Burn Management, pre-Hospital

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Dell Seton Medical Center

Trauma Burns

Demographics of Dell Seton Medical Center Burn patient population

- 2017 to April 2024
- Total number patients seen=1,589
- Etiology of injury:
  - Open flame 577
  - Scald 412
  - Road Rash 205
  - Contact 150
  - Flash 141
  - Electrical 46
  - Chemical 58

History Burn Program Dell Seton

- Prior to 2017, no burn center or specialty burn services provided in Central Texas Austin region
- All burns went to Brooke Army Medical Center in San Antonio ~ 70 miles away

2017

- Program began 30% or less TBSA
- Clinically focused
- BAMC & Parkland helped develop

2018

- Program expanded to all %TBSA burns

2020

- Opened full time outpatient program

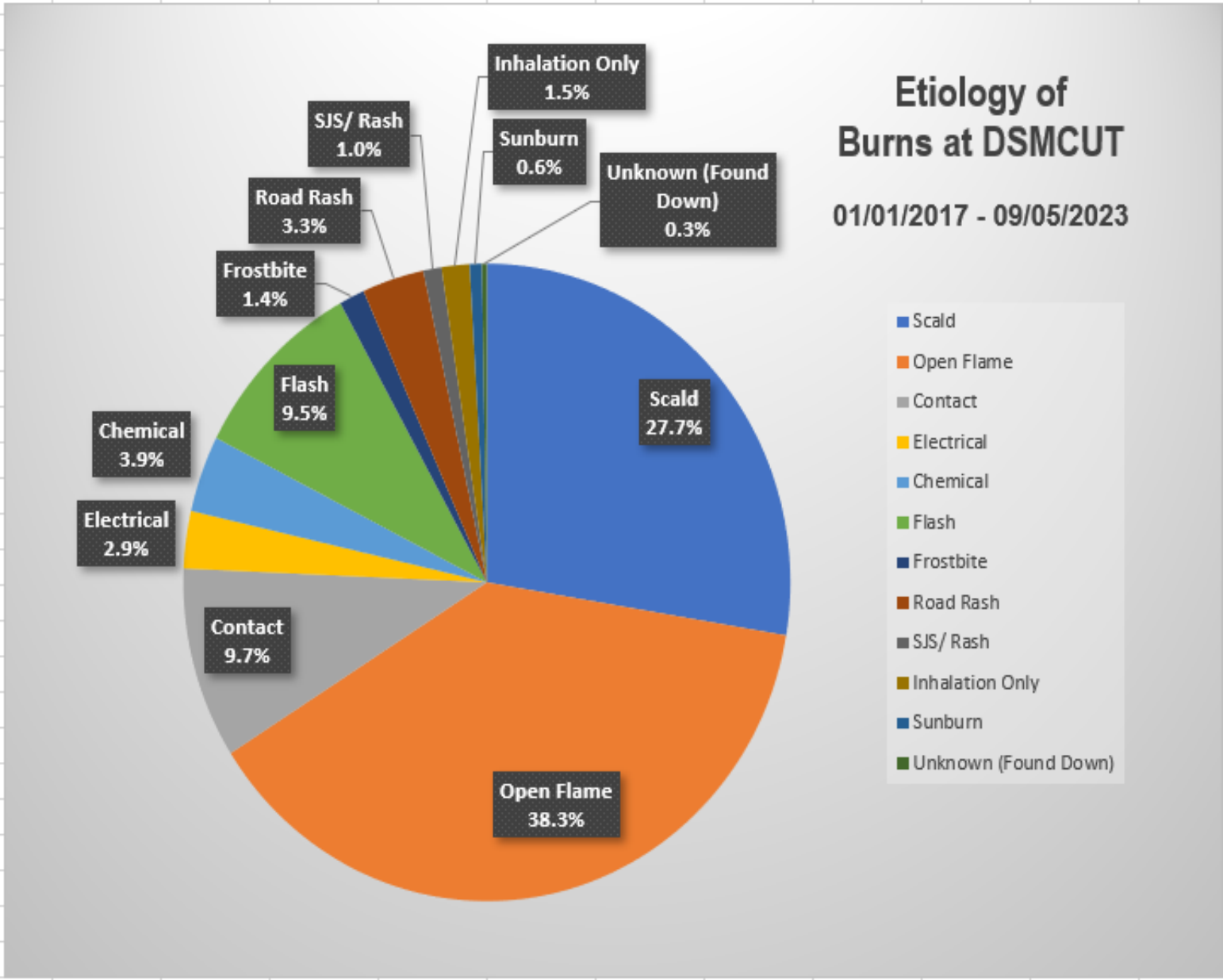
History:

- Largest surviving burn was 89% TBSA who is now living a normal life. Several 60% +TBSA have survived
- We have four burn surgeons:
  - Aydelotte, Cardenas, Trust, Egeland (plastic surgeon)
  - **3.5 APP's (Lenore Greene, Shawna Warren, Half of Frank Stokes, Chris Sutton)**
  - **4 RN's that provide daily dressing changes and wound care**

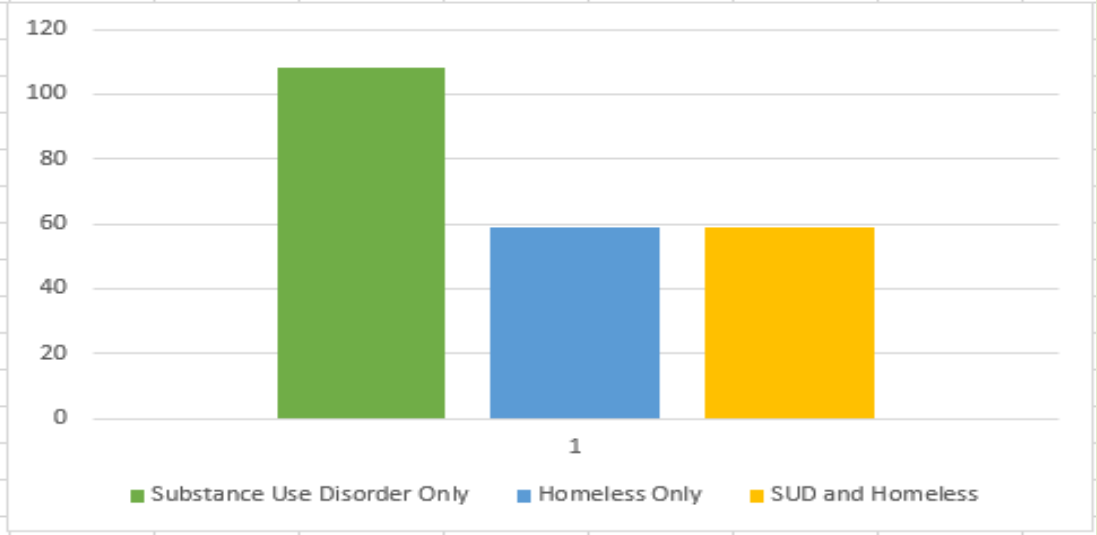
Structure

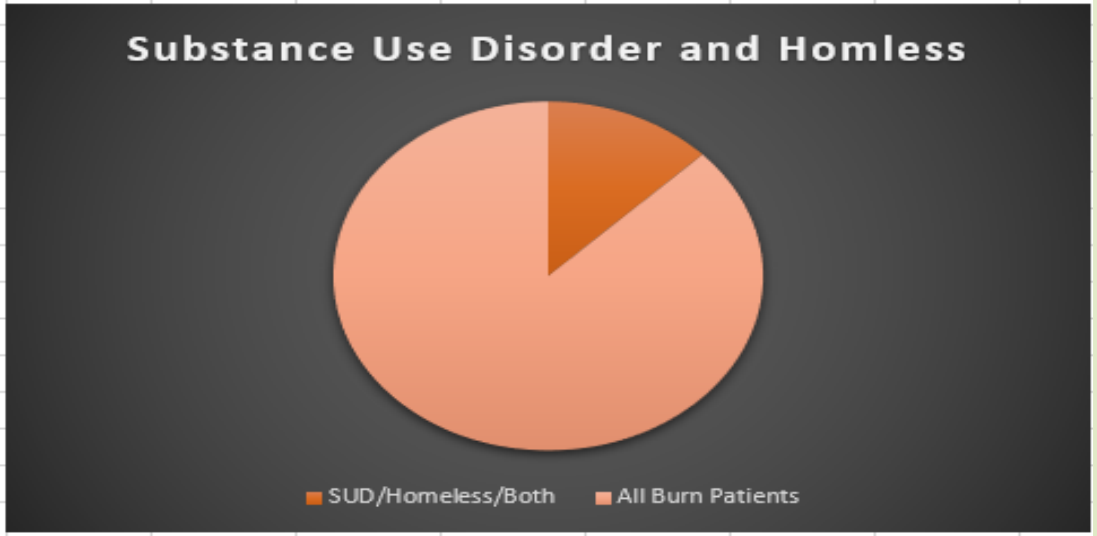
- Consolidated Inpatient Units - Separate from rest of the hospital Fixed number of ICU and Acute care beds or transitional beds on one unit
- Dedicated single purpose OR suites and procedure room
- Inpatient rehabilitation (Physical and Occupational Therapy)
- Burn Program staff- Burn registry, PI, education, etc
- Outpatient clinic-now located in the hospital
- Burn debridement, and wound treatment
- PT/OT rehabilitation therapy
- **Hospital is currently expanding, and we will have dedicated burn OR 24/7**

January 01, 2017 - Sept 05, 2023	
Scald	428
Open Flame	593
Contact	150
Electrical	45
Chemical	60
Flash	147
Frostbite	21
Road Rash	51
SJS/ Rash	15
Inhalation Only	23
Sunburn	10
Unknown (Found Down)	4
Total Count	1547



Substance Use Disorder Only	108
Homeless Only	59
SUD and Homeless	59
	226
SUD/Homeless/Both	226
All Burn Patients	1547





MEEK Grafting technique

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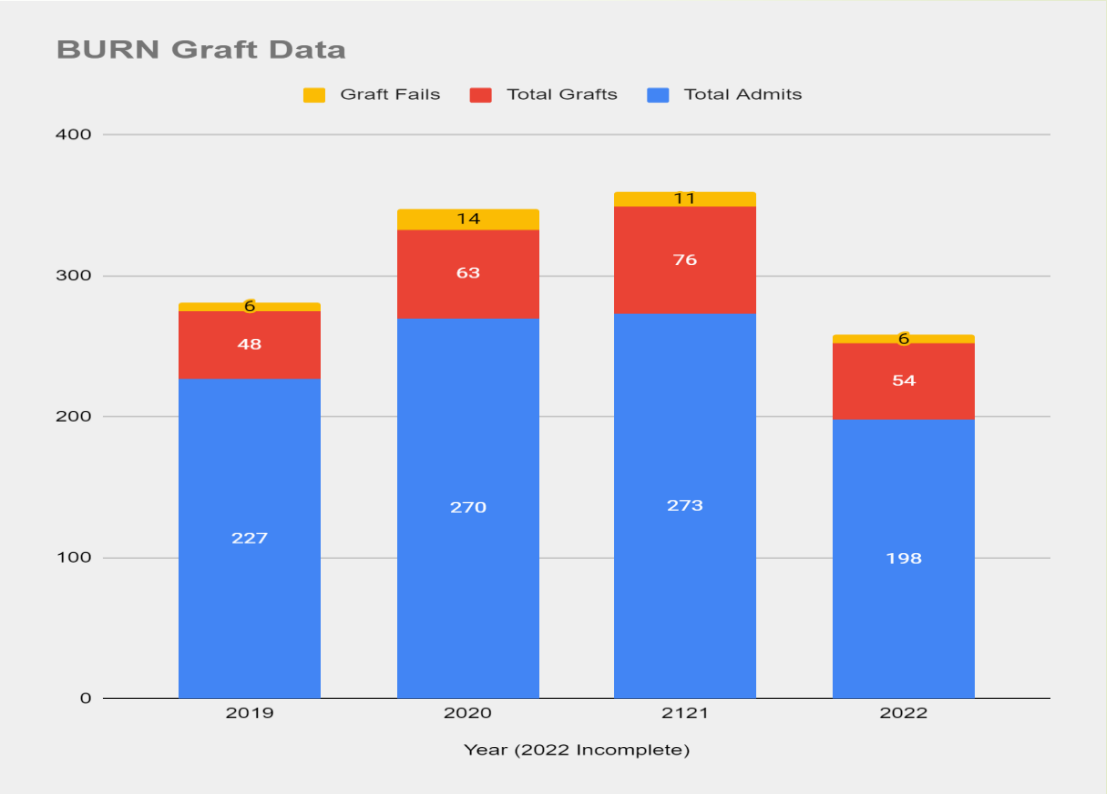
2019-2021 Graft fail defined as less than 80% graft take
2022 Graft fail defined as less than 90% graft take

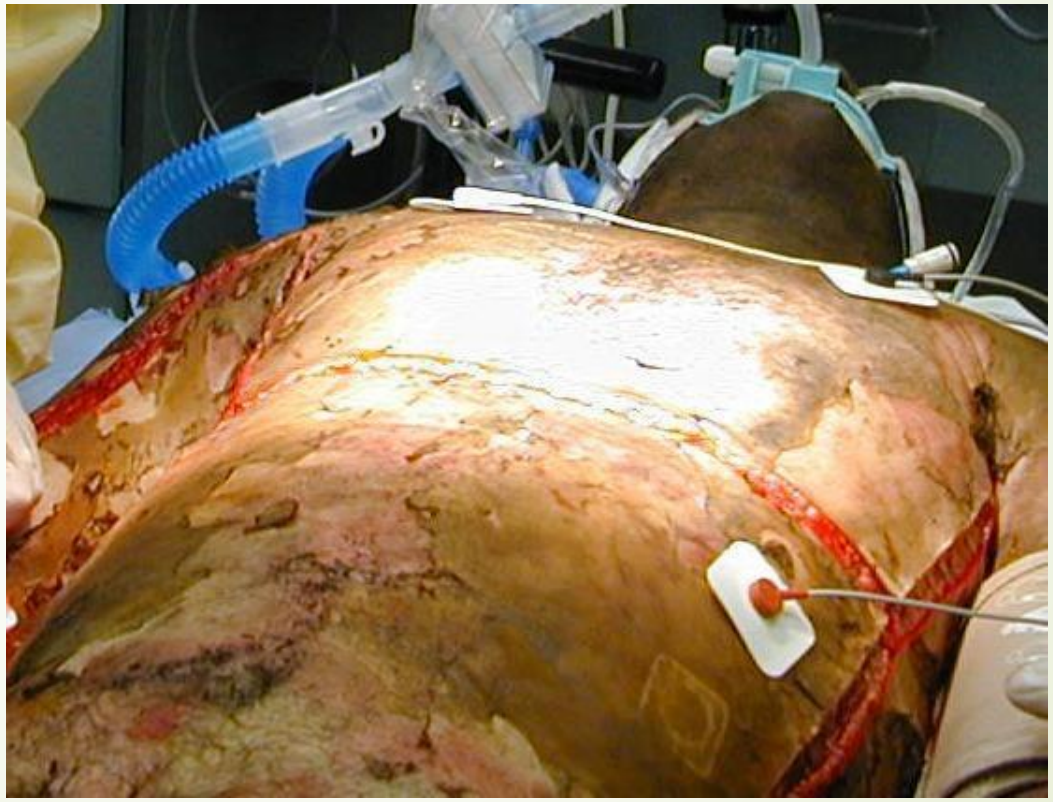


American Burn Association: pre-hospital management of burns

Partial thickness burn

Full thickness burn

Full thickness burn with escharotomy

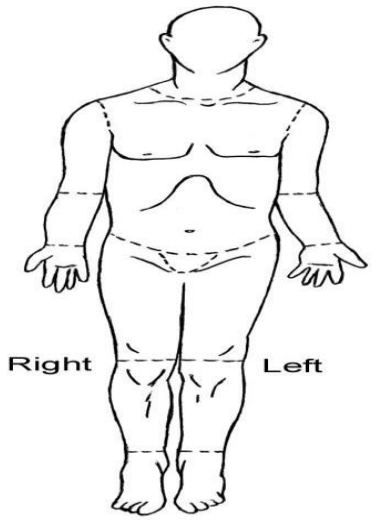


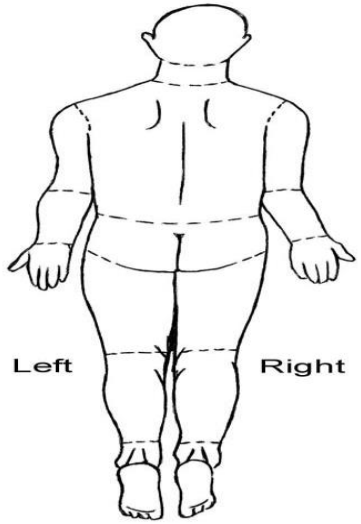
When do you transfer patients to a burn center?

American Burn Association Burn Center Transfer Criteria

1. Second and third degree burns greater than 10% total body surface area (TBSA) in patients under 10 or over 50 years of age.
2. Second and third degree burns greater than 20% TBSA in other age groups.
3. Second and third degree burns that involve the face, hands, feet, genitalia, perineum, and major joints.
4. Third degree burns greater than 5% TBSA in any age group.
5. Electrical burns including lightning injury.
6. Chemical burns.
7. Inhalation injury.
8. Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality.
9. Any patients with burns and concomitant trauma (such as fractures, etc.) in which the burn injury poses the greatest risk of morbidity or mortality. In such cases, if the trauma poses the greater immediate risk, the patient may be treated initially in a Trauma Center until stable before being transferred to a Burn Center. Physician judgment will be necessary in such situation and should be in concert with the regional medical control plan and triage protocols.
10. Hospitals without qualified personnel or equipment for the care of children should transfer children with burns to a Burn Center with these capabilities.
11. Burn injury in patients who will require special social/emotional and/or long-term rehabilitative support, including cases involving suspected child abuse, substance abuse.

Lund Browder





Date

Completed by

Shallow + Indeterminate or deep =

Shallow (pink, painful, moist)

Indeterminate or deep (dry, less sensation, white, mottled, dark red, brown or black, leathery.)

Percent surface area burned (Berkow formula)

Area	1 Year	1-4 Years	5-9 Years	10-14 Years	Y 15 Years	Adult	Shallow	Indeter-minate of deep
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	3.5	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								

Initial Burn Chart

Emergent Management of Thermal Burns

- Practice essentials:
- Burn care should begin at the site of injury and continue through the prehospital care and transportation to the closest burn center when appropriate
- Closest to Austin: Dell Seton Medical Center (level 1 Trauma Center)
- Followed by:
  - Dallas and San Antonio

Prehospital Care

- Remove the person from the source of burn without endangering rescue personnel.
- After extrication. Initial care of the burn victim should follow the basic principles of trauma resuscitation (ie, airway, breathing, and circulation (ABC's) as follows:
- Perform a rapid primary survey and immediately correct any problems found
- Remove any constricting clothing or jewelry
- When ventilatory and circulatory competence have been restored, perform a secondary survey
- Concurrently with airway and circulatory management, make an effort to stop the burning process

Prehospital Care

- Administer humidified oxygen via nonrebreathing reservoir mask and endotracheal tube at rate of 10-12 L/min if signs of inhalation injury are present.
- Patient who is not breathing should be intubated and ventilated with 100% oxygen
- Singed facial hair, soot in the nose can indicate inhalation injury and intubation should be considered early.
- Patient will undergo bronchoscopy on admission and at minimal again the following day per Dell Seton burn protocols

Prehospital Care
Treatment of Burn shock

- Administer humidified oxygen
- Administer IV fluids if transport time will be longer than 30 min OR if fluid resuscitation is indicated
  - Fluid resuscitation:
  - Begin resuscitation immediately with warmed fluids if possible
  - The arm is the preferred site for cannulation
  - Catheters may be placed through burned skin if unburned skin is unavailable
  - Fluid resuscitation of children is NOT recommended at the scene
  - In adults, administer lactated ringers or NS without glucose
  - IV flow rates are determined according to the patient's clinical status

Cooling of burn tissue

- Remove charred clothing
- Immerse the burn wound in cold water for about 30 min IF transport cannot be undertaken immediately
- Do not use ice water or apply ice directly to burn
- Local cooling of burns of less than 9% of TBSA can be continued longer than 30 min to relieve pain
- Minor burns can be cooled with running tap water and dressed after more life-threatening issues have been addressed

Transfer to burn center

- IF the vehicle with advanced life support capability can transport the burn patient to a specialized burn treatment facility within 30 min, the patient should be taken directly to this facility
- If transport time is greater than 30 min the patient should be transported instead to the nearest ED with advanced support capability

Initial emergency department treatment What to expect

- When the patient arrives in the ED, treatment as follows:
  - Rapid assessment of respiratory and cardiovascular status
  - Identify source of burn ie flame, chemical, electrical ect.
  - Establish the extent and depth of burn injury
  - Calculate the degree and TBSA of the burns
  - Determine the need for special procedures
    - Trialysis placement (burns greater than 40%) per protocol
    - Central line placement
    - CT to assess for other injuries
    - Operating room for initial debridement IF patient is stable

Initial emergency department treatment What to expect

- Cool burns with towels moistened with cool sterile saline
- Debride any blisters
- Fingers and toes should be wrapped individually, fluffed gauze separating digits
- Cover all partial –thickness wounds with bacitracin
- Cleanse other areas with minor burns with the use of mild soap and gentle scrubbing
- Check tetanus status

Airway and Respiratory Care

- Early intubation rather than observation is recommended in patients with signs of upper airway injury
- Fiber optic bronchoscopy helps with diagnosing acute inhalation injury, intubating patients with inhalation injury, and administering supplemental oxygen
- Full-thickness burns of the neck, a vertical incision through the eschar extending from the sternal notch to the chin helps maintain a patent airway
- If respiratory insufficiency is caused by a constricting eschar of the anterior thorax that limits respiratory excursion , escharotomy is imperative
- If respiratory failure ensues, mechanical ventilation is necessary

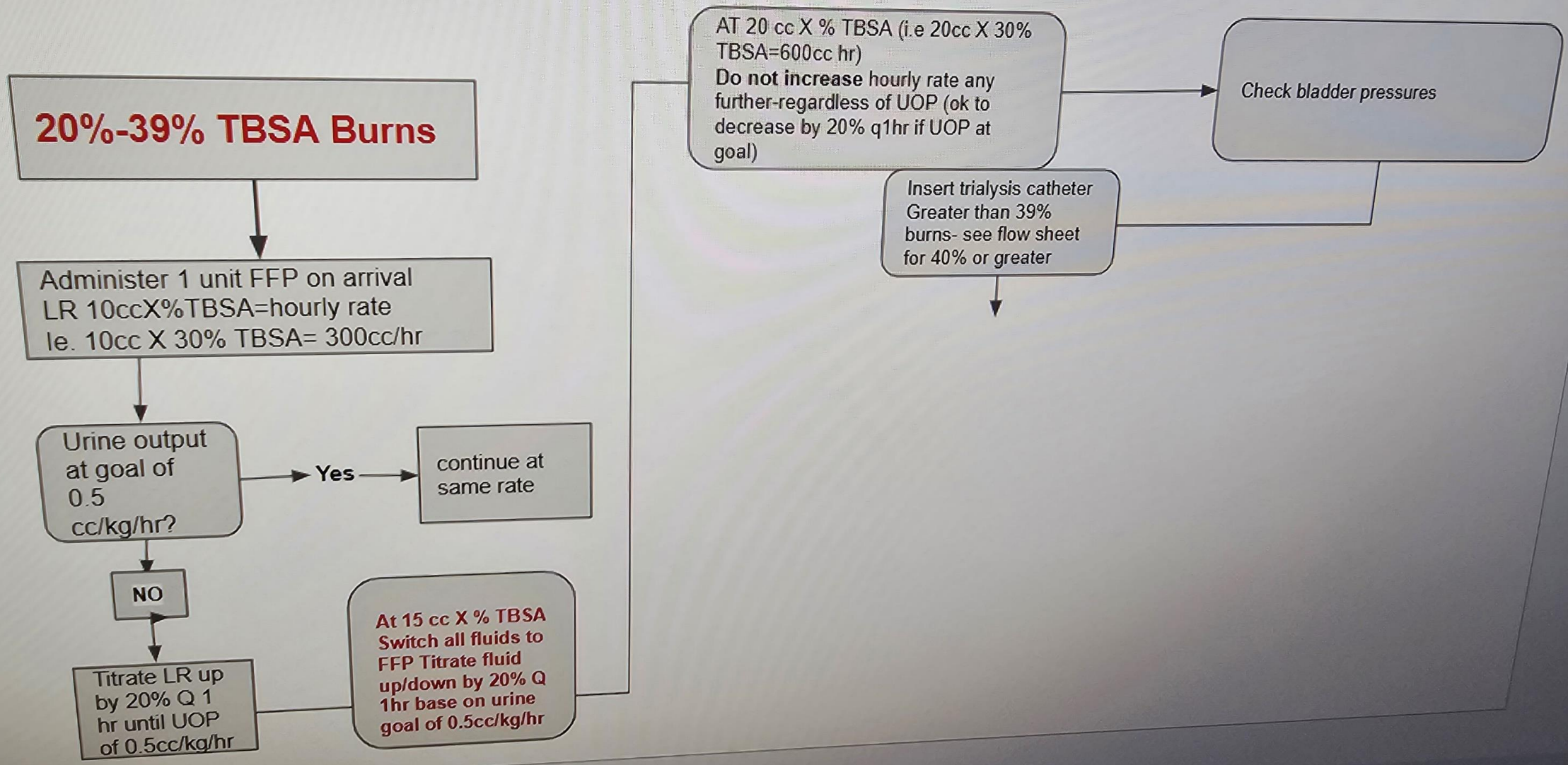
Airway and Respiratory Care

- Ventilator settings may be adjusted to slightly higher rates (16-20 breaths per min) and smaller tidal volumes 7-8 cc/KG
- For elevated Carboxyhemoglobin levels, give 100% oxygen until the COHB level is below 10%.

Fluid Resuscitation

- Place 1 or 2 large-bore peripheral lines and administer crystalloids (LR or NS)
- Burns < 20% of TBSA can be treated with oral and IV fluids
- Burns larger than 20% TBSA require IV resuscitation
- For larger burns:
- The Parkland formula is as follows: total crystalloid fluid (i.e., a solution with small molecules that can move into cells) over the first 24 hours = 4 milliliters x % TBSA (total body surface area burned) x body weight (kg). In children, the formula is edited to 3 ml x % TBSA x weight (kg). Often lactated ringers (i.e., a solution.

DSMC-UT Burn Resuscitation Strategy



DSMC-UT Burn Resuscitation Strategy

> 40% TBSA Burns

"Rule of 10's using FFP only

10cc X %TBSA=hourly fluid rate (i.e 10cc X 40% = 400cc/hr of FFP

Titrate FFP up/down by 20% Q1hr, based on goal of UOP of 0.5cc/KG/hr

At 20 ccX %TBSA (i.e 20 cc x 40% = 800cc hr of FFP)

Place Trialysis catheter on admission. Use all ports like a triple lumen catheter.

If in ER, obtain FFP from blood bank-if not immediately available start W/LR until FFP becomes available.

DO NOT increase hourly rate any further -regardless of UOP (ok to decrease FFP by 20% Q 1hr if UOP at goal)

Consult Nephrology on Day 2 of admission to evaluate and start CRRT.

Once CRRT starts decrease FFP infusion by 125 cc regardless of UOP

Bolus only for MAP <65 or SBP <90 use FFP only 1U FFP=1 bolus Notify SICU attending if additional needed

De-escalation FFP Resuscitation

a. If pt has been on FFP at 125cc hour for >12 hr, then change resuscitation fluid to 1:1 mixture of LR and albumin at 125cc hour
b. If on 1:1 mixture of LR and albumin for >12 hours then change fluid to LR only at 125cc hour
c. Stop all FFP resuscitation at 72 hours jpost burn