Just-in-Time Training Summary Sheet
Patient Care Priorities for the
First 24 hours in Burn Mass Casualty for Non-Burn Physicians
(Based upon "Guidelines for Burn Care Under Austere Conditions")

TRIAGE

1. If facility resources are overwhelmed, triage according to the "Resource Triage Diagram for Burn Injury in a Disaster" (see Appendix). To estimate Total Body Surface Area (TBSA) burn use the "Rule of Nines" or Palmar Method (See Appendix). Note: Only 2nd and 3rd degree burns are tallied.
2. Direct exposure to ionizing radiation (even as low as 2-6 Gy) may change the above triage categories (worsened outcomes)
3. Consider concomitant injuries from the effect of the blast. Follow Advanced Trauma Life Support (ATLS) guidelines.

DECONTAMINATION FOR RADIATION EXPOSURE

1. Determined by a radiation meter such as a Geiger-Mueller meter with a pancake probe. Readings of greater than two times background in counts per minute (cpm) are considered positive for contamination. If not available, all patients should be considered contaminated.
2. There can also be internal contamination (*e.g.*, pulmonary secretions).
3. Irrigate with water or saline. Contain runoff. Follow proper disposal of contaminated clothing/supplies.

AIRWAY/BREATHING

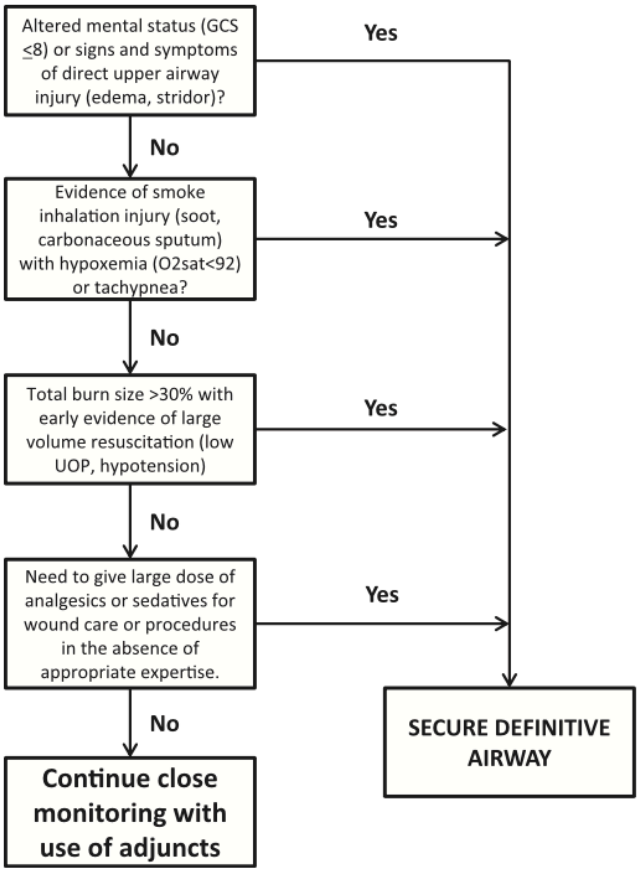

Figure 2. Proposed decision matrix for airway management during burn disasters.

Considerations:

- If there is a lack of ventilators, separate the need for airway protection from the need of mechanical ventilation.
- Utilize airway adjuncts where necessary.
- May need to ration oxygen.
- Conduct periodic airway/ventilator needs assessment rounds.
- C-spine precautions as needed.

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CIRCULATION (RESUSCITATION)

1. Patients with burns less than 20% BSA can be effectively resuscitated from burn shock using oral solutions; many patients with burns up to 40% TBSA can also be safely resuscitated in this manner.
    a. There are many formulas for oral rehydration solutions, but all include clean water, glucose, and electrolytes (see Appendix).
    b. Adults and children > 2 years should be allowed to take sips from a cup frequently, with the goal of consuming approximately 8 to 10 ounces every 10 to 15 minutes.
    c. Very young children < 2 years should be given a teaspoon of fluid every 1 to 2 minutes.
    d. Oral fluids should be given in amounts tolerated by the patient, accepting the occasional episode of nausea and vomiting as inevitable but not a reason to discontinue oral therapy.
2. For patients with burns >20%, IV resuscitation, if supplies permit, should be utilized using the Parkland formula. In resource-constrained environments, IV resuscitation may need to be restricted to survivable burns >40%.
    a. Total mL 24 hour fluid requirement = 4mL LR x Kg body weight x %TBSA
    b. Give ½ during the first 8 hours post injury and ½ during the following 16 hours
    c. Example: 4mL x 70 Kg patient x 50% TBSA = 14,000mL
    d. Give 7000mL during first 8 hours (875mL/hour) and 7000mL during following 16 hours (437.5mL/hour)
    e. Monitor hourly urine output: 30-50mL/hour for adults, 1m/Kg/hour for children
    f. Other endpoints of resuscitation as able: Vital signs, Hct, Lactate, Base Deficit
    g. Increase/decrease fluids by 10-20% each hour according to urine output. Beware of abdominal compartment syndrome if fluid rate gets to 6mL/Kg/hour.

If the patient is not responding to increases crystalloid volume consider 5% Albumin or FFP. If means of communication available, contact a burn surgeon for assistance or consider re-triage of resources.

WOUNDS

Recommendations adapted from "Guidelines for Burn Care Under Austere Conditions: Surgical and Nonsurgical Wound Management"

1. If the burn injury has just occurred, remove smoldering clothing andnflush for a few minutes with any readily available water source (cool to lukewarm temperature). This will stop the burning process and provide some pain relief.
    Caution: Avoid hypothermia, especially in patients with larger TBSA burns.
2. Identify and train a wound-care team.
3. Prepare a venue for wound care.
4. Determine availability of topical antimicrobials and plan their rational use.
5. Provide adequate analgesia and anxiolysis.
    a. Benzodiazepines
    b. Opioids, Ketamine
6. Mafenide acetate (Sulfamylon) and silver sulfadiazine (Silvadene) creams should be used when available (especially contaminated and/or deeper wounds). Twice daily ideal, once daily acceptable.
    a. Alternatives are Bacitracin, Polysporin with Vaseline or Xeroform gauze interface.
7. Alternatives to creams/ointments
    a. Silver-based dressings: *e.g.*, Acticoat™, Kerra Contact® Ag, Silverlon®
    b. Aqueous solutions: *e.g.*, Mafenide acetate solution, Dakin's
8. For patients with minor burns (<10% TBSA), consider having them do their own wound care or help each other if resources are limited.

APPENDIX

Table 1. Resource triage diagram for burn injury in a disaster

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

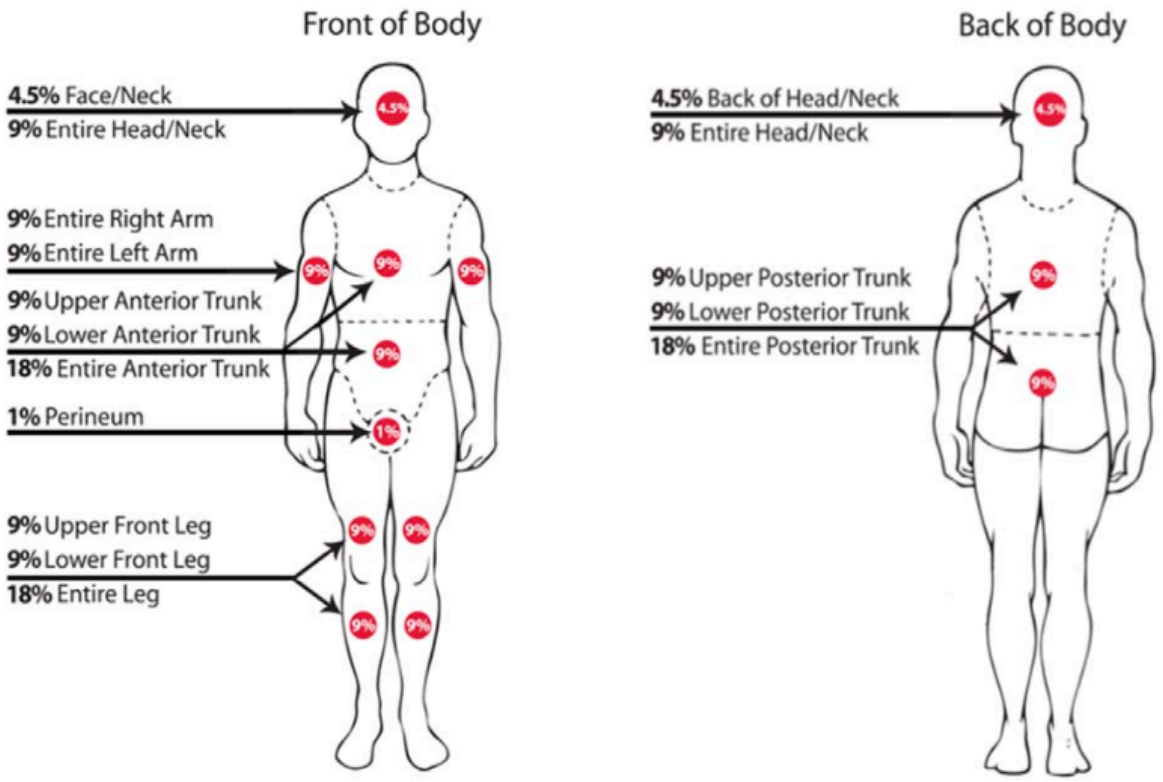

Figure 1. Depiction of the Rule of Nine's and Palmar Method of burn size estimation. For the Rule of Nines, each body region has a surface area in a multiple of nine. In the Palmar Method, the patient's palm represents approximately 1% of that patient's BSA. Reprinted with courtesy from The Burn Center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

APPENDIX (Continued)

Table 2. Composition of oral glucose-electrolyte solutions and clear liquids (based on 62–64, 66–68)

Solution	Na^+	K^+	Cl^-	Base	Glucose	Osmolality
Rehydration						
WHO-UNICEF ORS salts	90	20	80	10 (citrate)	111 (20 g/L)	310
WHO-UNICEF reduced osmolarity ORS salts	75	20	65	10 (citrate)	75 mmol/L	245
Meyer's solution	85	0	63	29 (citrate)	0	160
Rehydralyte®	75	20	65	30	139 (25 g/L)	325
Infalyte® or Ricelyte® liquid, oral	50	25	45	36 (citrate)	30 g/L as rice syrup solids	270
Lytren®	50	25	45	10 (citrate)	111 (20 g/L)	290
Pedialyte®	45	20	35	10 (citrate)	140 (25 g/L)	250
Resol®	50	20	50	11 (citrate)	111 (20 g/L)	270
Gatorade®	20	3	20	3	250 (35 g/L)	280
Cola	2	0.1	2	13 (HCO_3)	730	750
Ginger ale	3	1	2	4 (HCO_3)	500	540
Apple juice	3	28	30	0	690	730
Chicken broth	250	8	250	0	0	450
Tea	0	0	0	0	0	5

ORS, oral rehydration solution. Manufacturer information: Rehydralyte: Abbott Pharmaceutical Company, Abbott Park, IL; Infalyte: Mead Johnson and Company, Glenview IL; Ricelyte: Mead Johnson and Company, Glenview, IL; Lytren: Mead Johnson and Company, Glenview, IL; Pedialyte: Abbott Pharmaceutical Company, Abbott Park, IL; Gatorade: Gatorade Company, Chicago, IL.

Images from *J Burn Care Res* 2016; 37:e427–39

REFERENCES

Guidelines for Burn Care Under Austere Conditions: Introduction to Burn Disaster, Airway and Ventilator Management, and Fluid Resuscitation. *J Burn Care Res* 2016; 37:427–39.

Guidelines for Burn Care Under Austere Conditions: Special Etiologies: Blast, Radiation, and Chemical Injuries. *J Burn Care Res* 2016; 37:e482–496.

Guidelines for Burn Care Under Austere Conditions: Surgical and Nonsurgical Wound Management. *J Burn Care Res* 2016; DOI: 10.1097/BCR.0000000000000368.