

Background

The large number of burn casualties treated by coalition forces in the Iraq theatre has prompted a reevaluation of the optimal treatment plan. Many lessons have been learned and relearned during the last 4 years of treating casualties during OIF/OEF. Burn patients are very labor intensive and consume significant personnel and class VIII (medical logistic supply materials) resources. Despite the best efforts of providers at every level of care, the mortality for burn casualties who cannot be evacuated out of the theater of operations is significantly higher than that experienced in US facilities (Table 1). Experience among US treatment facilities in the past 3-4 years reveals no survivors among host nation casualties sustaining full thickness burns to 50% or greater total body surface area (TBSA). The spread of infection in large open wards is a real concern, which can threaten the outcome of non-burn patients. Furthermore the average burn patient in Accredited Burn Centers in the US stays 1-2 days for each percent burn. The factors have prompted a reevaluation of the optimal treatment plan based on severity of injury, treatment facility capabilities and potential for evacuation. The following recommendations are provided to assist the physician in making patient management decisions unique to the deployment environment. Chapter 28 of the 2004 edition of the Emergency War Surgery Handbook is an excellent general reference for burn care.

In every case, use of the Burn Patient Admission Orders (Appendix A) and the JTTS Burn Resuscitation Flow Sheet (Appendix B) is highly recommended, especially if the patient may transfer to another facility.

1. Coalition Casualties who can be Evacuated Out of Country

- a. Protect airway early, using a large-sized endotracheal tube (ETT) as possible (i.e., 8 mm) is strongly preferred, especially if inhalation injury is noted on bronchoscopy. A large ETT tube ensures ease of bronchoscopy and facilitates pulmonary suction, which are critical with inhalation injuries.
- b. Calculate burn size using a Lund and Browder chart (Appendix C).
- c. Initiate resuscitation using a standard burn formula (1-2 mL/kg/%BSA – see Burn Resuscitation Flow Sheet) and avoid boluses if possible, prefer to up-titrate the rate of intravenous fluids to maintain adequate urine output (UOP) as described below.
- d. Monitor UOP closely and decrease or increase the LR infusion 20% per hour to maintain a UOP of 30-50 mL/hour.
 - 1) Over-resuscitation is as harmful as under-resuscitation; patients who receive over of 6 mL/kg/%BSA burn are susceptible to severe complications.
 - 2) Hour- to-hour fluid management is critical, especially during the first 24 hours.
 - 3) Use of the Burn Resuscitation Flow Sheet (attached) to record fluid intake and UOP is mandatory. Refer to Appendix D for the Burn Resuscitation Flow Sheet Protocol.
- e. Keep the patient warm.
- f. Debride in the operating room (OR) with hibiclens, removing all blistered or sloughing skin (do not perform excision).

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- g. Perform escharotomy and/or fasciotomies early if pulses are not palpable and circumferential burns are present.
- h. Wrap burns on scalp, trunk neck and extremities in 5% Sulfamylon solution soaked dressings TID and as needed to keep dressings moist:
 - 1) There is less mess as opposed to Sulfamylon or Silvadene cream
 - 2) Easier for receiving institution to clean and evaluate on arrival
- i. Measure abdominal compartment pressure for casualties with large burns and those who receive a large resuscitation. Pressures > 25 mm Hg warrant intervention.
- j. Shave and debride face and scalp.
- k. Apply Sulfamylon cream to ear burns BID.
- l. Apply Bacitracin to face burns QID.
- m. If available, consult ophthalmology for all patients with deep facial burns or corneal injury by Wood's lamp exam.
 - 1) Apply Bacitracin ophthalmic ointment to eye lids QID.
 - 2) Apply Erythromycin ophthalmic ointment QID in the eyes.
- n. Change dressings every day until evacuated.
- o. Consult the Army Burn Center at the USAISR at DSN 312-429-2876 or burntrauma.consult@us.army.mil.

2. Host Nation Burn Casualties

- a. Triage casualties with full thickness burns of 50% or greater TBSA as expectant and provide adequate comfort measures. This requires careful and accurate calculation of burn size using a Lund and Browder chart (Appendix C).
- b. Remember that inhalation injury, comorbidities, and extremes of age, in addition to the burn increase mortality. Take these factors into consideration as treatment plans are initiated.
- c. For patients with combined partial and full thickness burns of 50% TBSA or greater, with less than half of the burn being full thickness, initially treat the patient as above (section 1) and allow the partial thickness component to declare itself after 2 days. It is initially sometimes difficult to determine the full extent of the full thickness burn. After 48 hours, reassess the percentage of full thickness burn.
- d. For patients with a less than 50% TBSA burn, attempts at early excision and grafting are recommend.
- e. Presently, no allograft (cadaveric skin) or xenograft (Pig skin) are available in theater; therefore, the extent of excision should be guided by amount of autograft donor skin available, meshing no wider than 3:1.
- f. Consider using a Negative Pressure Wound Dressing (NPWD) over fresh graft with intervening non-adherent layer (i.e. Dermanet, Silverlon) and leave in place for 3-5 days.
- g. Following NPWD removal, use Sulfamylon moistened gauze dressings for next 5-7 days before transitioning to Bacitracin.
- h. Initially excise only as much as donor skin is available to cover.

- 1) Do not excise wounds and leave open. If patients arrive in this state, re-excise and apply a NPWD until granulation tissue is present.
- 2) Rarely need to mesh skin wider than 2:1.
- i. Take the patient to the OR for staged excisions and grafting of the full thickness burns with a goal of complete excision within 1 week of injury.
- j. Once grafts are healed, continue to keep patient clean using showers, when available.
- k. Early ambulation and physical therapy, with range of motion of all affected joints is critical to the long-term functioning of these casualties.
- l. Early and continuous nutrition is key to wound healing. Use a nasogastric feeding tube and supplement with high protein, low fat tube enteral feedings, even when patient is able to eat. Utilize nutritionist whenever available. Supplement diet with a daily multivitamin.
- m. Questions about burn care in theater can be answered by the in-theater burn consultant who can be reached at DSN 318-239-7664.

3. Pitfalls

- a. Excising uninfected full thickness burns before having donor skin to cover the wound.
- b. Pseudomonas infections:
 - 1) High rate of graft loss.
 - 2) Ominous sign.
 - 3) Liberal use of Dakin's solution.
 - 4) Delay subsequent grafting until topical pseudomonas is well-treated.
- c. Transition from aggressive care to comfort care:
 - 1) Difficult decision.
 - 2) Initial burn may appear survivable but graft loss, topical infections, or donor site conversion may convert a potentially survivable situation into a non-survivable injury.
 - 3) Be aware of this possibility and the need for potential change to an expectant category.
 - 4) Elicit opinions from medical leaders, partners, and nurses as this is a decision should not be made solely by the treating physician.
- d. Consider inhalational injury in relationship to the TBSA burned when deciding whether to treat the patient or deem the patient expectant. (i.e., a patient with a 40% TBSA burn and an inhalational injury will likely not do well as a patient with a 40% TBSA burn and no inhalational burn)
- e. Perform large dressing changes in the OR (not ICU or ICW), especially early in the treatment process:
 - 1) Better evaluation.
 - 2) Improved ability to clean wounds.
 - 3) Improved pain control.
- f. Initial burn may appear survivable but graft loss, topical infections, or donor site conversion may lead to transition from a potentially survivable situation

into a non-survivable injury. Be aware of this possibility and the need for potential change to an expectant category.

- g. The decision to do less than everything possible should not be viewed as failure, but rather part of reality in a combat zone. The attending physician should not feel isolated about making the decision to decrease the level of care but should seek the opinions of leaders, partners, and nurses. Consult the Chaplain and, if needed, an interpreter to counsel the patient's family about the prognosis and plans.

4. Recommendations for Complicated Burn Care

- a. Recommendations for the difficult fluid resuscitation:
 - 1) At 12-18 hours post-burn, calculate the PROJECTED 24-hour resuscitation if fluid rates are kept constant. If the projected 24-hour resuscitation requirement exceeds **6 mL/kg/%TBSA**, the following steps are recommended:
 - a) Initiate 5% albumin early as described previously in the Emergency War Surgery Handbook.
 - b) Check bladder pressures every 4 hours.
 - c) If available, strongly consider placing a pulmonary artery (PA) catheter to guide resuscitation with specific PCWP and SvO₂ goals (Goal PCWP 10-12 mm Hg, SvO₂ 65-70%). If PA catheter placement is not practical, consider monitoring central venous pressures from a subclavian or IJ catheter along with central venous O₂ saturations. (Goal CVP 8-10 cm H₂O, ScvO₂ 60-65%)
 - If CVP or PCWP are not at goal, increase fluid rate.
 - If CVP or PCWP are at goal, consider vasopressin 0.02-0.04 Units/min to augment MAP (and thus UOP) or dobutamine 5 mcg/kg/min IV (titrate until SvO₂ or ScvO₂ at goal). The maximum dose of dobutamine is 20 mcg/kg/min.
 - If both CVP or PCWP and SvO₂ or ScvO₂ are at GOAL, stop increasing fluids (EVEN if UOP < 30 mL/hr). Consider the patient hemodynamically optimized and that the oliguria is likely a result of an established renal insult. Tolerate and expect some degree of renal failure. **Continued increases in fluid administration despite optimal hemodynamic parameters will only result in "resuscitation morbidity," that is often times more detrimental than renal failure.**
 - d) If the patient becomes hypotensive and oliguric (UOP < 30 mL/hr), then follow the **hypotension guidelines**.
 - e) Every attempt should be made to minimize fluid administration while maintaining organ perfusion. If UOP >

50 mL/hr, then decrease the fluid rate by 20%.

- 2) After 24 hours, titrate LR infusion down to maintenance levels and continue albumin until the 48-hour mark.
 - 3) War burn patients have exhibited multi-system injury to include soft tissue injury secondary to blunt/penetrating injury/blast and inhalational injury which all affect resuscitation amounts and may result in marked increased fluid needs above and beyond standard burn resuscitation formulas. The air evacuation environment may also increase fluid requirements and wound edema.
- b. Recommendations for hypotension:
- 1) The optimal minimum blood pressure for burn patient must be individualized. Some patients will maintain adequate organ perfusion (and thus have adequate UOP) at MAPs lower than 70 mm Hg. True hypotension must be correlated with UOP. If a MAP is not adequate (generally < 55 mm Hg) to maintain the UOP goal of at least 30 mL/hr, the following steps are recommended.
 - a) Vasopressin 0.02-0.04 units/min IV drip (DO NOT TITRATE).
 - b) Monitor CVP (Goal 8-10 cm H₂O).
 - c) If CVP not at goal, increase fluid rate.
 - d) If CVP at goal, add Levophed (norepinephrine) 2-20 mcg/min IV.
 - e) If additional pressors are needed, consider inserting a PA catheter to guide resuscitation with specific PCWP and SvO₂ goals (goal PCWP 10-12 mm Hg, SvO₂ 65-70%). These patients may be volume depleted but also suspect a missed injury.
 - If PCWP not at goal, increase the fluid rate.
 - If PCWP at goal, consider a dobutamine drip at 5 mcg/kg/min IV (titrate until SvO₂ at goal). The maximum dose of dobutamine is 20 mcg/kg/min.
 - If hypotension persists, look for a missed injury.
 - Consider adding epinephrine or neosynephrine as a last resort.
 - f) If the patient exhibits catecholamine-resistant shock, consider the following diagnoses:
 - Missed injury and on-going blood loss.
 - Acidemia. If pH < 7.20, adjust ventilator settings to optimize ventilation (target PCO₂ 30-35 mm Hg). If despite optimal ventilation, patient is still has a pH < 7.2, consider bicarb administration.
 - Adrenal insufficiency. Check a random cortisol and start hydrocortisone 100 mg every 8 hours.
 - Hypocalcemia. Maintain ionized calcium > 1.1 mmol/L.
- c. Recommendations for inhalational injury:

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- 1) Inhalation injury is further exacerbated by retained soot and chemicals. Remember, inhalation injury is mostly a chemical injury that will benefit from removing the chemical.
 - 2) Upon arrival, if patients are found to have visible soot in the airways, make every attempt to débride through bronchoscopic suction as much soot as possible. In addition, keep in mind that irrigation may actually make the injury worse by transporting injurious substances to new, uninjured parts of the lung, so irrigate judiciously.
 - 3) If a diagnosis of inhalation injury is made, use aerosolized heparin 5000 units every 4 hours. Mix heparin with albuterol as heparin can induce bronchospasm.
- d. Recommendations for abdominal compartment syndrome:
- 1) Massive fluid replacement ($> 6 \text{ mL/kg/\% burn}$) has led to abdominal compartment syndrome (increased bladder pressure, increased airway pressures, decreased UOP, hypotension) and extremity compartment syndromes (beyond standard escharotomy treatment).
 - 2) If the patient requires a decompressive laparotomy, do a full midline incision (NOT a small mini-laparotomy incision) followed by a temporary abdominal closure. If the abdominal wall skin is burned, Ioban dressing will not adhere to burnt skin. Use a traditional Bogotá bag or 3 L NS IV bag sewn to the skin (keep loose).
- e. Recommendations for escharotomy / fasciotomy
- 1) The requirement for escharotomy or fasciotomy usually presents in the first few hours following injury. If the need for either procedure has not presented in the first 24 hours, then circulation is likely to remain adequate without surgical intervention. For this reason, it would be unusual for a patient to require a new escharotomy or fasciotomy by the time of arrival at an Level IV facility.
 - 2) More likely, a patient with previous escharotomy or fasciotomy performed in the field might require extension of the incision or placement of a second incision on the other side of an extremity to restore circulation. This can occur if significant volumes of intravenous fluid are given in transit between the time of initial escharotomy and patient arrival at a rear medical facility.
 - 3) On arrival, assess distal circulation of all extremities by palpating the radial, dorsalis pedis and posterior tibial arteries. If a pulse is palpable in one or more arteries in each extremity, neither escharotomy nor fasciotomy are indicated, and serial assessments are appropriate. Elevate injured extremities 30-45°. Use Doppler ultrasound to assess distal circulation in the absence of palpable pulses. Absent Doppler signals or pulses that are diminishing on serial exam 30 minutes to one hour apart should prompt consideration of escharotomy.
 - 4) Escharotomy is normally performed when an extremity has a circumferential full thickness burn. If the burn is superficial or not circumferential and pulses are absent, consider inadequate circulation from other causes such as hypovolemia, hypotension, or occult

traumatic injury.

- 5) Extend escharotomy incisions the entire length of the full-thickness burn and carry across the joint when the burn extends across the joint. In the lower extremity, make a mid lateral or mid axial incision with a knife or electrocautery through the dermis to the level of fat. It is not necessary to carry the incision to the level of fascia. Although full-thickness burn is insensate, the patient will often require intravenous narcotics and benzodiazepines during this procedure. Given morphine 2-5 mg IV and midazolam 1-2 mg IV at 5-10 minute intervals as needed. On completion of midlateral or midmedial escharotomy, reassess the pulses. If circulation is restored, bleeding should be controlled with electrocautery and the extremity dressed and elevated at a 30-45° angle. Assess pulses hourly for at least 12-24 hours. If circulation is not restored, perform a second incision on the opposite side of the extremity.
- 6) For upper extremities, place the hand in the anatomic position (palm facing forward) and make an incision in the midradial or mid ulnar line. Ulnar incisions should stay anterior (volar) of the elbow joint to avoid the ulnar nerve, which is superficial at the elbow. If pulses are not restored, a second incision may be necessary on the opposite side of the extremity. If both the hand and arm are burned, continue the incision across the mid ulnar or midradial wrist and onto the mid ulnar side of the hand or to the base of the thumb and then the thumb webspace.
- 7) Finger escharotomies are controversial. Before performing finger escharotomies, consider that there is little other than bone and tendon in the fingers and that fingers burned badly enough to require escharotomy frequently end up as amputations. If finger escharotomies are performed, avoid functional surfaces (radial surface of the index and ulnar surface of the little finger). Place the fingers in a clenched position and note the finger creases at DIP and PIP joints. Escharotomy incisions should be just dorsal to a line drawn between the tops of these creases.
- 8) If bilateral extremity incisions do not restore circulation, re-evaluate the adequacy of the patient's overall circulation. A well-resuscitated adult burn patient should have a clear sensorium, a heart rate in the range of 110-130 beats per minute, and a UOP of 30 mL/hr or more.
- 9) In unusual cases, following escharotomy, fasciotomy may be necessary to restore circulation. This is more common in electrical injuries and in crush or other traumatic injuries. Leg fasciotomies should release all four compartments. Forearm fasciotomies should decompress all three compartments. The dorsal compartment may be accessed via a 3 inch longitudinal mid dorsal forearm incision. Dissect to the fascia, enter the fascia and then slide a Metzenbaum scissor distal to the level of the wrist and proximal to the upper forearm. The volar compartment is approached via a lazy-S curved incision from the

elbow to wrist. Avoid straight incisions on the volar surface as these may lead to later contractures. Also use the volar incision to access the mobile compartment, which is the fascia overlying the brachioradialis muscle. If escharotomies have already been performed, it may be possible to access the dorsal, volar, and mobile compartments by dissection between the dermis and fascia from the escharotomy site to the desired areas. Circulation should not be compromised by a desire to avoid additional incisions; however, as the burned tissue will later be excised during burn surgery. When performing an arm fasciotomy, some hand surgeons prefer to also decompress the median nerve at the carpal tunnel and/or the ulnar nerve at the Canal of Guyon.

- 10) Following escharotomy or fasciotomy, late bleeding may occur as pressure is decompressed and circulation restored. Examine the surgical site every few minutes for up to 30 minutes for signs of new bleeding, which is usually easily controlled with electrocautery.

Table 1. US Burn Mortality in American Burn Association Verified Burn Centers.

Age Group	0.1-9.9	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	Total
birth - 1.9	0.0%	0.2%	2.1%	4.5%	6.6%	10.9%	50.0%	42.1%	73.3%	60.0%	0.7%
Died/Total	1/6655	3/1926	8/389	7/157	5/76	5/46	12/24	8/19	11/15	3/5	63/9312
2 - 4.9	0.2%	0.1%	3.2%	5.7%	7.9%	12.5%	22.6%	31.3%	54.5%	76.2%	1.6%
Died/Total	7/3449	1/1086	11/341	9/159	6/76	6/48	7/31	10/32	12/22	16/21	85/5265
5 - 19.9	0.1%	0.2%	1.2%	3.3%	9.3%	9.9%	18.3%	30.9%	39.3%	55.9%	1.5%
Died/Total	11/7346	4/2441	10/838	13/400	20/216	15/151	19/104	21/68	24/61	38/68	175/11693
20 - 29.9	0.2%	0.8%	2.2%	3.7%	11.3%	17.0%	31.5%	42.3%	62.7%	77.6%	2.4%
Died/Total	11/5998	16/2065	16/720	12/324	24/212	23/135	28/89	22/52	32/51	52/67	236/9713
30 - 39.9	0.3%	0.7%	4.3%	7.7%	14.2%	26.5%	37.9%	52.7%	66.7%	82.9%	3.4%
Died/Total	18/6346	15/2287	35/811	33/426	33/233	41/155	36/95	49/93	46/69	58/70	364/10585
40 - 49.9	0.6%	1.4%	5.6%	14.9%	27.4%	36.6%	42.9%	58.8%	76.5%	85.5%	4.9%
Died/Total	31/5635	28/1957	41/738	55/368	61/223	53/145	45/105	40/68	39/51	65/76	458/9366
50 - 59.9	1.1%	3.0%	9.8%	22.7%	38.7%	56.3%	69.6%	81.6%	78.0%	84.4%	8.0%
Died/Total	36/3378	36/1198	50/510	58/255	55/142	63/112	39/56	40/49	32/41	54/64	463/5805
60 - 69.9	2.5%	8.6%	17.5%	36.0%	65.9%	72.4%	71.0%	88.6%	87.5%	76.1%	12.8%
Died/Total	45/1835	67/776	64/366	50/139	56/85	42/58	22/31	31/35	21/24	35/46	433/3395
≥70	7.2%	25.5%	52.7%	69.6%	80.1%	95.6%	94.6%	87.1%	91.9%	91.5%	27.6%
Died/Total	170/2348	281/1101	207/393	179/257	109/136	109/114	70/74	61/70	34/37	43/47	1263/4577
Total	0.8%	3.0%	8.7%	16.7%	26.4%	37.0%	45.6%	58.0%	67.7%	78.4%	5.1%
Died/Total	330/42990	451/14837	442/5106	416/2485	369/1399	357/964	278/609	282/486	251/371	364/464	3540/69711

MEDICAL RECORD – PROVIDER ORDERS

For use of this form, see MEDCOM Circular 40-5

DIRECTIONS: The provider will SIGN, DATE, and TIME each order or set of orders recorded. Only one order is allowed per line. Orders completed during the shift in which they are written will be signed off adjacent to the order and do not require recopying on other ITR forms.

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BURN PATIENT ADMISSION ORDERS (Page 1 of 5)

1. **Admit/Transfer** to ICU (1 / 2 / 3), SDU, ICW (1 / 2 / 3) to Physician _____

2. **Diagnosis:**

3. **Condition:** VSI SI NSI **Category:** Nation/Service (e.g., US/USA, HN/IA) _____

4. **Allergies:** Unknown NKDA Other:

5. Monitoring

5.1 Vital signs: Q ____ hrs

5.2 Urine output: Q ____ hrs

5.3 Transduce bladder pressure Q ____ hrs

5.4 Neurovascular/Doppler pulse checks Q ____ hrs

5.5 Transduce: ____ CVP ____ A-line ____ Ventriculostomy

5.6 Neuro checks: Q ____ hrs

5.7 Cardiac monitor: Yes / No

6. Activity

6.1 ____ Bedrest ____ Chair Q shift ____ Ad lib ____ Roll Q 2 hrs

6.2 ____ Passive ROM to UE and LE Q shift

6.3 Spine precautions: ____ C-Collar/C-Spine ____ TLS spine

7. Wound Care

7.1 ____ NS wet to dry BID to: _____

7.2 ____ Dakin's wet to dry BID to: _____

7.3 ____ VAC dressing to: ____ 75 mm Hg ____ 125 mm Hg

7.4 ____ Abdominal closure drains to LWS

7.5 ____ Other: _____

8. Tubes/Drains

8.1 ____ NGT to LCWS or ____ OGT to LCWS

8.2 ____ Place DHT ____ Nasal ____ Oral and confirm via KUB

8.3 ____ Foley to gravity

8.4 ____ Flush feeding tube Q shift with 30 mL water

8.5 ____ JP(s) to bulb suction; strip tubing Q 4 hrs and PRN

8.6 ____ Chest tube to: ____ 20 cm H₂O suction (circle: R L Both) or ____ Water seal (circle: R L Both)

Physician Signature _____

Date/Time _____

MEDCOM FORM 688-RB (TEST) (MCHO) JUL 07

PREVIOUS EDITIONS ARE OBSOLETE

MC V2.00

PATIENT IDENTIFICATION (For typed or written entries note: Name – last, first, middle initial; grade; DOB; hospital or medical facility)	Nursing Unit	Room No.	Bed No.	Page No.
	Complete the following information on page 1 of provided orders only. Note any changes on subsequent pages.			
	Diagnosis:			
	Allergies and reaction:			
	Height: _____ Weight (Kg): _____ Diet: _____			

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BURN PATIENT ADMISSION ORDERS (Page 2 of 5)**9. Nursing**

- 9.1 Strict I & O and document on the JTTS Burn Resuscitation Flow Sheet Q 1hr for burns > 20% TBSA
- 9.2 ___ Clear dressing to Art Line/CVC, change Q 7D and prn
- 9.3 ___ Bair Hugger until temperature > 36° C
- 9.4 ___ Lacrilube OU Q 6hrs while sedated
- 9.5 ___ Oral care Q 4hrs; with toothbrush Q 12 hrs
- 9.6 ___ Maintain HOB elevated 45°
- 9.7 ___ Fingerstick glucose Q ___ hrs
- 9.8 ___ Routine ostomy care
- 9.9 ___ Ext fix pin site care
- 9.10 ___ Trach site care Q shift
- 9.11 ___ Incentive spirometry Q 1 hr while awake; cough & deep breath Q 1 hr while awake

10. Diet

- 10.1 ___ NPO
- 10.2 ___ PO Diet: _____
- 10.3 ___ TPN per Nutrition orders
- 10.4 ___ Tube Feeding: _____ @ _____ mL/hr OR ___ Advance per protocol

11. Burn Resuscitation (%TBSA > 20%)

- 11.1 Post Burn 1-8 hrs: LR at _____ mL/hr IV (0.13 mL x Wt in kg x %TBSA)
- 11.2 Post Burn 8-24 hrs: LR at _____ mL/hr IV (0.06 mL x Wt in kg x %TBSA)
- 11.3 Titrate resuscitation IVF as follows to maintain target UOP (Adult: 35-50 mL/hr; Children: 1.0 mL/kg/hr)
- Decrease rate of LR by 20% if UOP is greater than 50 mL/hr for 2 consecutive hrs
 - Increase rate of LR by 20% if UOP is less than 30 mL/hr (adults) or pediatric target UOP for 2 consecutive hrs
- 11.4 If CVP > 10 cm H₂O and patient still hypotensive (SBP < 90 mm Hg), begin vasopressin gtt at 0.02 – 0.04 Units/min
- 11.5 Post burn day #2 (Check all that apply)
- ___ Continue LR at _____ mL/hr IV
- ___ Begin _____ at _____ mL/hr IV for insensible losses
- ___ Start Albumin 5% at _____ mL/hr IV ((0.3 – 0.5 x %TBSA x wt in kg) / 24) for 24 hrs

Physician Signature _____

Date/Time _____

MEDCOM FORM 688-RB (TEST) (MCHO) JUL 07

PREVIOUS EDITIONS ARE OBSOLETE

MC V2.00

PATIENT IDENTIFICATION (For typed or written entries note: Name – last, first, middle initial; grade; DOB; hospital or medical facility)	Nursing Unit Room No. Bed No. Page No.
	Complete the following information on page 1 of provided orders only. Note any changes on subsequent pages.
	Diagnosis:
	Allergies and reaction:
	Height: _____ Weight (Kg): _____ Diet: _____

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BURN PATIENT ADMISSION ORDERS (Page 3 of 5)

12. IVF (% TBSA \leq 20%): ___ LR ___ NS ___ D5NS ___ D5LR ___ D5 .45NS ___ + KCl 20 meq/L @ ___ mL/hr

13. Laboratory Studies & Radiology

13.1 ___ CBC, Chem-7, Ca/Mg/Phos: ___ ON ADMIT ___ DAILY @ 0300

13.2 ___ PT/INR ___ TEG ___ Lactate: ___ ON ADMIT ___ DAILY @ 0300

13.3 ___ LFTs ___ Amylase ___ Lipase: ___ ON ADMIT ___ DAILY @ 0300

13.4 ___ ABG: ___ ON ADMIT ___ 30 mins after ventilator change ___ Q AM (while on ventilator)

13.5 ___ Triglyceride levels after 48 hours on Propofol

13.6 ___ Portable AP CXR on admission

13.7 ___ Portable AP CXR Q AM

14. Prophylaxis

14.1 ___ Protonix 40 mg IV Q day

14.2 ___ Lovenox 30 mg SQ BID OR ___ Heparin 5000 U SQ BID starting _____

14.3 ___ Pneumatic compression boots

15. Ventilator Settings

15.1 Mode: ___ SIMV ___ CMV ___ AC ___ CPAP

15.2 FiO₂: ___ %

15.3 Rate: ___

15.4 Tidal Volume: ___ cc

15.5 PEEP: ___

15.6 Pressure Support: ___

15.7 Insp Pressure: ___

15.8 I/E Ratio: ___

15.9 ___ APRV: Phi ___ Plow ___ Thi ___ Tlow ___ FiO₂: ___ %

15.10 ___ Maintain patient in soft restraints while on ventilator

15.11 ___ Wean FiO₂ to keep SpO₂ > 92% or PaO₂ > 70 mm Hg

15.12 ___ Nebulizer/MDIs: ___ Albuterol ___ Atrovent ___ Xopenex Unit Dose Q 4 hrs

Physician Signature _____

Date/Time _____

MEDCOM FORM 688-RB (TEST) (MCHO) JUL 07

PREVIOUS EDITIONS ARE OBSOLETE

MC V2.00

PATIENT IDENTIFICATION (For typed or written entries note: Name – last, first, middle initial; grade; DOB; hospital or medical facility)	Nursing Unit _____ Room No. _____ Bed No. _____ Page No. _____
	Complete the following information on page 1 of provided orders only. Note any changes on subsequent pages.
	Diagnosis: _____
	Allergies and reaction: _____
	Height: _____ Weight (Kg): _____ Diet: _____

MEDICAL RECORD – PROVIDER ORDERS

For use of this form, see MEDCOM Circular 40-5

DIRECTIONS: The provider will SIGN, DATE, and TIME each order or set of orders recorded. Only one order is allowed per line. Orders completed during the shift in which they are written will be signed off adjacent to the order and do not require recopying on other ITR forms.

DATE / TIME ORDERS

(SIGNATURE REQUIRED FOR EACH ORDER/SET OF ORDERS. SIGNATURE MUST BE LEGIBLE; PROVIDER WILL USE SIGNATURE STAMP OR PRINT NAME).

BURN PATIENT ADMISSION ORDERS (Page 4 of 5)**16. Analgesia/Sedation/PRN Medications**

- 16.1 ____ Propofol gtt at ____ mcg/kg/min, titrate up to 80 mcg/kg/min for SAS 3-4.
- 16.2 ____ Versed gtt at ____ mg/hr, titrate up to 10 mg/hr for SAS 3-4; may give 2-5 mg IVP Q 15 minutes for acute agitation or burn wound care.
- 16.3 ____ Ativan gtt at ____ mg/hr, titrate up to 15 mg/hr for SAS 3-4; may give 1-4 mg IVP Q 2-4 hours for acute agitation.
- 16.4 ____ Fentanyl gtt at ____ mcg/kg/hr, titrate up to 250 mcg/kg/hr; for analgesia may give 25-100 mcg IVP Q 15 minutes for acute pain or burn wound care.
- 16.5 ____ Morphine gtt at ____ mg/hr, titrate up to 10 mg/hr, for analgesia may give 2-10 mg IVP Q 15 minutes for pain or burn wound care
- 16.6 Important: Hold continuous IV analgesia/sedation at 0600 hrs for a SAS \geq 4. If further analgesia/sedation is indicated, start medications at $\frac{1}{2}$ of previous dose and titrate for a SAS 3-4.
- 16.7 ____ Morphine 1-5 mg IV Q 15 minutes prn pain
- 16.8 ____ Fentanyl 25-100 mcg IV Q 15 minutes prn pain
- 16.9 ____ Ativan 1-5 mg IV Q 2-4 hrs prn agitation
- 16.10 ____ Percocet 1-2 tablets po Q 4 hrs prn pain
- 16.11 ____ Motrin 800 mg po TID prn pain
- 16.12 ____ Toradol 30 mg IV loading dose, then 15 mg IV Q 8 hrs for 48 hours
- 16.13 ____ Tylenol ____ mg / Gm PO / NGT / PR Q ____ hrs PRN for fever or pain
- 16.14 ____ Morphine PCA: Program (circle one): 1 2 3 4
- 16.15 ____ Zofran 4-8 mg IVP Q 4 hrs PRN for nausea/vomiting
- 16.16 ____ Dulcolax 5 mg PO / PR Q day PRN for constipation

17. Specific Burn Wound Care

- 17.1 Cleanse and debride facial burn wounds with Sterile Water or (0.9% NaCl) Normal Saline Q 12 hrs, use a washcloth or 4x4s to remove drainage/eschar
- 17.2 Cleanse and debride trunk and extremities with chlorhexidine gluconate 4% solution (Hibiclens) and Sterile Water or Normal Saline, before prescribed dressing changes
- 17.3 Change fasciotomy dressings and outer gauze dressings daily and as needed; moisten with sterile water Q 6 hours and as needed to keep damp, not soaking wet

Physician Signature _____

Date/Time _____

MEDCOM FORM 688-RB (TEST) (MCHO) JUL 07

PREVIOUS EDITIONS ARE OBSOLETE

MC V2.00

PATIENT IDENTIFICATION <i>(For typed or written entries note: Name – last, first, middle initial; grade; DOB; hospital or medical facility)</i>	Nursing Unit Room No. Bed No. Page No.
	Complete the following information on page 1 of provided orders only. Note any changes on subsequent pages.
	Diagnosis:
	Allergies and reaction:
	Height: _____ Weight (Kg): _____ Diet: _____

MEDICAL RECORD – PROVIDER ORDERS

For use of this form, see MEDCOM Circular 40-5

DIRECTIONS: The provider will SIGN, DATE, and TIME each order or set of orders recorded. Only one order is allowed per line. Orders completed during the shift in which they are written will be signed off adjacent to the order and do not require recopying on other ITR forms.

DATE/ TIME ORDERS

(SIGNATURE REQUIRED FOR EACH ORDER/SET OF ORDERS. SIGNATURE MUST BE LEGIBLE; PROVIDER WILL USE SIGNATURE STAMP OR PRINT NAME).

BURN PATIENT ADMISSION ORDERS (Page 5 of 5)

17. Specific Burn Wound Care (continued)

Face & Ears

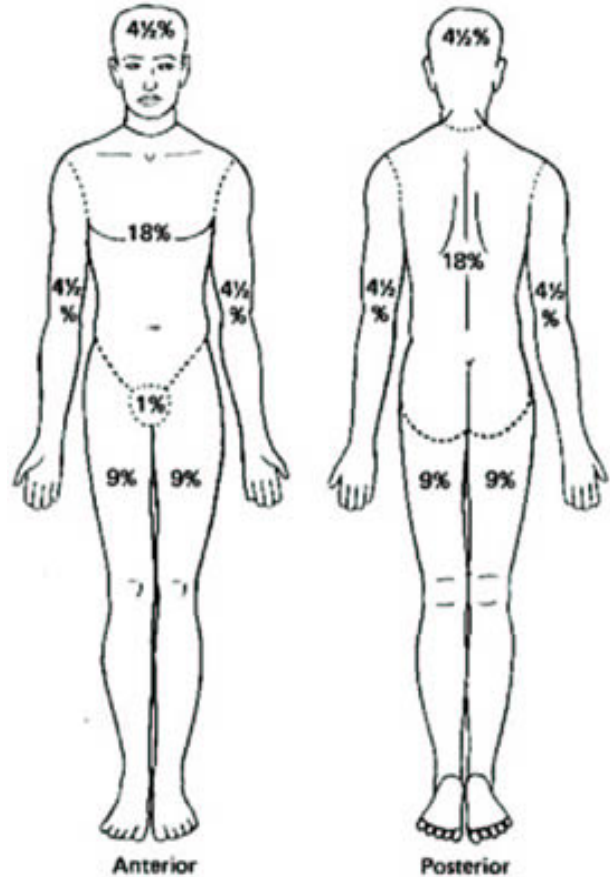
- ____ Bacitracin ointment BID & PRN
- ____ Sulfamylon cream to ears BID & PRN
- ____ 5% Sulfamylon solution dressing changes Q AM & wet downs Q 6 hrs
- ____ Bacitracin ophth ointment: apply OU Q 6 hrs

BUEs & Hands, BLEs, Chest, Abdomen & Perineum

- ____ Silvadine cream Q AM & PRN (*deep partial & full thickness*)
- ____ Sulfamylon cream Q PM & PRN (*deep partial & full thickness*)
- ____ 5% Sulfamylon solution - change Q AM & wet downs Q 6 hrs (*superficial partial thickness, perineal burn wounds, or Pt O/C to OR/AE*)
- ____ Silverlon dressing & Sterile Water wet downs Q 6 hrs (apply dressing and DO NOT remove for 72 hrs)

Back

- ____ Silvadine cream Q AM & PRN (*deep partial & full thickness*)
- ____ Sulfamylon cream Q PM & PRN (*deep partial & full thickness*)
- ____ 5% Sulfamylon powder dressing changes Q AM & wet downs Q 6 hrs (*superficial partial thickness, Pt O/C to OR/AE*)



18. Other Orders

- 18.1 _____
- 18.2 _____
- 18.3 _____

19. Notify Physician if: SBP < _____, MAP < _____, HR < _____ or > _____, SaO₂ < _____%, T > _____, UOP < 30 mL for 2 consecutive hours

Physician Signature _____

Date/Time _____

MEDCOM FORM 688-RB (TEST) (MCHO) JUL 07

PREVIOUS EDITIONS ARE OBSOLETE

MC V2.00

PATIENT IDENTIFICATION (For typed or written entries note: Name – last, first, middle initial; grade; DOB; hospital or medical facility)	Nursing Unit	Room No.	Bed No.	Page No.
	Complete the following information on page 1 of provided orders only. Note any changes on subsequent pages.			
	Diagnosis:			
	Allergies and reaction:			
	Height: _____ Weight (Kg): _____ Diet: _____			

JTTS Burn Resuscitation Flow Sheet

Date:

Initial Treatment Facility:

Name	SSN	Pre-burn est. wt (kg)	% TBSA	Estimated fluid vol. pt should receive		
				1st 8 hrs	2nd 16 hrs	Est. total 24 hrs
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Date & Time of Injury				BAMC/ISR Burn Team DSN 312-429-2876						
Tx Site/ Team	Hr from burn	Local Time	Crystalloid Colloid	TOTAL	UOP	Base Deficit	BP	MAP (>55)	CVP	Pressors (Vasopressin 0.02-0.04 u/min)
	1st									
	2nd									
	3rd									
	4th									
	5th									
	6th									
	7th									
	8th									
	Total Fluids:									
	9th									
	10th									
	11th									
	12th									
	13th									
	14th									
	15th									
	16th									
	17th									
	18th									
	19th									
	20th									
	21st									
	22nd									
	23rd									
	24th									
Total Fluids:			<input type="text"/>							

JTTS Burn Resuscitation Flow Sheet

Date:

Name	SSN	Pre-burn est. wt (kg)	% TBSA	Fluid volume ACTUALLY received		
				1st 8 hrs	2nd 16 hrs	24 hr Total

Date & Time of Injury				BAMC/ISR Burn Team DSN 312-429-2876						
Tx Site/ Team	Hr from burn	Local Time	Crystalloid Colloid	TOTAL	UOP	Base Deficit	BP	MAP (>55)	CVP	Pressors (Vasopressin 0.02-0.04 u/min)
	25th									
	26th									
	27th									
	28th									
	29th									
	30th									
	31st									
	32nd									
	33rd									
	34th									
	35th									
	36th									
	37th									
	38th									
	39th									
	40th									
	41st									
	42nd									
	43rd									
	44th									
	45th									
	46th									
	47th									
	48th									
Total Fluids:										

JTTS Burn Resuscitation Flow Sheet

Date:

Name	SSN	Pre-burn est.	Fluid volume ACTUALLY received			
		wt (kg)	% TBSA	1st 24 hrs	2nd 24 hrs	48 hr Total
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Date & Time of Injury				BAMC/ISR Burn Team DSN 312-429-2876						
Tx Site/ Team	Hr from burn	Local Time	Crystalloid Colloid	TOTAL	UOP	Base Deficit	BP	MAP (>55)	CVP	Pressors (Vasopressin 0.02-0.04 u/min)
	49th									
	50th									
	51st									
	52nd									
	53rd									
	54th									
	55th									
	56th									
	57th									
	58th									
	59th									
	60th									
	61st									
	62nd									
	63rd									
	64th									
	65th									
	66th									
	67th									
	68th									
	69th									
	70th									
	71st									
	72nd									
Total Fluids:										

BURN ESTIMATE AND DIAGRAM

Total Area front/back (circumferential)							
		one side-- anterior	one side-- posterior				
	Adult	adult	adult	1st	2nd	3rd	TBSA
Head	7	3.5	3.5				0
Neck	2	1	1				0
Anterior trunk*	13	13	0				0
Posterior trunk*	13	0	13				0
Right buttock	2.5	na	2.5				0
Left buttock	2.5	na	2.5				0
Genitalia	1	1	na				0
Right upper arm	4	2	2				0
Left upper arm	4	2	2				0
Right lower arm	3	1.5	1.5				0
Left lower arm	3	1.5	1.5				0
Right hand	2.5	1.25	1.25				0
Left hand	2.5	1.25	1.25				0
Right thigh	9.5	4.75	4.75				0
Left thigh	9.5	4.75	4.75				0
Right leg	7	3.5	3.5				0
Left leg	7	3.5	3.5				0
Right foot	3.5	1.75	1.75				0
Left foot	3.5	1.75	1.75				0
	100	48	52	0	0	0	0

Age: _____
 Sex: _____
 Weight: _____

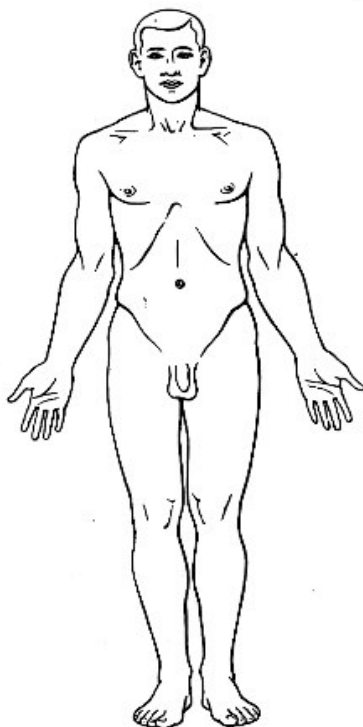


DIAGRAM A

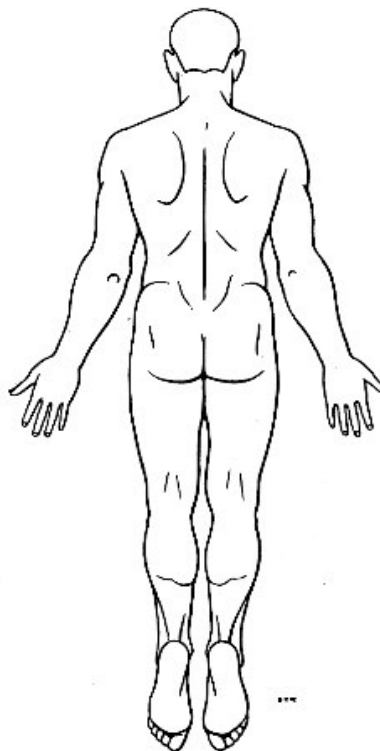
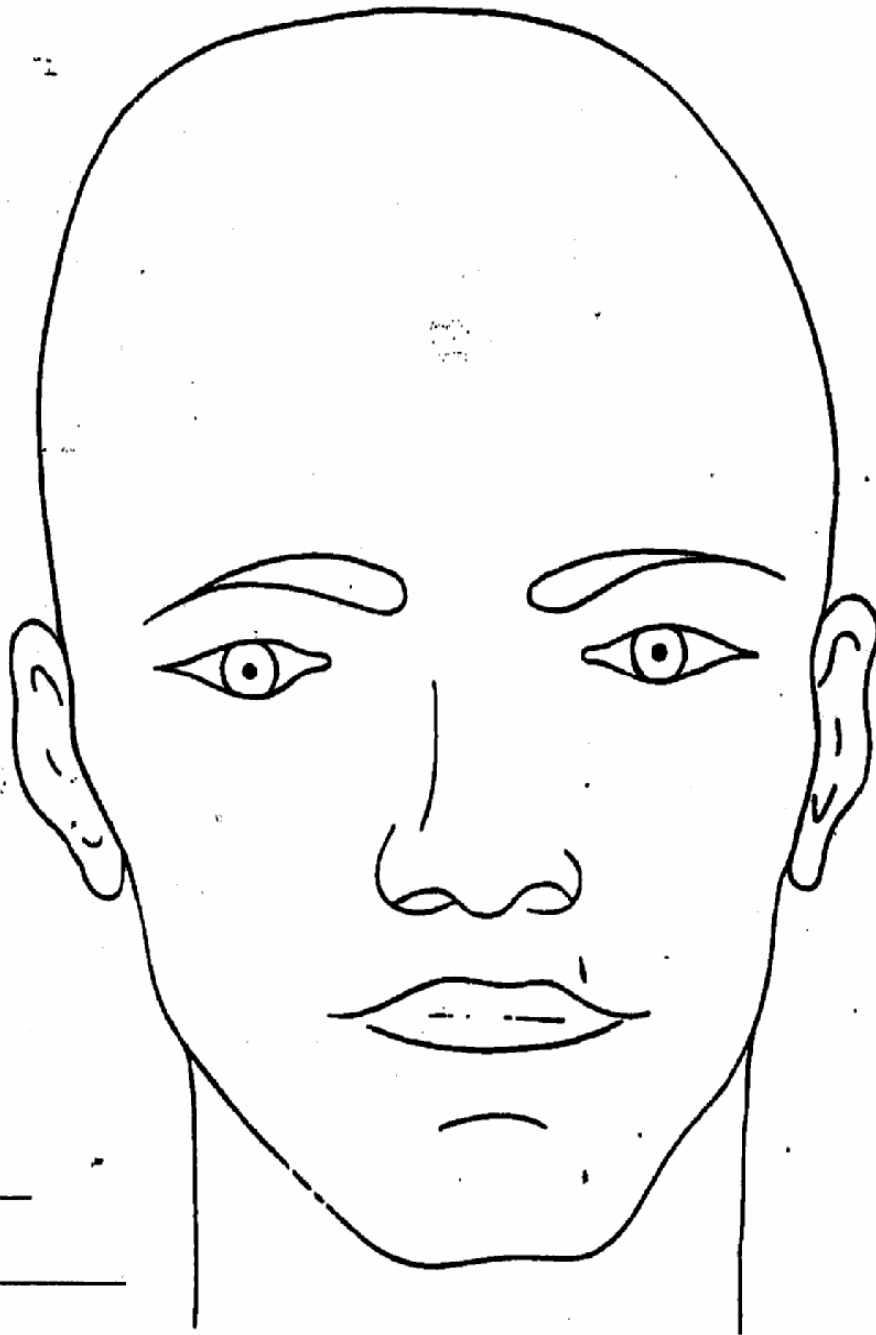


Figure 25 (17)

BURN DIAGRAM - HEAD



Date: _____

name



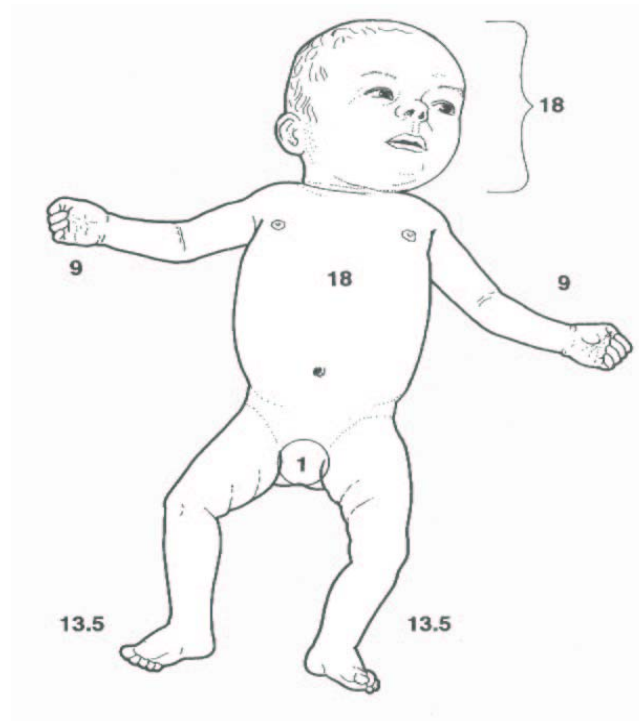
DIAGRAM F

Figure 25 (22)

Date: _____
 2nd: _____
 3rd: _____
 Total: _____

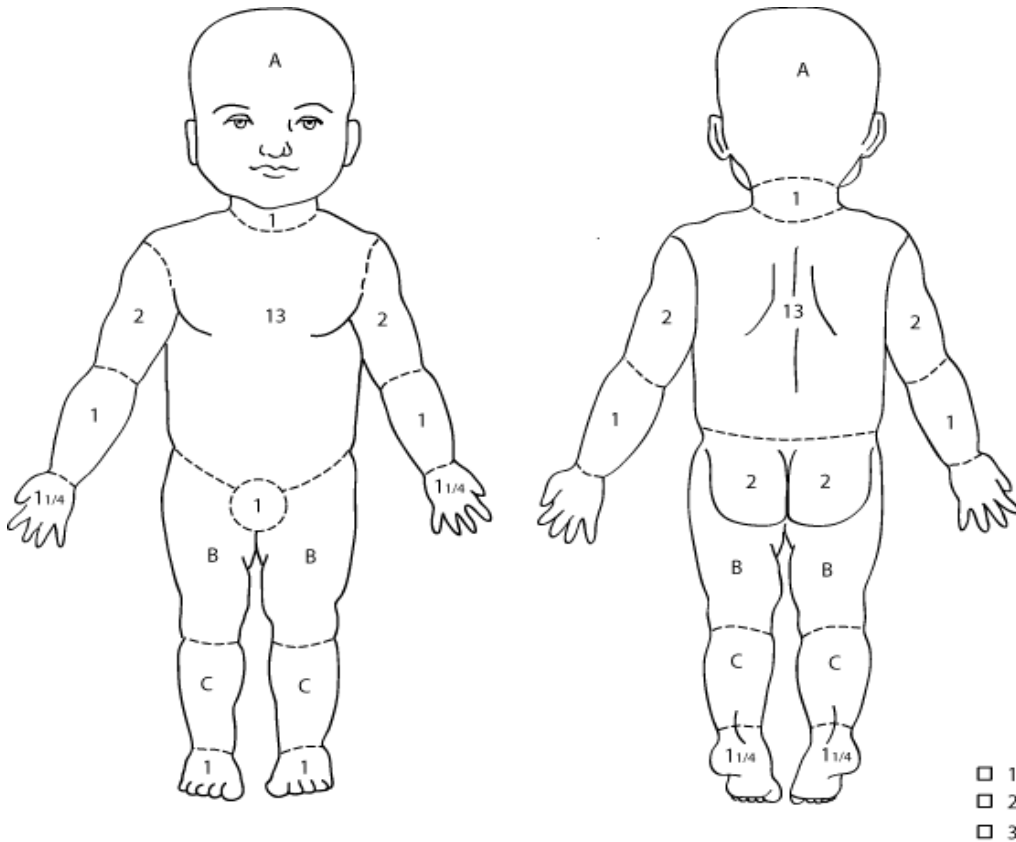
BABY BURN ESTIMATE AND DIAGRAM

Total Area front/back (circumferenti	Birth to1				
	year	1st	2nd	3rd	TBSA
Head	19				0
Neck	2				0
Anterior trunk*	13				0
Posterior trunk	13				0
Right buttock	2.5				0
Left buttock	2.5				0
Genitalia	1				0
Right upper arm	4				0
Left upper arm	4				0
Right lower arm	3				0
Left lower arm	3				0
Right hand	2.5				0
Left hand	2.5				0
Right thigh	5.5				0
Left thigh	5.5				0
Right leg	5				0
Left leg	5				0
Right foot	3.5				0
Left foot	3.5				0



CHILD BURN ESTIMATE AND DIAGRAM

Total Area front/back (circumferential)								
	1 to 4	5 to 9	10 to 14	15				
	years	years	years	years	1st	2nd	3rd	TBSA
Head	17	13	11	9				0
Neck	2	2	2	2				0
Anterior trunk*	13	13	13	13				0
Posterior trunk*	13	13	13	13				0
Right buttock	2.5	2.5	2.5	2.5				0
Left buttock	2.5	2.5	2.5	2.5				0
Genitalia	1	1	1	1				0
Right upper arm	4	4	4	4				0
Left upper arm	4	4	4	4				0
Right lower arm	3	3	3	3				0
Left lower arm	3	3	3	3				0
Right hand	2.5	2.5	2.5	2.5				0
Left hand	2.5	2.5	2.5	2.5				0
Right thigh	6.5	8	8.5	9				0
Left thigh	6.5	8	8.5	9				0
Right leg	5	5.5	6	6.5				0
Left leg	5	5.5	6	6.5				0
Right foot	3.5	3.5	3.5	3.5				0
Left foot	3.5	3.5	3.5	3.5				0



JTTS Burn Resuscitation Flow Sheet Protocol

Purpose: The JTTS Burn Resuscitation Flow Sheet provides clinicians with a tool to track burn resuscitation over a 72-hour period. Conceptually, the flow sheet creates a continuum between clinicians during the resuscitation phase. This format allows clinicians to accurately trend intake and output, hemodynamics and vasoactive medications, and promotes optimal outcomes through precise patient management.

I. The clinicians at the first medical facility where the patient receives treatment will initiate the JTTS Burn Resuscitation Flow Sheet. This treatment facility will be listed in the “Initial Treatment Facility” block. Clinicians at any level of care may initiate the flow sheet.

II. Record today’s date in the “Date” block according to the current date where the recorder is located (do not adjust this date based on the patient’s origin or destination; use the local date).

III. Record the patient’s full name and social security number in the “Name” and “SSN” blocks. Document name and SSN on all three pages of the flow sheet.

IV. Record the patient’s weight in the “Pre-burn est. wt (kg)” block. In theater, record the estimated weight based on the patient’s weight prior to injury or “dry weight.” If a patient presents prior to initiating resuscitation and an accurate weight can be easily obtained without delaying care, providers are urged to weigh the patient and record the result.

V. Record the total body surface area burned in the “% TBSA” block. Clinicians will assess the burn size and use this value to determine fluid resuscitation requirements. Following the patient’s transfer to another facility, the receiving clinicians are required to “re-map” the burn, considering that burn wound may “convert” between assessments at one facility or during transport between two facilities.

VI. Burn Fluid Resuscitation Calculations: Use the ABLS guidelines to determine fluid requirements for the first 24 hours post-burn. At 8-12 hours post-burn, reevaluate resuscitation efforts and recalculate fluid resuscitation needs. If fluid resuscitation needs exceed ABLS formula calculations, consider the guidelines established in the Emergency War Surgery Handbook and the addendum to the handbook, “Recommendations for Level IV Burn Care.” *[LRMC specific: USAISR/BAMC Burn Unit Guidelines can also be found in the LRMC Burn Care Guide]*

- a. Clinicians at the first medical facility to treat the patient will calculate the fluid requirements for the first 24 hours post-burn and record the amount in the block on page 1 labeled “Estimated fluid vol. pt should receive.”
- b. Clinicians will record the “fluid volume ACTUALLY received” during the first 24 hours of resuscitation in the block labeled as such at the top of page 2. This amount will equal the actual volume delivered during the first 24 hours (as recorded on page 1).
- c. Clinicians will transcribe the 24-hour fluid volume totals recorded on pages 1 and 2 of the flow sheet onto page 3 in the block labeled “fluid volume ACTUALLY

received.” This allows clinicians to see the first 48-hour totals as the patient enters into the last 24 hours of the 72-hour period.

VII. Record the local date and time that the patient was injured in the “Date & Time of Injury” block. This date and time IS NOT the time that the patient arrived at the medical facility, but rather the date and time of INJURY.

VIII. Record the facility name and/or treatment team in the “Tx Site/Team”) block. The facility name/team name is the team of clinicians who managed the patient during each specified hour on the flow sheet. This team may reside within a facility, in which case the facility name is recorded, or be a transport team (e.g., Medevac, CCATT, Aerovac).

IX. “Hr from burn” is defined as the number of hours after the burn injury occurred. If a patient does not arrive at a medical facility until 3 hours after the burn occurred, clinicians do not record hourly values for hours 1-3 but begin recording in the row marked “4th” hour post-burn. To the extent possible, clinicians should confer with level I and II clinicians to determine fluid intake and urine output. These totals may be recorded in the 3rd hour row.

X. Record the current local time of the recorder in the “Local Time” block, be it Baghdad Time, Berlin Time, ZULU, or CST. As with date, do not adjust this time based on the patient’s origin or destination; use the local time.

XI. Record the total volume of crystalloids and colloids administered in the “crystalloid/colloid” column, not the specific fluids delivered. Clinicians should refer to the critical care flow sheet to determine the fluids types and volumes. This burn flow sheet is designed to track total volumes. Examples of crystalloid solutions are LR, 0.45% NS, 0.9% NS, D5W, and D5LR. Examples of colloids are Albumin (5% or 25%), blood products, and other volume expanders such as dextran, hespan, or hexextend.

XII. Document the name, dosage, and rate of vasoactive agents in the “Pressors” block. Patients who receive vasoactive agents may also have invasive pressure monitoring devices (e.g., arterial line, central venous line, pulmonary artery catheter), in which case significant values should be recorded in the “BP” and “MAP (>55)/CVP” columns.

XIII. For additional burn resuscitation guidelines refer to the Emergency War Surgery Handbook and the “Recommendations for Level IV Burn Care.”

		JTTS Burn Resuscitation Flow Sheet				Page 1	
Date:	[1]	Initial Treatment Facility:			[2]		
Name		SSN	Pre-burn est. wt (kg)	Estimated fluid vol. pt should receive			
			% TBSA	1st 8 hrs	2nd 16th hrs	Est. Total 24 hrs	
[3]		[4]	[5]	[6]	[7]	[8]	[9]
Date & Time of Injury			[10]		BAMC/ISR Burn Team DSN 312-429-2876		

[22] **24-hr Total:** Total IVF & UOP for 1st 24 hours post-burn

	[11]	[12]	[13]	[14a]	[14b]	[15]	[16]	[17]	[18]	[19]	[20]
Tx Site/ Team	HR from burn	Local Time	Crystalloid (ml)	Colloid	TOTAL	UOP	Base Deficit	BP	MAP (>55)	CVP	Pressors (Vasopressin 0.02-0.04 u/min)
	1st		/	/					/	/	
	2nd		/	/					/	/	
	3rd		/	/					/	/	
	4th		/	/					/	/	
	5th		/	/					/	/	
	6th		/	/					/	/	
	7th		/	/					/	/	
	8th		/	/					/	/	
	9th		/	/					/	/	
	10th		/	/					/	/	
	11th		/	/					/	/	
	12th		/	/					/	/	
Total Fluids 1st 12 hrs					[21]						
	13th		/	/					/	/	
	14th		/	/					/	/	
	15th		/	/					/	/	
	16th		/	/					/	/	
	17th		/	/					/	/	
	18th		/	/					/	/	
	19th		/	/					/	/	
	20th		/	/					/	/	
	21st		/	/					/	/	
	22nd		/	/					/	/	
	23rd		/	/					/	/	
	24th		/	/					/	/	
Total Fluids:					[22]						

The guidelines for page 2 remain the same as for page 1, with the exception of the calculation table. On page 2, the values in [a] and [c] are the **actual** volumes delivered and recorded from page 1, blocks 21 & 22. [b] is the **actual** volume delivered from the 9th hour through the 24th hour. These values allow caregivers to re-calculate the mL/kg/% TBSA, and evaluate for over-resuscitation

The guidelines for page 3 remain the same as for pages 1 & 2, with the exception of the calculation table. On page 3, the values in [d] and [e] are the **actual** 24 hour fluid totals recorded from pages 1 & 2. [f] is the **total** volume delivered over the first 48 hrs ([d] + [e]). Once again, these values allow caregivers to recalculate the mL/kg/% TBSA, and evaluate for over-resuscitation