



# ***JOINT TRAUMA SYSTEM CLINICAL PRACTICE GUIDELINE***

## **Burn Care**

Approved November 2013



# Burn Care

**Goal.** The goal of this CPG is to provide practical, evidence-based, recommendations for optimal care of burn casualties who generally fall into one of two categories: military casualties who most frequently sustain burns related to an explosion and can be rapidly evacuated out of theater for definitive care; and local national patients, often children, who commonly sustain burns from accidents, who present for care at military medical facilities with no possibility of definitive care beyond that provided in theater.



# Burn Care

Contact the US Army Institute of Surgical Research (USAISR) Burn Center as soon as possible at

DSN 312-429-2876 (BURN)

or

Commercial (210) 916-2876

or

Commercial (210) 222-2876.

Email: [burntrauma.consult.army@mail.mil](mailto:burntrauma.consult.army@mail.mil)

Early consultation will facilitate coordination of care to include possible activation of Burn Flight Team to assist with movement back to CONUS. Inability to contact the Burn Center should not delay the evacuation process.

JTTS Burn Resuscitation Flow Sheet, Page 1 of 3



Note – this version of BFS will be updated soon

Date		Initial Treatment Facility				Estimated fluid vol. pt should receive			
Name		SSN	Pre-burn est. wt (kg)		%TBSA	Estimated 12 hr Infusion	Estimated 24 hr Total Infusion		
Date & Time of Injury			BAMC/ISR Burn Team DSN 312-429-2876						
Tx Site/ Team	HR from burn	Local Time	Crystalloid	Total	UOP	Base Deficit	BP	MAP (>55)	Pressors (Vasopressin 0.02-0.04 u/min)
			Colloid					CVP	
	1 <sup>st</sup>								
	2 <sup>nd</sup>								
	3 <sup>rd</sup>								
	4 <sup>th</sup>								
	5 <sup>th</sup>								
	6 <sup>th</sup>								
	7 <sup>th</sup>								
	8 <sup>th</sup>								
Total Fluids:									
	9 <sup>th</sup>								
	10 <sup>th</sup>								
	11 <sup>th</sup>								
	12 <sup>th</sup>								
	13 <sup>th</sup>								
	14 <sup>th</sup>								
	15 <sup>th</sup>								
	16 <sup>th</sup>								
	17 <sup>th</sup>								
	18 <sup>th</sup>								
	19 <sup>th</sup>								
	20 <sup>th</sup>								
	21 <sup>st</sup>								
	22 <sup>nd</sup>								
	23 <sup>rd</sup>								
	24 <sup>th</sup>								
Total Fluids:									

#2: Use "Rule of Tens" to calculate Adult starting rate

#1: Contact ISR

Burntrauma.consult.army@mail.mil

#3: Titrate LR hourly to achieve UOP 30-50 ml/hr and tissue perfusion

Refer to the attached Worksheet for formulas and additional information

#4: At hour 24 calculate "actual" 24hr fluid – if > 250ml/kg monitor for fluid overload



# Burn Resuscitation Worksheet

Initiate **AFTER** completion of trauma assessment and interventions

**Adults only: Refer to CPG for pediatric resuscitation**

1. Contact USAISR Burn Center (DSN 312-429-2876) or email: [burntrauma.consult.army@mail.mil](mailto:burntrauma.consult.army@mail.mil)

Date/Time contact: \_\_\_\_\_ POC: \_\_\_\_\_ by: \_\_\_\_\_

2. Estimated Pre-burn Weight (wt): \_\_\_\_\_ kg (Average Service Members are 82 ± 15 kg)

3. Estimate Total Burn Surface Area (TBSA) using Rule of Nines (refine with Lund-Browder)

Partial thickness (2nd) \_\_\_\_\_% + Full thickness (3rd) \_\_\_\_\_% = **TBSA** \_\_\_\_\_%

**IF TBSA >40%:** intubate (use ETT ≥ 7.5 fr to facilitate bronchoscopy)

**IF TBSA <15%:** formal resuscitation may not be required, provide maintenance and/or oral fluids

4. Standard Burn Resuscitation Fluid: Lactated Ringers (LR) or Plasmalyte

5. Calculate **INITIAL Fluid Rate (adults):**

**IF wt < 40kg:** 2ml x %TBSA \_\_\_\_\_ x wt(kg) \_\_\_\_\_ ÷ 16 = \_\_\_\_\_ ml/hr

**IF wt ≥ 40kg:** %TBSA \_\_\_\_\_ x 10 = \_\_\_\_\_ ml/hr

**IF wt > 80kg:** add 100ml/hr to initial rate for every 10 kg >80:

**adjusted initial fluid rate = \_\_\_\_\_ ml/hr**

(Example: 100kg patient with 50% TBSA burn = 50% x 10 = 500 ml + 200 ml = 700 ml TOTAL for first hour)

6. If Inhalation Injury Present: administer aerosolized heparin in albuterol (5,000 u Q4 or 10,000 units Q6 hours)

7. **Titrate Resuscitation Fluid:** maintain target **UOP 30-50ml/hr** (Q 1 hour)

IF **rhabdomyolysis** present: use target **UOP 75-100 ml/hr** (Contact USAISR)

**Goals:** UOP >30 but <50ml/hr; adequate tissue perfusion (normalized lactate/base deficit), MAP >55

mmHg

Minimum fluid rate 125/hr

\* **Avoid fluid boluses**

\*\* **Too much fluid as dangerous as too little**



## High risk for over resuscitation/abdominal compartment syndrome:

If hourly rate  $\geq 1,500\text{ml/hr} \times 2 \text{ hrs}$  **OR**

If **total** 24 hr volume exceeds:  $\text{wt}(\text{kg}) \times 250\text{ml} = \text{_____ml}$  (includes all infused fluids)

- Contact USAISR Burn Center (DSN 312-429-2876)
- Consider adjuncts
- Check bladder pressures Q4hrs ( $>20 \text{ mmHg}$  notify MD)
- Avoid surgical decompression (significant mortality risk in burns)

## Adjuncts:

1. Colloids: 5% albumin/FFP (hextend only if others unavailable)

\* Colloids not preferred until hour 8-12; can consider earlier in difficult resuscitation

Infuse at ml/hr according to chart below based on patient weight and burn size

5% Albumin Infusion (ml/hr)	30-49%TBSA	50-69% TBSA	70-100% TBSA
<70 kg	30	70	110
70-90 kg	40	80	140
>90 kg	50	90	160

2. Vasopressors:

(REF: "Burn CPG, 12 JUN13, 9.b., pg.7)

Contact USAISR Burn Center (DSN 312-429-2876)

- **Ensure adequate volume** (CVP trend 6-8 cm H<sub>2</sub>O); **maintain MAP > 55 mmHg**
- Maintain ionized Ca  $>1.1 \text{ mmol/L}$
- Start with vasopressin 0.02-0.04mg/min. **DO NOT TITRATE**
- Second line pressor: norepinephrine 2-20mcg/min
- Consider adding dobutamine 2-5mcg/kg/min if volume adequate
- Continued refractory hypotension: consider epinephrine infusion
- Refractory shock: consider adrenal insufficiency, give hydrocortisone 50mg Q6 hrs
- Manage acidemia (pH $<7.2$ ): use ventilatory interventions first, then bicarbonate or THAM infusion

3. Renal replacement therapy if available (Contact USAISR DSN 312-429-2876)



## Assessment/Interventions:

- Complete full secondary trauma exam
- Ensure thermoregulation; administer warmed fluids; cover with space blanket
- Partial thickness (2<sup>nd</sup> degree): blanch, moist, blisters, sensate
- Full thickness (3<sup>rd</sup> degree): leathery, white, non-blanching, dry, insensate, thrombosed vessels
- Protect eyes with moisture shields if corneas exposed or blink reflex slow (NOT Fox shield)
- **Prompt intubation for facial burns, suspected inhalation injury, TBSA >40%**
  - anticipate induction-associated hypotension;
  - secure with cloth tie, no tape;
  - reassess ETT position at teeth Q1 hr
  - Intubated patients require oro/naso-gastric tube for decompression
  - IV administration of proton-pump inhibitor
- Monitor bladder pressure at least Q4hrs for large burns or high volume resuscitations (Burn CPG, 2013, page 7)
  - Abdominal compartment syndrome: decreased UOP, increased pulmonary pressures, difficulty ventilating, bladder pressure trending > 20 mmHg
  - Avoid decompressive laparotomy; consider percutaneous peritoneal drainage with catheter
  - Reduce crystalloid volume using colloid or vasopressors
- Monitor pulses hourly: palmar arch, dorsalis pedis, posterior tibial with Doppler
  - Consider escharotomy if signal diminished; refer to CPG for technique
- Monitor extremity compartment pressures as clinically indicated
  - Elevate burned extremities at all times
  - Extremity compartment syndrome: pain, paresthesia, pallor, paralysis, pulselessness (late sign)
  - Fasciotomy may be required
- Wound care
  - Thoroughly cleanse burn wounds, preferably in OR
  - Select topical antimicrobial in consultation with Burn Surgeon
    - based on product availability, expected transport time, etc
  - Acceptable to cover burns with dry sheets or clean dressings for first 24 hours
- All definitive surgical burn interventions done at USAISR

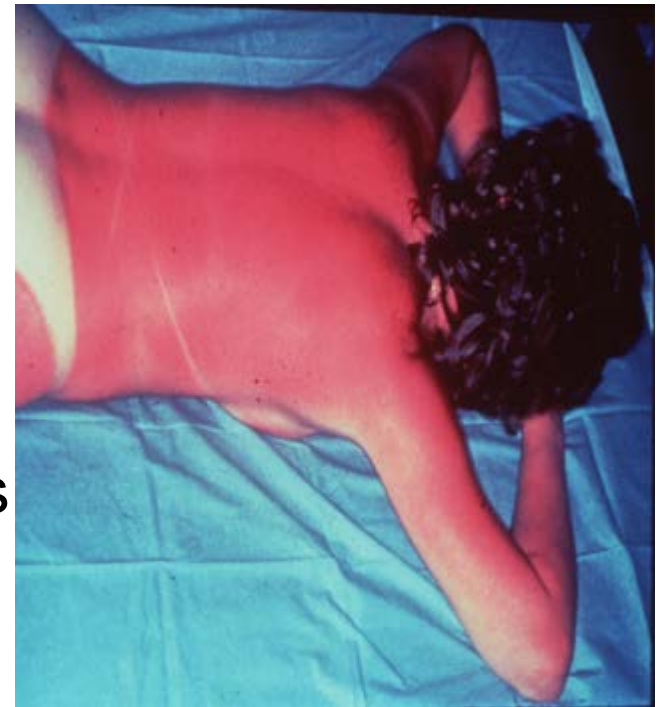




# Superficial Burn (1<sup>st</sup> Degree)

**\*\*\* not part of  
TBSA calculation**

- Caused by a minor flash or sun
- Superficial - involves only the epidermis
- Skin intact, red in color
- Dry surface, no blisters
- Painful, hypersensitive
- Heals in approximately 3-6 days







# Superficial Partial Thickness Burn (2<sup>nd</sup> Degree)

- Involves the epidermis and part of dermis
- Mottled red color
- Blisters or weeping
- Very painful / nerve endings exposed
- Usually heals in 10-14 days without surgery
- Minimal scarring





# Deep Partial Thickness Burn (2<sup>nd</sup> Degree)

- Extends more deeply into the dermis
- Decreased moistness
- Skin is pale in color
- Absent or prolonged blanching
- Some healing in 21-28 days, requires skin grafting





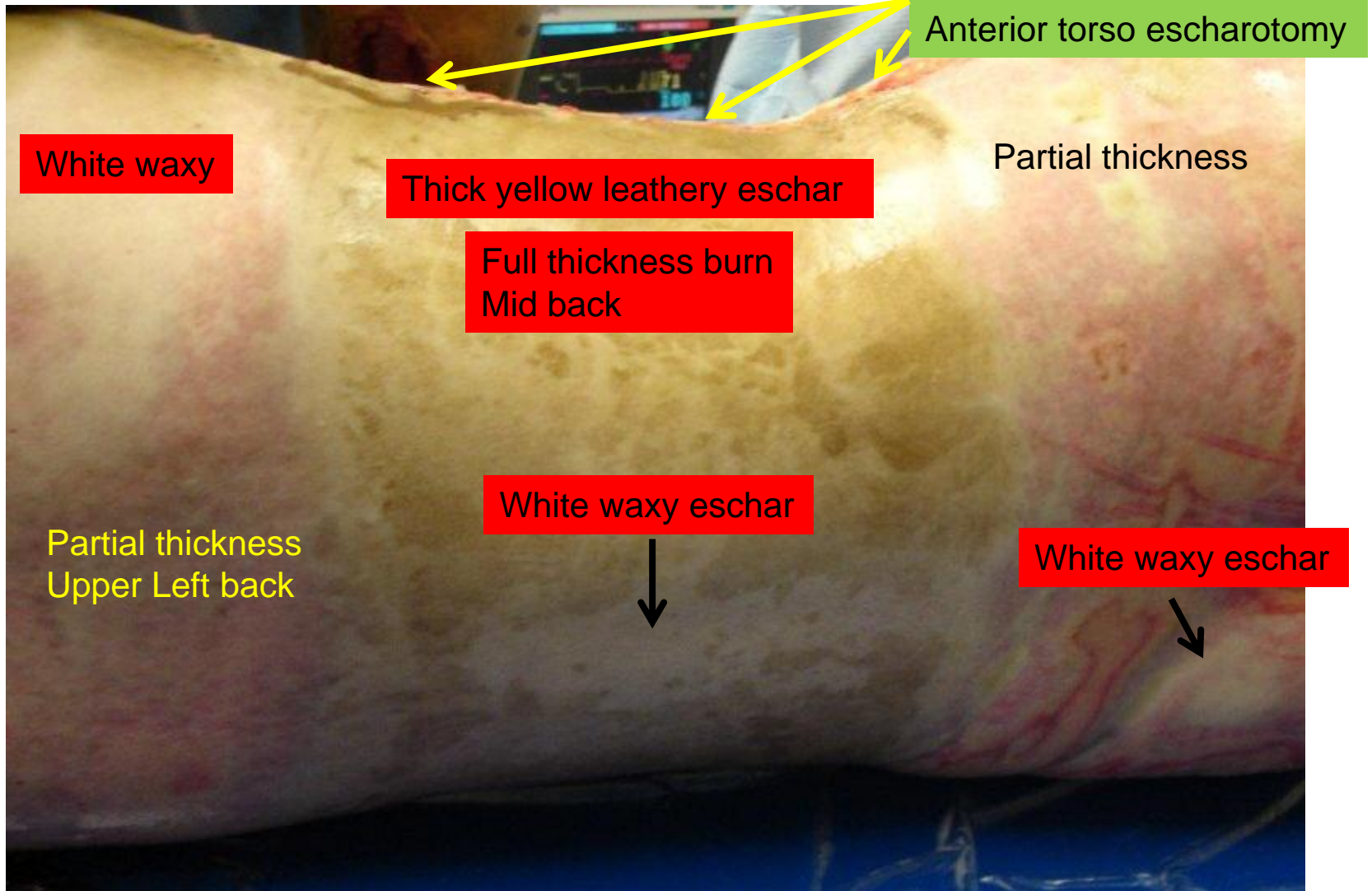
# Full Thickness Burn (3<sup>rd</sup> Degree)

- Dermis is destroyed
- Translucent, parchment-like or leathery appearance, charred
- Dry surface, thrombosed blood vessels
- Painless, non-blanchable
- Requires grafting





# Full thickness circumferential torso burn w/ escharotomy





# BLE circumferential full thickness burns w/ medial and lateral escharotomies





# Burn Care

## Performance Improvement Core Measures

- ❖ All patients who suffered second and/or third degree burns of  $\geq 20\%$  TBSA had the Burn Flow Sheet initiated and completely documented at the first MTF providing treatment and all subsequent MTFs until their arrival at a definitive care MTF in CONUS.
- ❖ All patients who suffered circumferential extremity full thickness burns with known or suspected development of neurovascular compromise of the involved limb had appropriate escharotomy performed.