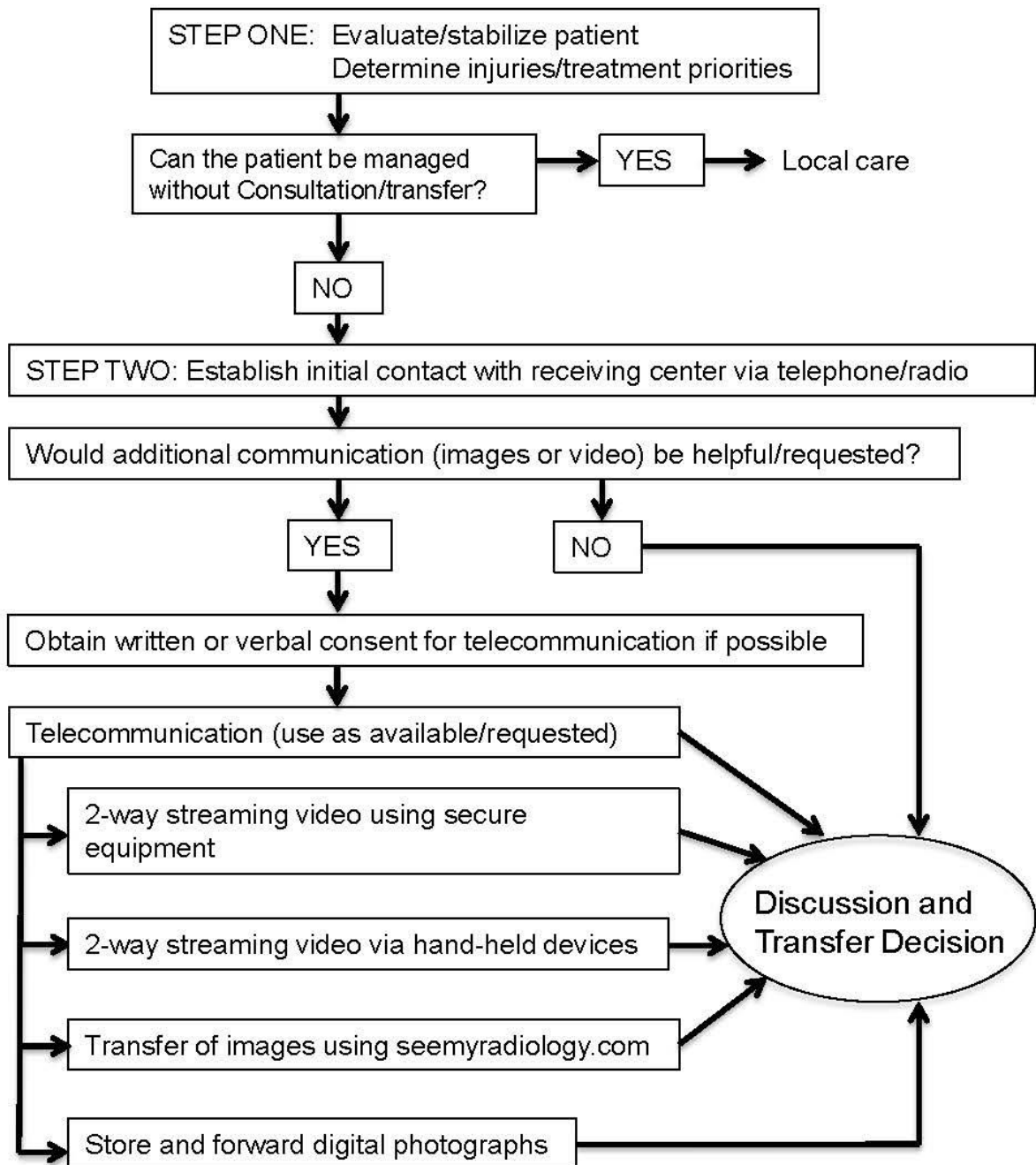
The patient should not be encouraged to increase activity during the first 24-48 hours of fluid resuscitation. Once the patient is stable and they do not have any additional injuries such as fractures or exposed tendons, they should be able to move all areas that are burned. They should flex and extend the knees, elbows and wrists. They should raise their arms over their heads. They should make circles with their ankles. They should touch each fingertip to their thumb and then straighten the fingers. If the back of the hand has a deep burn they should not try and make a fist. Standing and ambulating are fine, even if the bottoms of the feet are burned. Sitting and trying to feed themselves should be encouraged. The patient should continue to elevate extremities during periods of rest, which will prevent swelling.

Exercise stimulates circulation, reduces swelling, maintains strength and functional movement and prevents scar contracture. Exercise and mobility also prevent serious medical conditions such as blood clots, pneumonia and bone loss. A burn wound will heal in the position it is held most often. For this reason it is important to maintain proper positioning during rest to prevent contractures.

Burn Disaster Crisis Standards of Care: Tracking Sheets, Telemedicine and Transfer

COMMUNICATING WITH TERTIARY/DEFINITIVE CARE IN A
BURN/TRAUMA DISASTER

University of Utah Healthcare Burn Center
801-581-2700





Consent for Telehealth Consultation and Treatment

To better serve the needs of people throughout our region, some health care services are now available by two-way interactive video communications and/or by the electronic transmission of information, which may assist in the evaluation and treatment of health care problems. Referred to as “telemedicine” or “telehealth” this means that I may be evaluated and treated by a provider at the University of Utah (University Provider) by telemedicine from Salt Lake City, Utah. Since this may be different than the type of consultation with which I am familiar, I understand and agree to the following:

1. The University Provider may be at a different location from me. A physician or other provider (“local provider”) may be at my location with me to assist in the consultation. Consultation may also take place at my home without a local provider present.
2. The telemedicine process may consist of transmission of video or digital photographs of me, or of transmission of xrays, test results, or details of my medical record. These will be transmitted to and discussed with the University Provider.
3. Information transferred electronically may be more vulnerable to disclosure or tampering than information transferred by other means.
4. In an emergent situation either the University provider or my local provider will determine/direct who will be present during the telemedicine consultation.
5. In a non-emergent situation I will be informed if any additional personnel are to be present other than myself, individuals accompanying me, the University Provider and Local Provider. I will give my verbal permission prior to additional personnel being present.
6. Video recordings may be taken of the telehealth consultation, after I have given my written permission prior to recording. Video recordings and other data, including x-rays, images, and photos may be kept, viewed, and used for purposes including teaching, training, technical, scientific, research, or administrative purposes, including performance improvement.
7. The University provider will obtain additional consent if use of compact disc recordings and other data, including x-rays, images, and photos is desired for any other purpose.
8. The local provider, if present and the University Provider will keep a written record of the consultation in my medical record.
9. I understand that my participation in telemedicine is voluntary. I have the right to
 - A. Refuse the telemedicine consultation, or stop participation at any time.
 - B. Limit the physical examination during the consultation.
 - C. Request that the local provider refrain from transmitting information if I make the request before the information is transmitted
 - D. Request that nonmedical personnel leave the room or be denied permission to view the telemedicine consultation at any time.
 - E. Request to consult privately with the University Provider at any time.
10. This signed consent form is valid for three years.

I acknowledge the nature of my condition and the nature and purpose of the proposed telemedicine procedures and any substantial and significant risks of serious harm together with their alternative methods of treatment or non-treatment, have been explained to my satisfaction.

I acknowledge/understand the attendant risks involved and voluntarily assume them in the hopes of obtaining the desired beneficial results.

I acknowledge/understand that all claims for negligence and other claims against the University of Utah and its employees and agents, including physicians, nurses, technicians, and students may be governed by the provisions of the Utah Governmental Immunity Act, Utah Code Annotated Section 63G-7-101 et seq., as may be amended from time to time, a special law restricting how and when a claim must be presented and limitations on the amount recovered.

Signature of Patient: _____ Date: _____

Patient Representative: _____ Date: _____

Witness: _____ (if patient unable to sign) Date: _____

Patient Name: _____
(please print)

Local Provider: _____

Location: _____

Please FAX signed form to (801) _____ and place original in patient’s record.

Confidential: This material is prepared pursuant to Utah Code Annotated § 26-25-1 et seq., for the purpose of evaluating health care rendered by hospitals or physicians and is **not** part of the medical record. It is also classified as “protected” under the Government Records Access and Management Act, Utah Code Annotated § 63G-2-101 et seq.



Burn Patient Consultation Information Sheet

Telemedicine using live stream

- The requesting health care facility will contact the University of Utah Health Care Burn Center (UUHC BC) at (801) 581-2700 and request a burn telemedicine consultation.
- Patient consent will be obtained if possible using the University of Utah Burn Center Informed Consent for Telemedicine Consultations form, or similar facility-specific patient informed consent form. The form will then be faxed to the UUHC BC at (801) 585-2103.
- UUHC BC will turn on the telemedicine equipment and prepare to receive the requesting health care facility telemedicine call for patient consultation.
- The patient providers will use the Burn Estimate and Diagram (referring provider) in addition to the Burn Center Referral Sheet (burn center provider) to document the consultation.

Telemedicine using store and forward of patient images

- The requesting health care facility will contact the University of Utah Health Care Burn Center (UUHC BC) at (801) 581-2700 and request a burn telemedicine consultation using store and forward of patient images.
- UUHC BC will send an email to the requesting facility at the specified email address with PHI in the subject line; this ensures that patient information is protected.
- Requesting ED physician will obtain patient consent for the store and forward of images using the University of Utah Burn Center Informed Consent for Telemedicine Consultations form, or similar facility-specific patient informed consent form. The form will then be faxed to the UUHC BC at (801) 585-2103.
- Patient images will then be attached to the PHI email and sent to the UUHC BC with a PHI in the subject line so that images will be secure.
- UUHC BC and referring physician will then communicate via phone regarding patient images.
- The patient providers will use the Burn Estimate and Diagram (referring provider) in addition to the Burn Center Referral Sheet (burn center provider) to document the consultation.

*** When you first receive an encrypted (PHI) email from UUHC BC using the Cisco Registered Envelope Service (CRES), you will be asked to register through Cisco. This process will take approximately five minutes, and you will be asked to choose a password and a security phrase. You will then be asked to activate your account. This process ensures patient information is kept secure. This account will cover all PHI email from the UUHC BC sent to the registrant's email address.**

Secure emails come from the following address: CRES Do Not Reply (DoNotReply@res.cisco.com).

For more information and to read FAQ regarding CRES, please use the following link and choose the option stating "Third party secure mail"

<http://www.secureit.utah.edu/training/securemail/index.html>

Patient consultation utilizing the PEAK radios

- The requesting Health Care facility will contact the University of Utah Health Care Burn Center (UUHC BC) using the PEAK radio system and request a burn patient consultation. The channel to be used is currently the SST Coalition option, but eventually there will be a designated Burn Channel.
- The facility will obtain patient consent.
- The patient care providers from the requesting Health Care Facility and the UUHC BC will communicate utilizing the PEAK radio regarding the burn patient consultation.
- The PEAK radio is a secure channel which cannot be picked up by scanners. All facilities with PEAK radios will be able to hear a patient consultation if they are tuned to that channel.
- The patient providers will use the Burn Estimate and Diagram (referring provider) in addition to the Burn Center Referral Sheet (burn center provider) to document the consultation.



UNIVERSITY OF UTAH
HEALTH CARE

| Burn Center

Burn Patient Transfer Guidelines

Burn Disaster Crisis Standards of Care

Date: _____ Time: _____ AM / PM Contact: _____
 Referring Hospital: _____ Telephone: _____
 Referring Physician: _____
 Burn MD/ Accepting Physician: _____

PATIENT INFORMATION

Name: _____ Age: _____ Sex: M / F Pre-burn Wt: _____ Lb/Kg
 Burn Date: _____ Time of injury: _____ AM / PM Allergies: _____

<u>Burn Type</u>	<u>Source</u>	
Flame ☐	_____	Total % BSA: _____
Inhalation ☐	enclosed space / open air	Complete the burn estimate and diagram to show burn areas
Scald ☐	_____	Other Notes: _____
Chemical ☐	_____	_____
Electrical ☐	_____	_____
Contact ☐	_____	_____
Radiation ☐	_____	_____

Respiratory Status: _____ Intubated Yes / No Tube Size _____ ABG's _____ O₂ _____
 SaO₂%: _____ ETCO%: _____ Respiratory Treatments: _____
 Non-burn Wounds: _____
 Complications – Other injuries: None / _____

<u>Medical History:</u>	<u>Vital Signs</u>	<u>Immunizations</u>	Up-to-date: Yes / No
_____	Pulse: _____	Tetanus/Diphtheria	Yes / No
_____	RR: _____	Antibiotics (list on back)	Yes / No
_____	B/P: _____	Cyanokit	Yes / No
_____	Temp: _____	Time/Date administered	_____

<u>Intravenous Fluids</u>	<u>All Current Medications</u>	<u>Other Tests</u>
IV: _____ at _____ Site: _____	_____	Foley _____ ml
IV: _____ at _____ Site: _____	_____	NGT _____ ml
Blood Work: _____	_____	X-Ray _____
(Not Required)	_____	Dressings _____
	_____	(No wet dressings. Use clean, dry sheet & blankets)

Family/Guardian: _____ Contact #: _____ Notified: Yes / No

TRANSPORT

<u>To Referring Hospital</u>	<u>Burn Center</u>	☐ to arrange	<u>Final Disposition:</u>
Basic Life Support ☐	Notification _____ AM/ PM		Transfer accepted ☐
Critical Care ☐	Departure _____ AM/ PM		
Helicopter ☐	Utah DOH Notified Yes / No		Referred to Outpatient ☐
Other: _____			
Comments: (Use back too) _____		Provider: _____	

Burn Disaster Crisis Standards of Care Radiation Injury Treatment Guidelines

Radiation Injury – EMS

Burn Disaster Crisis Standards of Care

If radiation exposure is suspected or if an explosive event trigger is unknown:

- *Use appropriate PPE (Tyvek suit, if available – Gown, Gloves, and Mask suffice)
- *Trauma trumps decontamination. Decontaminate as able, but decontamination should NOT supersede critical intervention.
- * For patients triaged as “Green,” on-site decontamination should be considered the first-line intervention.
- *Exposure and/or contamination alone are NOT medical emergencies. Begin with initial assessment and triage.

If radiation contamination is suspected, a contamination survey can be conducted with a Geiger meter (“pancake probe”).

Contact your local HAZMAT team for event assistance and notify the Department of Health at 866 364-8824 to alert them of the situation.

Follow standard ATLS guidelines

Maintain Airway, Breathing, Circulation

Monitor for disability and deficit

- *If deficits exist consider lethal radiation dose.

Evaluate and Maintain Circulation

NOTE: Based on availability and triage, IV/IO only if indicated for hemodynamic support.

Disability, Neurological Deficit

Typically alert & oriented

A- Alert

V- Responds to verbal stimuli

P- Responds only to painful stimuli

U- Unresponsive

***If deficits exist consider CO, history of anoxia, chemical exposure, traumatic injury, or lethal radiation dose.**

In addition to the AVPU scale the Glasgow Coma Scale can also be used.

Exposure

Place a mask on the patient, and shield their face. Remove all clothing and jewelry – TAKE CARE when removing any item from a potentially contaminated patient. Cut, don’t tear, clothing away from the face with shears to minimize airborne dispersal of contaminating agents. Roll clothing AWAY from body.

Double-bag clothing as able.

If decontamination cannot happen immediately, cocoon wrap the patient with a sheet prior to transport to minimize further contamination of personnel and equipment.

Considerations:

If able, survey patients for contamination at the scene. Use of Geiger-Mueller Meters (“pancake probes”) is optimal when available. Contact local HAZMAT teams or Health Department.

A patient is considered not contaminated (“clean”) if a radiological survey measures less than 2x background.

Follow your standard decontamination procedures.

Radiation Injury - ED

Burn Disaster Crisis Standards of Care

See Radiation Patient Treatment Algorithm on next page.

For 24/7 assistance, contact Radiation Emergency Assistance Center (REAC/TS): 865-576-1005

If Radiation is suspected or if an explosive event trigger is unknown:

*Use appropriate PPE (Tyvek suit, if available – Gown, Gloves, and Mask suffice)

***Don't let patients die whilst waiting for decontamination. If life saving care needs to be performed prior to entering the facility a medical team wearing appropriate PPE should provide care until decontamination occurs.**

*Trauma trumps decontamination. Decontaminate as able, but decontamination should NOT supersede critical intervention. Minimize exposure of personnel and equipment by properly containing potential contaminants. (Cover contaminated wounds, cocoon-wrap patient, etc.)

*Exposure and/or contamination alone are NOT medical emergencies. Begin with head-to-toe assessment and triage.

* The psychological well-being of the patient should be constantly addressed.

If radiation contamination is suspected, a contamination survey can be conducted with a Geiger meter ("pancake probe"). Contact your HAZMAT team and / or local RITN Center for support and notify your assigned regional coalition coordinator in addition to the DOH at 866 364-8824.

Follow standard ATLS guidelines

Maintain Airway, Breathing, Circulation

Monitor for disability and deficit

*If deficits exist consider lethal radiation dose.

Considerations:

- Establish a secure perimeter to prevent unnecessary exposure/contamination of personnel, equipment, and facility. Direct patient traffic to appropriate areas.
- Universal precautions (Tyvek suit, if available – Bunny suit, surgical gloves under disposable gloves, mask/hood suffice) to avoid unnecessary contamination of personnel and equipment.
- Maintain "clean" and "dirty" zones to avoid cross-contamination: Cover unnecessary items with plastic/sheets as available. Place tape on floor and cordon off areas for "contaminated" and "clean" zones. Conduct radiological survey of all persons/equipment leaving the "contaminated" zone to prevent contamination of clean areas. If transport of contaminated patients is necessary prior to decontamination place a hair net and cocoon wrap the contaminated patient/wound and clean equipment prior to movement. Use the shortest possible route.
- Removal of contaminated clothing and shoes and rapid washing of exposed skin and hair removes 90% contamination.
- As soon as reasonably feasible, decontaminate open wounds, orifices, and known contaminated sites on patient. Ask the patient to blow their nose.
 - Decontamination of a wound – Using one cleansing wipe at a time, clean from OUTSIDE IN, with a single swipe per cleansing cloth. Dispose of cleansing wipe after single swipe and start fresh, continuing from OUTSIDE to INSIDE.
- Considering possibility of internal contamination (inhalation or ingestion of radionuclides or open wound contamination), it is important to swab nares and/or wound for radiological survey. Collect expelled bodily fluids for safe disposal per hospital-specific guidelines.
- VENTILATION – As reasonably feasible, perform triage, treatment, and decontamination in Negative Pressure spaces to avoid recirculation of potentially contaminated air throughout the department or facility. Consult Emergency Management or Engineering teams to discuss need for further ventilation precautions.

Radiation Injury – Definitive Care

Burn Disaster Crisis Standards of Care

Hematopoietic Syndrome

- Seen in absorbed doses of 1 Gy or greater and require 7 days or more to manifest, depending upon dose.
- Filgrastim/Pegfilgrastim for neutropenia.
- Packed Red Blood Cells and Platelets should be irradiated, if possible, per AABB guidelines.
- Platelet transfusion parameters in the non-hemorrhagic patient for platelet counts of <15,000.

In the presence of open wounds or bleeding, a higher parameter may need to be considered.

Gastrointestinal Syndrome

- Nausea and vomiting are the earliest indicators of gastrointestinal syndrome.
- Time-To-Vomiting is an indicator of absorbed dose. (See Table 2 in Reference Tables)
- Aggressive management of fluid loss.
- Antiemetic regimen – 5HT3 antagonists, benzodiazepine, and phenothiazines.
- Patients will not be amenable to enteral feeding and may require parenteral nutrition.

Expect development of anorexia, abdominal pain, and diarrhea.

Neurovascular Syndrome

- Seen in very high dose exposures (20-30 Gy).
- Cognitive and neurological deficits, ataxia, seizures, and hypotension may all present from cerebral edema.

Symptoms present hours to days from exposure and are generally fatal.

Cutaneous Radiation Syndrome

- | | | |
|-------------------------|----------|------------------------------|
| • Epilation | 3 Gy | ~ 17 days |
| • Erythema / blistering | 6 Gy | May be early (days) to weeks |
| • Dry Desquamation | 10-15 Gy | 2-3 weeks |
| • Wet Desquamation | 20-50 Gy | 2-3 weeks |
| • Deep Ulceration | > 30 Gy | > 3weeks |

Infection Risk

- Absolute Neutrophil Count (ANC) <500 puts patient at high risk for opportunistic infection.
- As possible, patients should be maintained in Positive Pressure environment :
 - Strict hand washing; All personnel need to follow facility protocol for isolation.
 - Patient should wear protective face mask (N-95 standard) when outside isolation.
- Prophylactic standard of care is a flouroquinolone, acyclovir, and an antifungal.
- In febrile patient, antibiotic coverage must be expanded to include gram positive and gram negative bacteria.
- Infection risk is directly related to neutropenia and varies by patient.

Considerations for Acute Radiation Syndrome and Radiation Burns

- Incident history
- History of Signs and Symptoms
- Physical Examination – document skin changes. (See Cutaneous Radiation Syndrome above.)
 - If skin changes occur over time and are indicative of radiation burns, treat the affected area in accordance with thermal burn treatment guidelines and consider consultation with local Burn Center.
- Labs to consider in addition to routine labs:
 - CBC/diff every 6 hours
 - Absolute Lymphocyte Count (ALC)
 - Serum amylase
 - Urinalysis and urine for bioassay in addition to a 24 hour fecal.

NOTE: Transfer of radiation patients to an RITN facility should occur as soon as conditions allow.

For guidance call: 865-576-1005 (24/7 Ask for REAC/TS)

Table 1. Phases of Radiation Injury*

Dose Range, Gy	Prodrome	Manifestation of Illness	Prognosis (without Therapy)
0.5–1.0	Mild	Slight decrease in blood cell counts	Almost certain survival
1.0–2.0	Mild to moderate	Early signs of bone marrow damage	Highly probable survival (>90% of victims)
2.0–3.5	Moderate	Moderate to severe bone marrow damage	Probable survival
3.5–5.5	Severe	Severe bone marrow damage; slight GI damage	Death within 3.5–6 wk (50% of victims)
5.5–7.5	Severe	Pancytopenia and moderate GI damage	Death probable within 2–3 wk
7.5–10.0	Severe	Marked GI and bone marrow damage, hypotension	Death probable within 1–2.5 wk
10.0–20.0	Severe	Severe GI damage, pneumonitis, altered mental status, cognitive dysfunction	Death certain within 5–12 d
20.0–30.0	Severe	Cerebrovascular collapse, fever, shock	Death certain within 2–5 d

* Modified from Walker RI, Cervený RJ, eds. (21). GI = gastrointestinal.

Table 2. Triage Categories Based on Time-To-Emesis

Physical injury without irradiation	Expected changes in triage categories after whole-body irradiation		
	< 2 Gy Vomit > 4 h	2–6 Gy Vomit 1–4 h	> 6 Gy Vomit < 1 h early erythema
Uninjured	Ambulatory monitoring	Ambulatory monitoring, Administer cytokines and delay hospitalization	
Minimal	Minimal	Delayed	
Delayed	Delayed	Variable	
Immediate	Immediate		
Expectant			Expectant

From Uniformed Services University of the Health Sciences (USUHS)

Table 3. Triage Category Affected by Radiation Dose and Resource Availability

Triage category affected by radiation dose and resource availability				
RADIATION ONLY				
Radiation Dose* (Gy)				
>10* Likely fatal (in higher range)	Expectant ³ Immediate ²	Expectant ³	Expectant ³	Expectant ³
6–10* Severe	Immediate ²	Immediate ²	Delayed ²	Expectant ³
>2–6* Moderate	Immediate ¹	Immediate ¹	Immediate ¹	Immediate ¹
>0.5–<2* Minimal	Minimal B ³	Minimal B ³	Minimal B ³	Minimal B ³
<0.5* Minimal	Minimal A ³	Minimal A ³	Minimal A ³	Minimal A ³
Resource availability:	Normal	Good	Fair	Poor
Standard of care**:	Conventional	Contingency	Crisis	Crisis

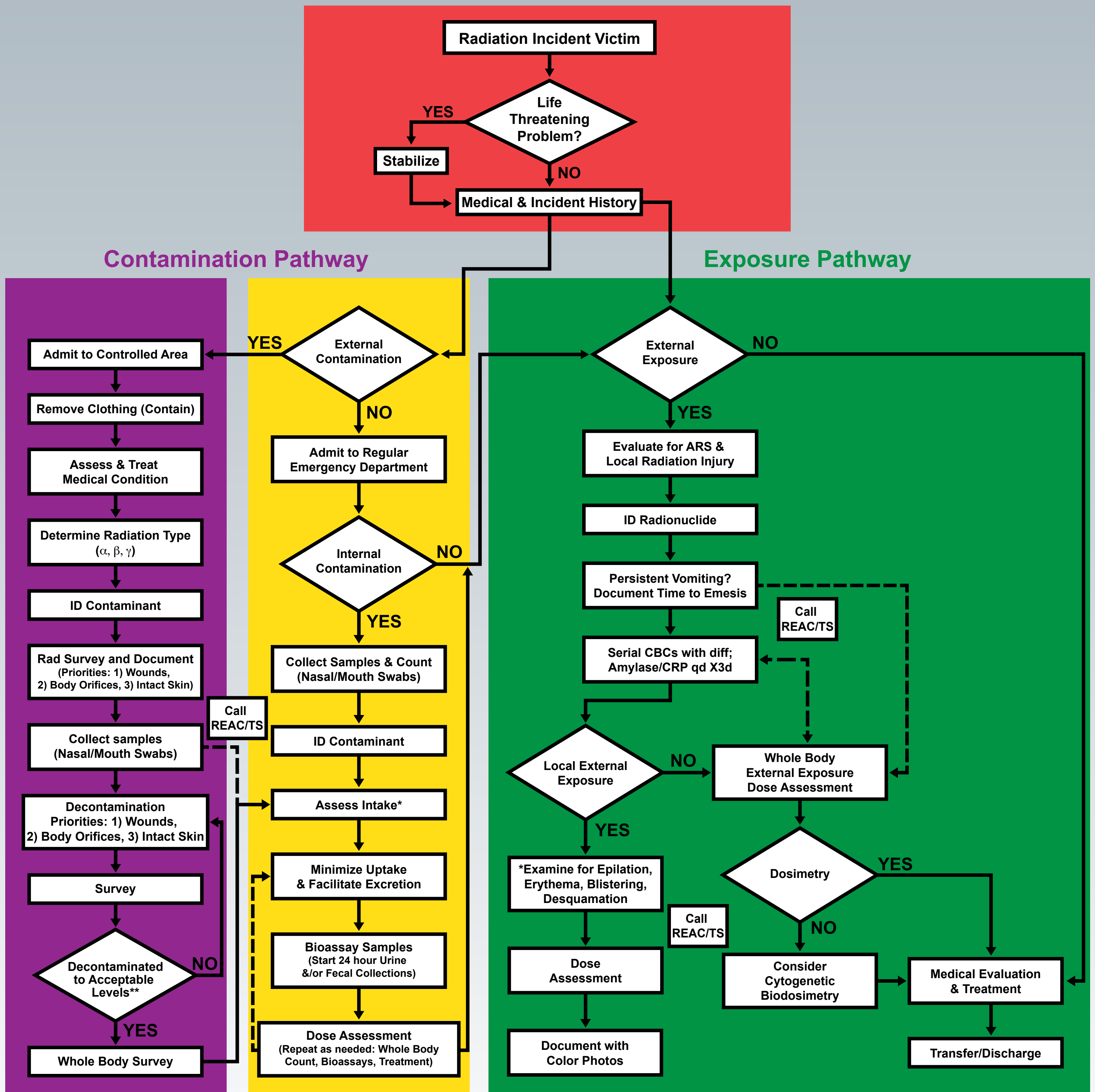
Legend: Radiation Only

*Radiation dose received by the whole body or a significant portion of the whole body.

**Institute of Medicine. *Guidance for establishing crisis standards of care for use in disaster situations: A letter report*. Washington, DC: Institute of Medicine, National Academies of Science; 2009.

Radiation Patient Treatment

Version 2, August 2012



Radiation Emergency Assistance Center/Training Site (REAC/TS)

24-Hour Emergency Phone: 865-576-1005

Routine Work Phone: 865-576-3131

On the Web: orise.orau.gov/reacts

* See REAC/TS Pocket Guide <http://orise.orau.gov/reacts/resources/radiation-accident-management.aspx>

** <2-3X Natural Background or No Reduction in Counts, Medical Priorities Dictate Stopping Decontamination, Health Physics Consultation Warranted