

Title: <b>Burn Resuscitation: Patients &gt; 30kg and &gt;20% TBSA</b>		<b>Guideline</b>		
Patient Age Group:	( ) N/A	( ) All Ages	( ) Newborns	( ) Pediatric (x) Adult

## DESCRIPTION/OVERVIEW

This is a nurse-driven and physician referenced guideline for the acute resuscitation of the adult burn patient weighing more than 30kg and burn greater than 20% TBSA.

## REFERENCES

- Ennis, J., Chung, K., Renz, E., Barillo, D., Albrecht, M., Jones, J., . . . Holcomb, J. (2008). Joint Theater Trauma System Implementation of Burn Resuscitation Guidelines Improves Outcomes in Severely Burned Military Casualties. *The Journal of Trauma: Injury, Infection, and Critical Care*, S146-S152. doi:10.1097/TA.0b013e318160b44c
- Fahlstrom, K., Boyle, C., & Makic, M. (2013). Implementation of a Nurse-Driven Burn Resuscitation Protocol: A Quality Improvement Project. *Critical Care Nurse*, 33(1), 25-35. <http://dx.doi.org/10.4037/ccn2013385>
- Park, S., Hemmila, M., & Wahl, W. (2012). Early albumin use improves mortality in difficult to resuscitate burn patients. *Journal of Trauma and Acute Care Surgery*, 73(5), 1294-1297. doi:10.1097/TA.0b013e31827019b1

## AREAS OF RESPONSIBILITY

Medical and Nursing staff caring for the burn patients weighing more than 30kg and burn greater than 20% TBSA.

## GUIDELINE PROCEDURES

For Patients > 30kg and >20% TBSA

Time, Date, & Type of Injury	Admission Weight(kg)	%TBSA	Total LR for 24 hours

Calculation for Resuscitation:

- Ascertain the type of burn injury:
  - Thermal and Chemical burn injury **without** suspected inhalation injury:
    - $2\text{cc} \times \text{admit weight(kg)} \times \% \text{ TBSA } 2^{\text{nd}} \text{ and } 3^{\text{rd}} \text{ degree burns} = \text{LR fluid total for 24 hrs}$
  - Thermal or Chemical burn injury **with** suspected inhalation injury:

- i.  $3\text{cc} \times \text{admit weight(kg)} \times \% \text{ TBSA } 2^{\text{nd}} \text{ and } 3^{\text{rd}} \text{ degree burns} = \text{LR fluid total for 24 hrs}$
- High Voltage Electrical, with evidence of deep tissue injury or hemochromogens in the urine, without regard to the presence of an inhalational injury:
  - i.  $4\text{cc} \times \text{admit weight(kg)} \times \% \text{ TBSA } 2^{\text{nd}} \text{ and } 3^{\text{rd}} \text{ degree burns} = \text{LR fluid total for 24 hrs}$
2. Divide fluid total in half.
3. Give first half of fluid in first 8 hours and second half of fluid in remaining 16 hours post injury (\*note: hourage is determined from the onset of injury **NOT** the arrival time to hospital).
4. **Take the first 8 hr fluid goal and divide by 8 to get hourly rate for IVF.** Remember to incorporate the pre-hospital and ER fluid administration into the first 8 hr calculation. (Example: If the patient received 2L crystalloid in the ER prior to arrival to the unit, subtract 2L from the 8 hour total, divide the remaining by 8 to get your hourly rate.)
5. LR maintenance fluid:
  - 4cc/hr for the first 10kg of body weight
  - 2cc/hr for the second 10kg of body weight
  - 1cc/hr for the remaining body weight
  - **Maintenance rate=\_\_\_\_\_ cc/hr**

**-Run maintenance fluid at set rate during resuscitation. This is independent from resuscitation fluids.**
6. Urine output goal:  $0.5\text{-}1\text{cc} \times \text{weight (kg)} = \text{cc/hr}$ 
  - **UOP goal: \_\_\_\_\_ cc/hr**
7. Titrate fluids hourly based on Urine output.
  - If the UOP < goal, increase IVF rate by 20%.
  - If UOP continues to be below goal in the next hour, increase IVF by 20% and notify Burn Attending.
  - If UOP > than 1-2cc/kg/hr for 2 consecutive hours: decrease IVF rate by 10% but do not drop below calculated maintenance rate.
8. If unable to meet UOP goal after 2 hours add: Albumin 5% gtt for 18hrs ( $0.3\text{cc} \times \text{weight (kg)} \times \% \text{ TBSA} / 18 = \text{cc/hr}$  (not titrated))
  - **Albumin 5% gtt rate (not titrated): \_\_\_\_\_ cc/hr**

9. If Albumin does not help after 2 hours add FFP (1 unit over 1 hour) monitor Hct 1 hour post infusion and q4 hours thereafter until resuscitation complete.
10. When the patient is able to maintain UOP and had completed their 24 hour fluid goal and time goal, then fluid can be changed to D5  $\frac{1}{2}$  NS.
11. Vitamin C infusion ordered for burns > 30%TBSA. **Used only until patient reaches the end of the resuscitation time or 18hrs of Vitamin C infusion, whichever is sooner.**
  - $(66 \times \text{weight (kg)}) / 25 = \text{cc/hr}$  (**do not titrate**)
  - **This amount is in addition to the maintenance fluid rate. (Vit. C alters accu-check reads, USE LAB DRAWS while the patient is receiving Vit C).**
12. Labs:
  - Admission:
    - o Type & Cross
    - o CBC
    - o Full set of labs (including Chem 7, LFTs, Mg, Phos, Ionized Ca, Lactate, Coags)
    - o ABG if intubated
    - o HCG (if Female)
    - o Carboxyhemoglobin if inhalation injury is suspected
    - o Urine Myoglobin, CK, if electrical injury is suspected
  - During resuscitation initial 48 hours:
    - o CBC q6hr, Hct & Hgb q6 hour (drawing one q 3 hours)
    - o Glucose q1hr
    - o Chem 7, lactate, Ionized Ca, Mg, Phos: q6hr
    - o ABG if intubated q6hr
  - Routine Labs after resuscitation:
    - o Q3 days: Type & Screen
    - o Complete every Monday and Thursday:
      - Prealbumin, Amalyse, Lipase, LFTs, Cortisol, CBC, TSH, CRP, Chem 7, Mag, Phos, PT/PTT, Copper, Zinc, Selenium.

Example:

100kg patient with 30% TBSA without a suspected inhalation injury:

$2\text{cc} \times 30(\% \text{TBSA}) \times 100\text{kg} = 6\text{L}$  resuscitation fluid

- half in first 8 hours : 3L
  - o  $3000\text{cc}/8\text{hr} = 375\text{cc}$  per hour LR
- half over following 16hrs: 3L
  - o  $3000\text{cc}/16\text{hr} = 187.5\text{cc}$  per hour LR

Maintenance rate calculation:

$4\text{cc/hr}$  for the first 10kg of body weight =  $4\text{cc/hr} \times 10\text{kg} = 40\text{cc/hr}$

$2\text{cc/hr}$  for the second 10kg of body weight =  $2\text{cc/hr} \times 10\text{kg} = 20\text{cc/hr}$

$1\text{cc/hr}$  for the remaining body weight =  $1\text{cc/hr} \times 80\text{kg} = 80\text{cc/hr}$

**Maintenance rate total = 140cc/hr (at no point in the resus does the IVF rate drop below this)**

When you add the Resus + Maintenance =  $515\text{cc/hr}$  (goal for the first 8 hours)

-This may be increased or decreased based on the UOP goal of  $0.5\text{-}1\text{cc/hr}$

-But, do not drop rate below the Total Maintenance =  $140\text{cc/hr}$

The Vitamin C is a separate calculation that is used for 18 hours or resuscitation is over.

## RESOURCES/TRAINING

Training for nursing and medical staff to be done by Unit Based Educators, Charge Nurses, and Attending Physicians in the Trauma, Surgical, and Burn Intensive Care Unit.

Resource/Dept	Contact Information
Crystal Sanchez, RN, MSN-TSBICU	
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## DOCUMENT APPROVAL & TRACKING

Item	Contact	Date	Approval
Owner	[Title, Department/Area]		
Consultant(s)	[Name, Title]		
Committee(s)	[Committee Name(s)]		[Y or N/A]
Nursing Officer	[Name], Chief Nursing Officer		[Y or N/A]
Burn Director	[Name, Department (or Chief Medical Officer)]		[Y or N/A]
Medical Director	[Name, Department (or Chief Medical Officer)]		[Y or N/A]
Human Resources	[Name], HR Administrator, [UNMH or UNM]		[Y or N/A]
Finance	[Name, Title], [UNMH or HSC]		[Y or N/A]
Official Approver	[Name, Title, Area]		Y
Official Signature		Date:	
Effective Date		[Day/Mo/Year]	
Origination Date		[Month/Year]	
Issue Date	Clinical Operations Policy Coordinator		

## ATTACHMENTS

1. Adult Burn Resuscitation Flowsheet
2. Adult Burn Resuscitation Care Map

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Title:  
Owner:  
Effective Date:  
Doc. #

# Adult Burn Resuscitation Protocol Flowsheet

For Patients > 30kg and >20% TBSA

Fluid Calculation Used (Circle one)		2cc x kg x TBSA	3cc x kg x TBSA	4cc x kg x TBSA	
Estimated Fluid Volume Patient Should Receive					
Name	Weight(kg)	%TBSA	1 <sup>st</sup> 8 hours	2 <sup>nd</sup> 16 hours	Est. Total 24 hours

Maintenance Fluid Rate: \_\_\_\_\_ cc/hr

Calculated Urine output goal: \_\_\_\_\_ cc/hr

Total IVF Pre-hospital and ER: \_\_\_\_\_

(Site: PH= Pre-hospital; ER= Emergency Room; ICU= Burn Unit)

Site	Hour	Time	Crsyt/Colloid	Total	UOP	BP	MAP	CVP	Pressors (Y/N)
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								

8 Hour Goal: \_\_\_\_\_

8 Hour Actual: \_\_\_\_\_

+Overage/-Shortage: \_\_\_\_\_

Site	Hour	Time	Crsyt/Colloid	Total	UOP	BP	MAP	CVP	Pressors (Y/N)
	9								
	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								

16 Hour Goal: \_\_\_\_\_

16 Hour Actual: \_\_\_\_\_

24 Hour Goal: \_\_\_\_\_

24 Hour Actual: \_\_\_\_\_

24 Hour +Overage/-Shortage: \_\_\_\_\_

Title: \_\_\_\_\_

Owner: \_\_\_\_\_

Effective Date: \_\_\_\_\_

Doc. # \_\_\_\_\_

