

Minnesota Burn Surge Education

Introduction

- **Module 1: Minnesota Statewide Burn Surge Planning**
- **Module 2: Introduction to Burn**
- **Module 3: Burn Treatment and Stabilization**
- **Module 4: Special Treatment Considerations**

Module 1:

Minnesota Statewide Burn Surge Planning

Objectives

Why is this necessary



MN Burn Surge Plan



Resources

Why is this necessary

Multiple Burn Causalities Incident can quickly overwhelm Burn Centers

Limitations for capacity and burn trained personnel

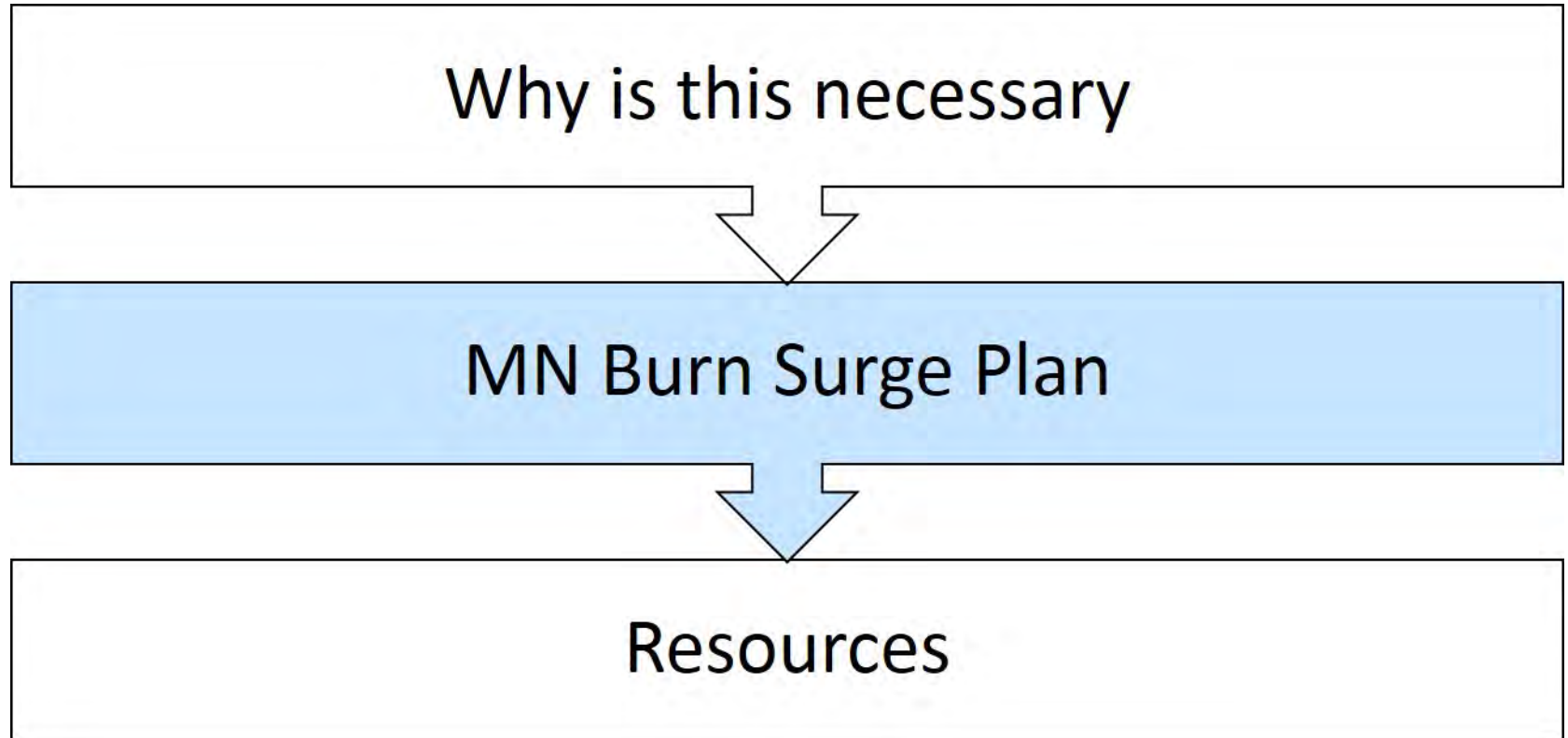
Burn Care is a specialized service



Definition of a Burn Disaster

A burn disaster is defined by the American Burn Association (ABA) as any incident where capacity and capability is insufficient, patient care may be compromised, patient care is possible, and may require an individual Burn Center, state, regional, or federal disaster response.

Objectives



MN Burn Surge Plan: 3 Phases

Phase 1 – Local Response

All agencies are to follow normal operating referral and transportation protocols.

HCMC Burn Center licensed for 17 beds and can surge up to 25 beds.

Regions Burn Center licensed for 18 beds and can surge up to 25 beds.

MN Burn centers will provide communication to requesting hospital within an hour

Phase 2 – MN Burn Center and Metro Regional Response

Burn Center Medical Directors will assist in decision making of patient transport to Burn Surge Facilities or outside MN .

Metro Regional hospitals will surge as needed to assist in increasing regional capacity of treating burn victims.

Phase 3 – MDH State Response

Burn Surge Facilities will be activated and receive instructions on definitive care for any patients they are stabilizing. Decision should be within 6-8 hours of activating state plan.

National Inter-State partners will be activated: Mid-West ABA Region – Nebraska and DHHS Region V: Great Lakes Health Partnership

MN ABA verified Burn Centers



Hennepin County **Medical Center**



Regions Hospital
HealthPartners

National verification by the American Burn Association (ABA) & the American College of Surgeons - Committee on Trauma (ACS-CoT)

Integrated multidisciplinary teams - optimal functional & cosmetic outcome

Experienced care of burn injuries of any size or mechanism in all ages

- associated trauma
- multiple medical conditions
- physical, occupational & psychological care, rehabilitation and reintegration
- integrated regional mass casualty coordination

Burn Surge Facilities

Burn Surge Facility	Regions
Mayo Clinic Hospital – Rochester	Facility will serve as point of referral for both SE and SC regions.
Sanford – Worthington	Facility will serve as point of referral for SW region.
St. Cloud Hospital	Facility will serve as point of referral for both Central and WC regions.
Altru – Grand Forks Sanford – Fargo Essentia Health – Fargo	Facility will serve as point of referral for both NW and WC regions.
Essentia Health – Duluth	Facility will serve as point of referral for NE region.
Abbott Northwestern Children’s Hospitals & Clinics Mercy Hospital North Memorial UMMC – M Health	Facility will serve as point of referral for Metro region.

Role of Burn Surge Facility

Severely burned patients require a dedicated burn facility for definitive care.

Note: Info recommended below is taken from MN Burn Surge Plan

Initial Assessment & Treatment

- Recognize and treat any associated trauma
- Diagnose burn size & initial depth
- Initial burn dressings/wound care
- Continue resuscitation

Stabilization (72H)

- Surgical/Critical Care Management
- Communication with Incident Command Center
- Supportive care: fluids, analgesia, ventilator support, nutrition
- Plan and coordinate transfer to Verified Burn Center for definitive management

Objectives

Why is this necessary

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MN Burn Surge Plan

Resources

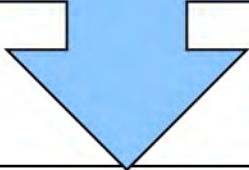
Resources

- **MDH Burn Surge website**
<http://www.health.state.mn.us/oep/healthcare/burn/>
- **American Burn Association**
<http://ameriburn.org/>
- **HCMC Burn Center**
<http://www.hcmc.org/clinics/burncenter/>
- **Regions Hospital Burn Center**
<http://www.regionshospital.com/rh/specialties/burn-center/>

Module 2: Introduction to Burn

Objectives

Discuss the nature and epidemiology of burn injuries



Overview of skin and burn classifications

Epidemiology

- **Incidence**
 - 1.25 Million injuries / year
 - 450,000 patients seek treatment per year
 - 40,000 patients hospitalized annually
 - 3,400 deaths from burn injuries
 - 96.1% overall survival rate

Epidemiology

Demographics

Gender



69% Male

31% Female

Ethnicity



59% Caucasian

19% African-American

15% Hispanic

7% Other

Epidemiology

- **Injury Types**
 - 44% fire/flame
 - 33% scald
 - 9% contact
 - 4% electrical
 - 3% chemical
 - 7% other



Epidemiology

- **Location**

- 69% Home
 - Kitchen - scald
- 9% Occupational
- 7% Street/Hwy
- 5% Recreational/Sport
- 10% Other



High Risk Groups

- **Children**
 - Scald injuries most common
- **Elderly**
 - Flame injuries most common
 - Pre-existing conditions



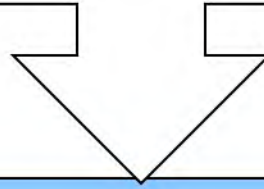
High Risk Groups

- **Chemical intoxication**
 - Risk-taking behavior
 - Impaired responsiveness
 - 40% of house fire deaths are associated with substance abuse



Objectives

**Discuss the nature and epidemiology
of burn injuries**



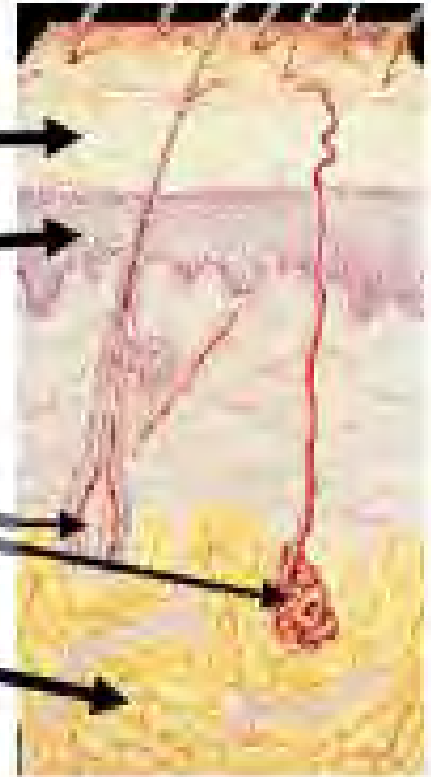
**Overview of skin and burn
classifications**

Skin Function

- **Protects from infection and injury**
- **Regulates body temperature**
- **Prevents loss of body fluids**
- **Sensory contact with environment**

Skin Anatomy

- **Epidermis** →
- **Dermis** →
- **Dermal Appendages** →
- **Subcutaneous Tissue** →



Burn Definition

- **An injury to tissue usually caused by heat but also by abnormal cold, chemicals, poison gas, electricity, or lightning.**

Burn Wound Zones

Zone of Coagulation

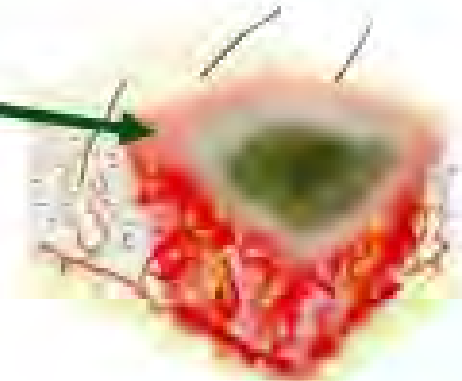
- Dead and stays dead regardless of Rx

Zone of Stasis

- Area of vessel contraction
- Inflamed
- Ischemic
- ± viable depending on care

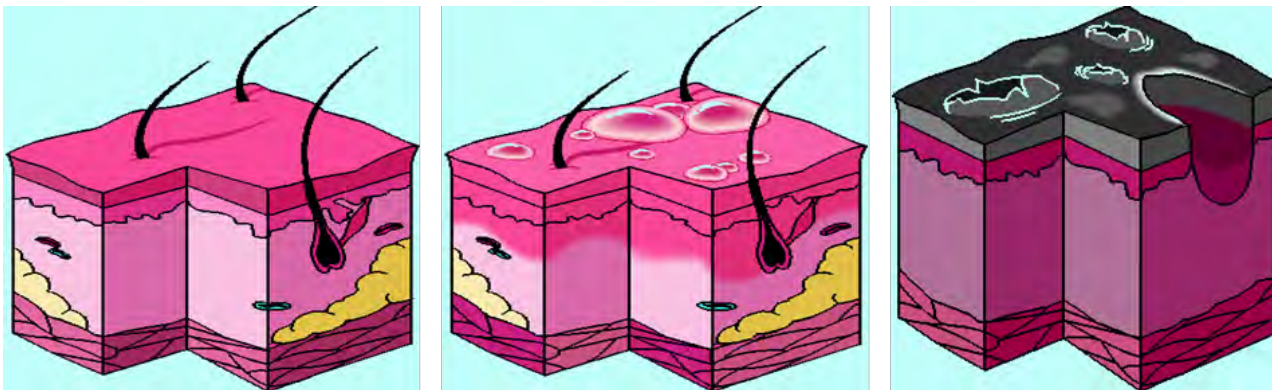
Zone of Hyperemia

- Vessel dilatation
- Capillary permeability
- Viable with good care and no infection



Burn Depth

- **Four categories**
 - First Degree
 - Second Degree
 - Third Degree
 - Fourth Degree



First Degree Burn (Superficial)

- **“Sunburn” injury**
- **Epidermis only**
- **No scarring**
- **No disfigurement**



Note: First degree burns do NOT count toward calculation of TBSA burned

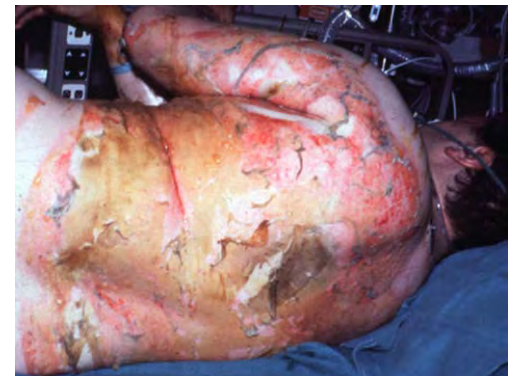
Second Degree Burn (Partial-Thickness)

- Entire epidermis and part of dermis
- Pink and blistered
- Most painful
- Heals in 2-3 weeks
 - Via Dermal Appendages
- Pigmentation changes
- Minimal scarring
- +/- skin grafting



Third Degree Burn (Full-Thickness)

- Entire dermis and epidermis
- White, dry appearance
- Coagulated vessels
- Scarring and disfigurement
- Heals by contracture
- Skin grafting indicated



Fourth Degree Burn (Deep Full-Thickness)

- **Burn into underlying structure**
- **Often charred**
- **Disfigurement**
- **Disability**



Module 3:

Burn Treatment and Stabilization

Objectives

Describe the basics of initial burn assessment and management



Estimating TBSA percentage of Burn



Fluid Resuscitation and Urine Output



Analgesia and Sedation



Discuss follow up care and/or transfer criteria

Initial Care

- **Stop the burning process**
- **Initial resuscitation flows just like trauma**
 - Airway
 - Breathing
 - Circulation
 - Disability
 - Exposure
 - Fluids



Airway/Breathing

Indications for Intubation

Hoarseness,
voice change

Stridor

Large TBSA burn
(>50%)

Extensive facial
burns

Burns inside
mouth

Significant burn
edema

Signs of
obstruction

Difficulty
swallowing

Using accessory
muscles

Inability to
handle
secretions

Respiratory
fatigue

Poor
oxygenation/ven-
tilation

Very large doses
of narcotics

Impaired level of
consciousness,
not protecting

Circulation



Assess for pulses in extremities and hemodynamic stability

If there is active hemorrhage control with direct pressure – if this fails, tourniquet and or surgical control may be used

The burn will remain stable throughout hemorrhage stabilization

Resuscitate with Crystalloid (LR) and blood products as needed to treat hypotension in addition to burn fluid resuscitation

Circulation

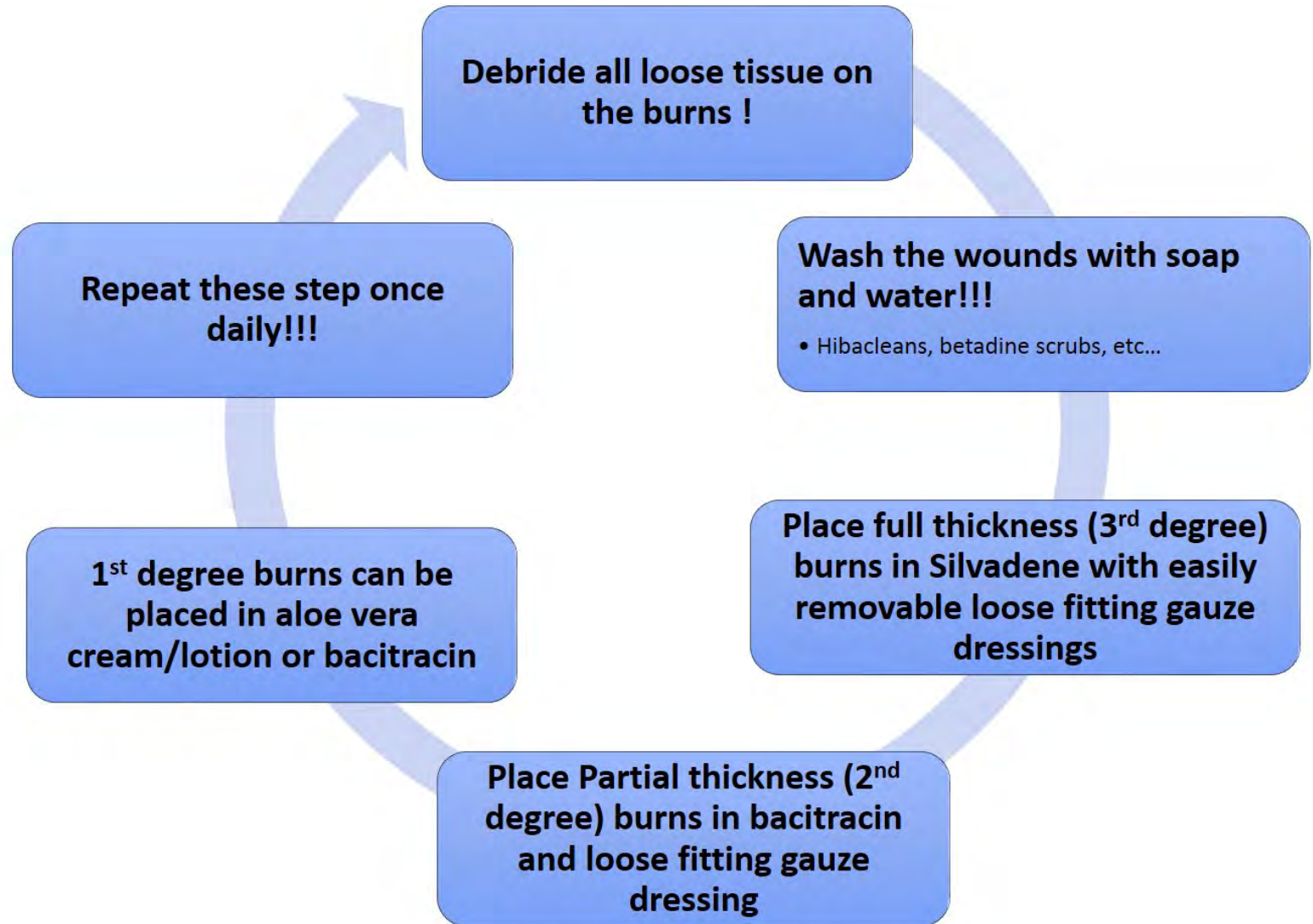
- **May need to place Arterial lines for accurate monitoring of blood pressure in the setting of multiple extremity burns**
- **Monitor and trend central venous pressures**
- **Monitor bladder pressures and compartment pressures of the affected extremities**
- **Monitor for ongoing traumatic injuries:**
 - Intracranial hemorrhages
 - Bowel injuries
 - Etc...

Acute Burn Care

- **Burn wound management**
 - Local wound care (this is important)
 - After wounds are clean, assess for escharotomy requirements
 - Skin grafting **MAY BE REQUIRED, HOWEVER NO NEED FOR SURGICAL INTERVENTION IN 1ST 72 HOURS!**



Local Wound Cares



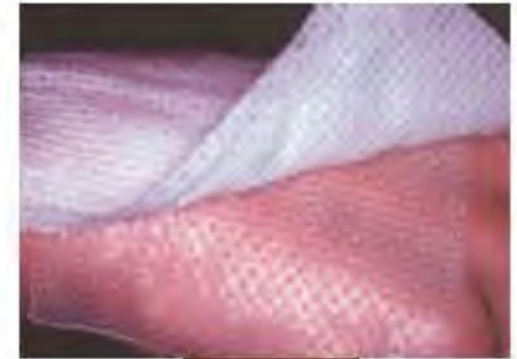
Options of Burn Dressings



Bacitracin



Adaptic



Mepitel



Kerlix Gauze



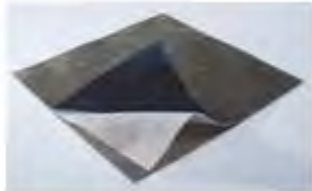
Stockinet



Coban

Options of Burn Dressings

Acticoat & Acticoat Flex



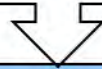
Mepilex Ag



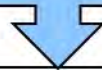
Mepilex Ag Transfer

Objectives

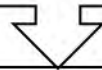
Describe the basics of initial burn assessment and management



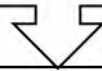
Estimating TBSA percentage of Burn



Fluid Resuscitation and Urine Output



Analgesia and Sedation



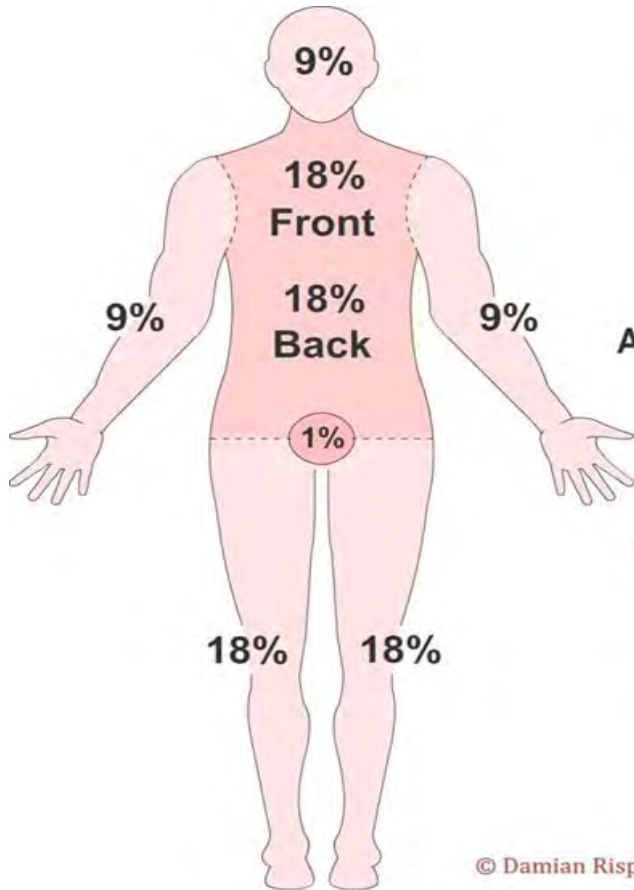
Discuss follow up care and/or transfer criteria

Estimating Percent TBSA

**1% TBSA = size of patient hand
(whole palmer surface)**



“Rule of Nines”



Rule of Nines

Measure 2nd and 3rd Degree Burns

A Patients hand ~ 1% of the total body surface area

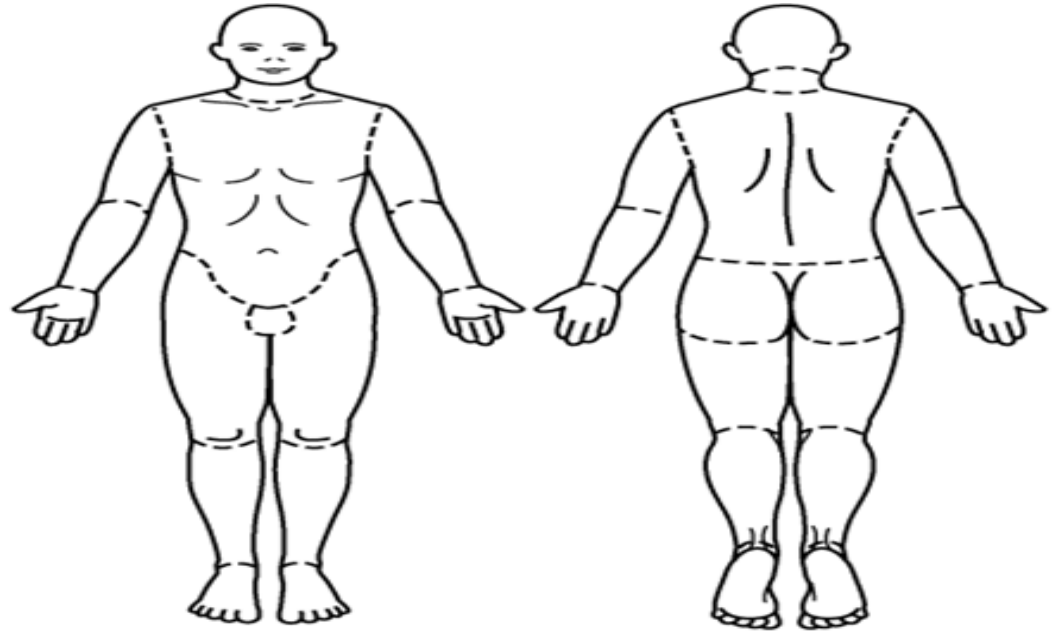


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Method of Lund and Browder

Burn Surge Facilities should use Lund and Browder method



	Birth 1 yr.	1-4 yrs.	5-9 yrs.	10-14 yrs.	15 yrs.	Adult	Burn size estimate
Head	19	17	13	11	9	7	
Neck	2	2	2	2	2	2	
Anterior trunk	13	13	13	13	13	13	
Posterior trunk	13	13	13	13	13	13	
Right buttock	2.5	2.5	2.5	2.5	2.5	2.5	
Left buttock	2.5	2.5	2.5	2.5	2.5	2.5	
Genitalia	1	1	1	1	1	1	
Right upper arm	4	4	4	4	4	4	
Left upper arm	4	4	4	4	4	4	
Right lower arm	3	3	3	3	3	3	
Left lower arm	3	3	3	3	3	3	
Right hand	2.5	2.5	2.5	2.5	2.5	2.5	
Left hand	2.5	2.5	2.5	2.5	2.5	2.5	
Right thigh	5.5	6.5	8	8.5	9	9.5	
Left thigh	5.5	6.5	8	8.5	9	9.5	
Right leg	5	5	5.5	6	6.5	7	
Left leg	5	5	5.5	6	6.5	7	
Right foot	3.5	3.5	3.5	3.5	3.5	3.5	
Left foot	3.5	3.5	3.5	3.5	3.5	3.5	

Objectives

Describe the basics of initial burn assessment and management



Estimating TBSA percentage of Burn



Fluid Resuscitation and Urine Output



Analgesia and Sedation



Discuss follow up care and/or transfer criteria

Fluid Resuscitation

- Soaker hose analogy
- Fluid leaks out of vessels at a predictable rate, similar to that of a soaker hose
- Goal is to titrate intravenous fluids (IVF) to this rate in order to maintain intravascular volume
- Urine Output is a marker of intravascular volume and can be used to titrate IVFs



Fluid Resuscitation

- **Restore intravascular volume**
 - Crystalloid
 - Parkland, Mod Brooke
 - Colloid
 - Evans, Slater
 - Hypertonic
 - Warden, Demling/Dextran
- **NO BOLUS THERAPY except to correct initial hypotension!!!**

Fluid Resuscitation

- Rate out (capillary leak) = Rate in (IV fluid rate)
- Kidneys are the Canary in the coalmine!
- **Strive for hourly UOP of 30-50 ml/hr**
- or
- **0.5 ml/kg of ideal body weight**



Fluid Resuscitation

- **Initial fluid resuscitation rates while figuring out burn TBSA % and ongoing issues and during patient transfer:**
 - 5 years old and younger—LR @ 125 ml/hr
 - 6-14 years old – LR @ 250 ml/hr
 - 15 years and older – LR @ 500 ml/hr
 - Extreme injury— LR @ 750 ml/hr
- **Ongoing resuscitation for 2nd and 3rd degree burns**
 - Adults: 3 mL/kg/% TBSA over first 24 hours
 - Children: 3 mL/kg/% TBSA over first 24 hours
 - Rhabdo/Electrical: 4 mL/kg/% TBSA over first 24 hours

Example:

- **100Kg male with 50% burn**
- **3ml / Kg / %TBSA**
 - $3\text{ml} \times 100\text{kg} \times 50 = 15000\text{ ml}$
- **Total 24 hr volume: 15 L**

Starting infusion rate – *needed to meet UOP goals*: Total volume / 16

1st 8 hrs: 7.5L (940ml/hr)

2nd 16 hrs: 7.5L (470ml/hr)

Note: Adjust by urine output

Adequate Resuscitation

- **High to normal pulse for age**
- **Urine output**
 - Peds: 0.5-1.0mL/kg/hr averaged over 2-4 hours
 - Adults: 0.5mL/kg/hr averaged over 2-4 hours
- **Mean arterial pressure \geq 60 mmHg**

Fluid Resuscitation

- **Fluid of choice for resuscitation is Lactated Ringers**
- **Fluids can be increased by 10% each hour that urine output (UOP) goals are not achieved**
- **Albumin infusion can be initiated in patients with an hourly UOP that is less than 30ml/hr for eight consecutive hours, despite escalating fluid infusion volumes**
- **Rarely need to exceed greater than 1 liter of LR/hr**
- **The fore mentioned formulas are *resuscitation starting points* and UOP should be used to guide therapy**
- **Most burn resuscitations last appx 24-48 hours**
 - **As patients close their capillary leak syndrome, fluids should be titrated to a maintenance fluid rate**
 - **This is also dependent on hourly UOP and associated labs**

Fluid Resuscitation: Compartment Syndrome

What is it?

- Capillary leak resulting from 2nd and 3rd degree burns increases fluid in tissue
- Develop from excess fluid administration and with bolus therapy.
- Pressure in the area increases within burned, non-pliable skin and leads to decreased blood flow to the extremity

What to look for?

- Progressing pain
- Sensory changes to distal extremity (if not burned)
- Poor circulation distally (capillary refill, pallor, late changes to pulses)
- If in doubt – check compartment pressures! (can call for consult!)

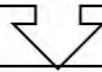
Fluid Resuscitation: Compartment Syndrome

- **When / how to treat**
 - >30 mmHg compartment pressure treat, consider when pressures approach 20 mmHg
 - Escharotomy (through burn) indicated in extremities to relieve pressure and restore perfusion
 - Fasciotomy (into muscle) in extreme cases and in electrical injuries when muscle is damaged and contributing

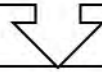


Objectives

Describe the basics of initial burn assessment and management



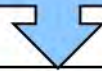
Estimating TBSA percentage of Burn



Fluid Resuscitation and Urine Output



Analgesia and Sedation



Discuss follow up care and/or transfer criteria

Analgesia and Sedation

- **Pain needs to be assessed and quantified as background pain and procedural pain**
- **Pain and analgesic treatment should be assessed hourly and adjusted to achieve adequate pain control**
- **Burn pain is treated in three distinct modalities**
 - Pharmacological
 - Surgical
 - Behavioral

Pain management

- **Surgical management consists of closing open wounds and completion of skin grafting procedures**
- **Pharmacological management of pain**

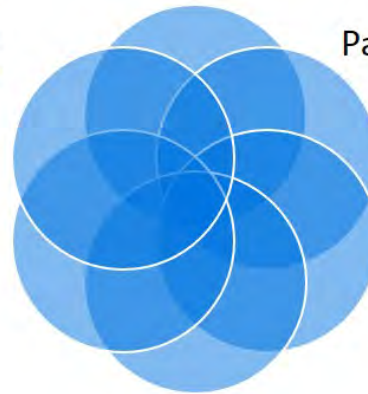
Pain medications should be scheduled and not administered on a PRN basis

Keep in mind the elderly when administering pain and anxiety medications

Pain medications can be augmented with antianxiety medications

Treat pain and anxiety in a 2:1 ratio for procedures

Treat background pain and procedural pain separately



Manage side effects and assess for respiratory depression frequently in the non intubated patient

Objectives

Describe the basics of initial burn assessment and management



Estimating TBSA percentage of Burn



Fluid Resuscitation and Urine Output



Analgesia and Sedation



Discuss follow up care and/or transfer criteria

Prep for Outpatient Clinic

- **Bacitracin/Adaptic (B&A) dressings**
 - Silvadene alters wound appearance, pseudoeschar
 - Silvadene OK for very deep or possibly infected wounds
- **Supplies to change dressings daily**
- **Pain medication until patient can be seen by burn center**
- **Tetanus booster**
- **Important to know referral burn centers contact information**
- **Follow up to burn center in one week or less**

Referral Criteria for Burn Center

> 10% TBSA

**Face, hands, feet,
genitals,
perineum, major
joints**

Third degree

**Electrical,
including lightning**

Chemical burns

Inhalation injury

**Pre-existing
conditions**

Associated trauma

Pediatrics

**Special social,
emotional, rehab
needs**

Prep for Transfer

- **Consider other life-threatening injuries/conditions**
- **SECURE all lines/tubes**
- **Dry sterile covering to wounds**
- **Imaging and labs**
- **Tetanus booster**
- **Continuous IV fluids – Parkland Formulas or use following:**
 - **< 5 yo: 125 mL/hr**
 - **6-14 yo: 250 mL/hr**
 - **15 yo and up: 500 mL/hr**
 - **Severe burn with associated trauma and inhalation injury/electrical injuries: 750 mL/hr**
- **Air vs. Ground**
- **Most admit directly to Burn Centers if able**

Guidelines for Safe Transport

- Keep Patient warm and dry, no wet dressings
- Secure airway if necessary *before* transport
- Initiate fluid resuscitation
- Foley catheter in place
- Tetanus prophylaxis
- Continue pain and sedation medications
- No Bolus therapy unless overtly hypotensive



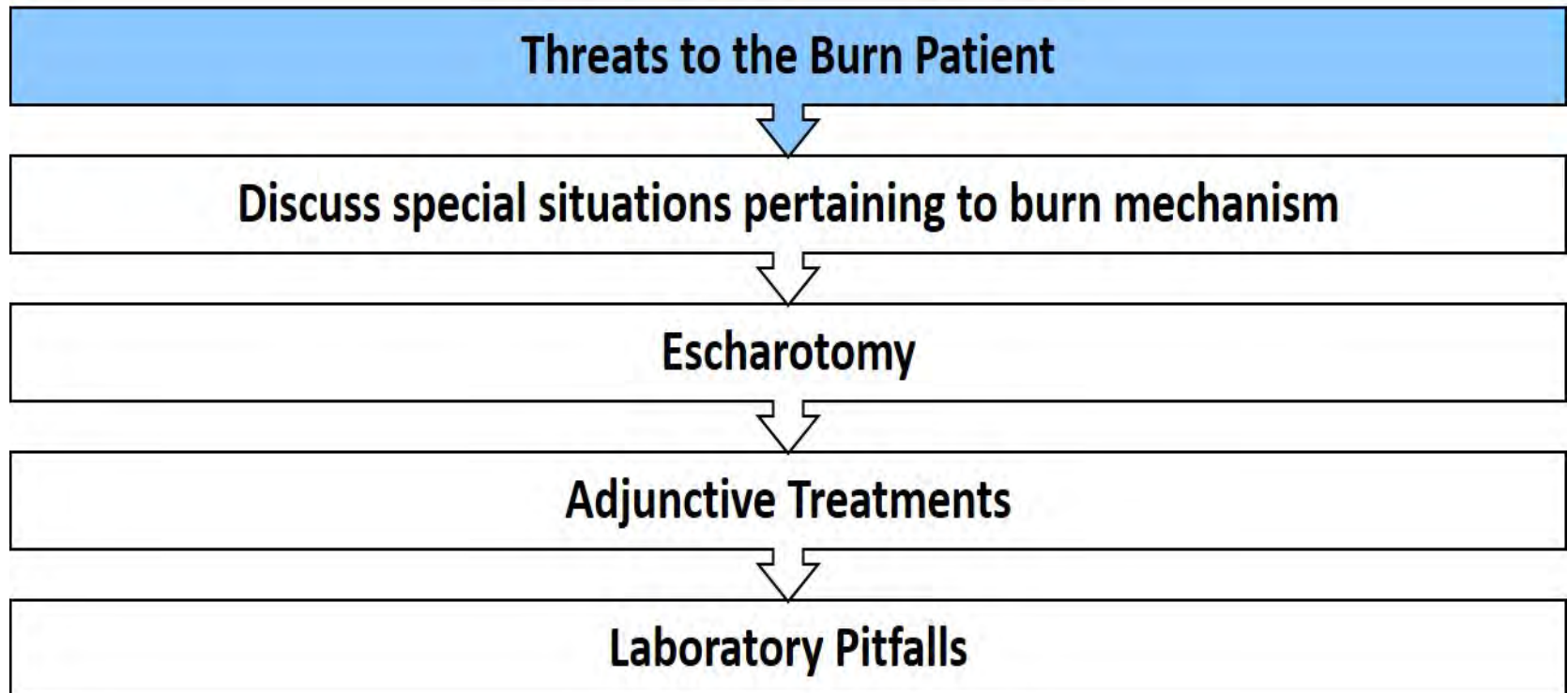
Transport issues (Ground and Rotary Transport service areas)

Air Service	Rotor Wing	Fixed Wing	IFR Rotor Capability	Dispatch	Bases	Hospital System
Avera Careflight	X	X	X	1-800-592-1889	SD	Avera
Life Link III	X	X		1-800-328-1377	MN, WI	Hospital Consortium
Mayo One	X	X	X	1-800-237-6822	MN, WI	Mayo Clinic
MedLink AIR	X		X	1-800-527-1200	WI	Gunderson Health System
Mercy Air Med	X			1-877-463-7291	IA	Mercy North Iowa
Ministry Spirit Air	X		X	1-888-411-1362	WI	Ministry Health Care
North Memorial Air Care	X		X	1-800-247-0229	MN, WI	North Memorial Medical Center
NorthStar Criticair	X			1-800-223-1596	ND	Trinity Health
Sanford Air Med	X	X	X	1-844-424-7633	MN, ND, SD	Sanford Health
Valley Med Flight	X	X		1-800-828-0168	MN, ND, MI	Independent

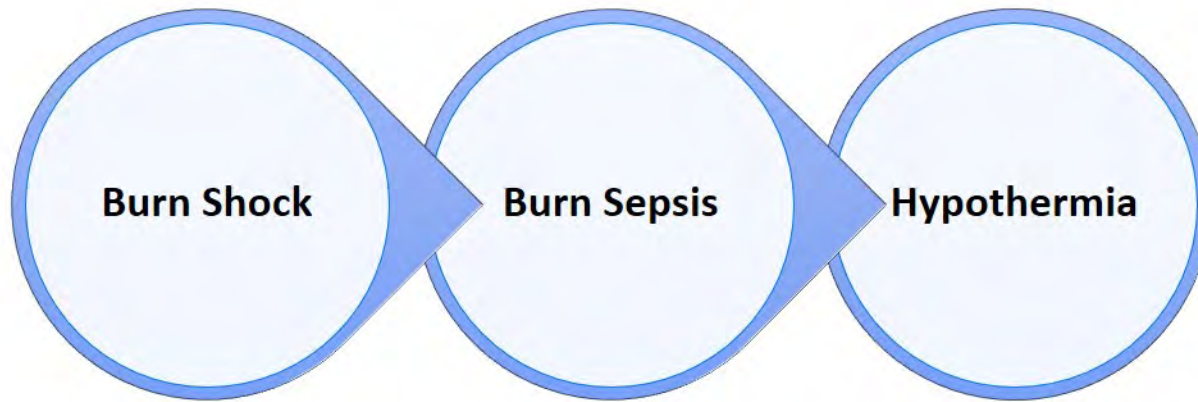
Module 4:

Special Treatment Considerations

Objectives



Specific Threats to Burn Patients



Burn Shock

- **Burn Patients typically die from one of two causes:**
 - “Burn shock” resulting in early deaths
 - Multiple organ failure and sepsis leading to late deaths
- **Burn shock is multifactorial:**
 - Hypovolemic distributive shock *plus*
 - Mediator dependent reduction of cardiac output also contributes to the “burn shock” state, this is similar to a high output cardiogenic shock
 - This can be significant in patients with an underlying heart disease, such as congestive heart failure

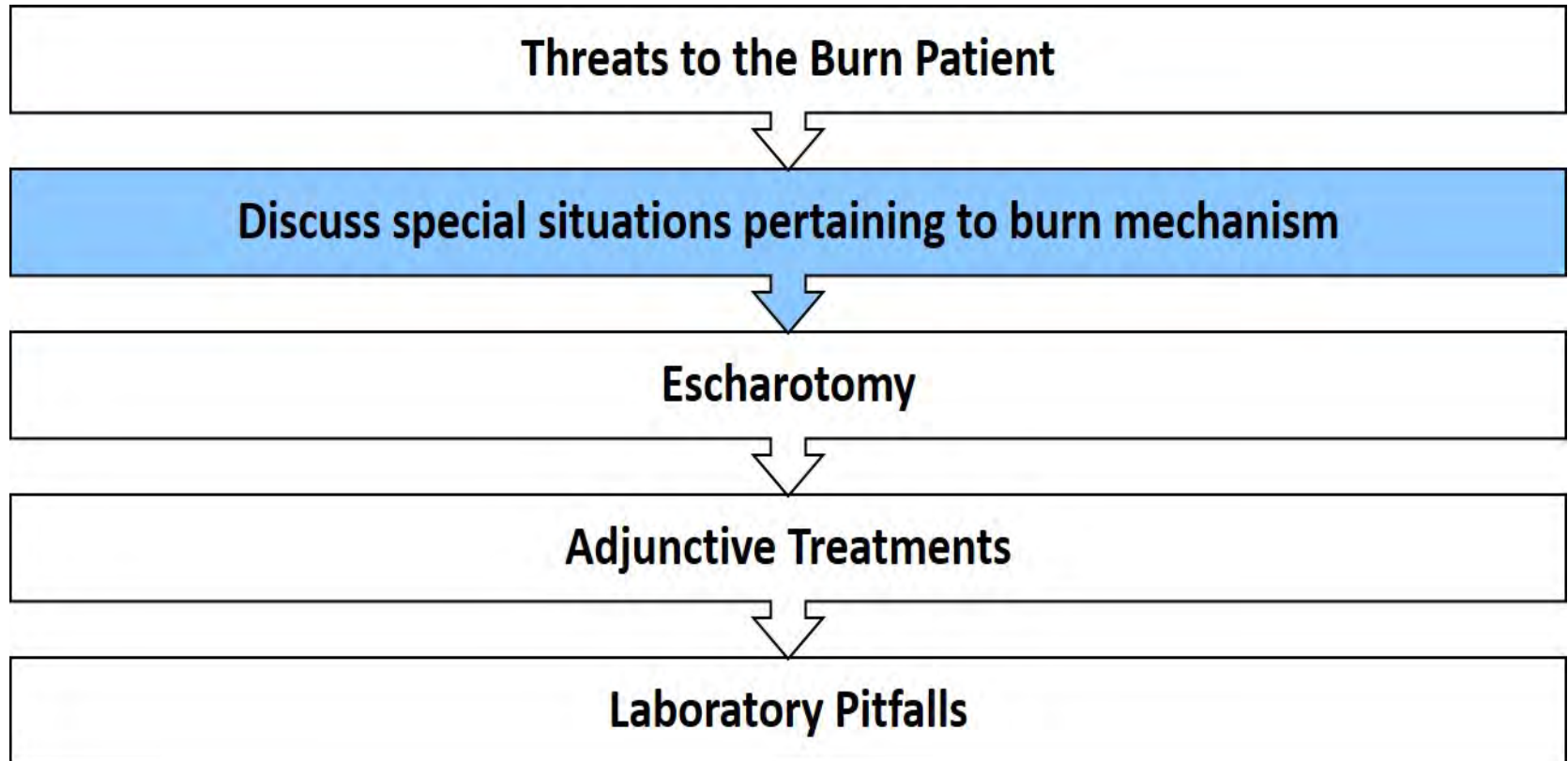
Burn Sepsis

- **Typically results in late burn deaths**
- **“Burn sepsis” prevention is facilitated by the early removal of devitalized tissue (eschar)**
 - Typically try to have devitalized eschar removed within one week
 - Removal of eschar relieves the patient of heavily colonized wounds that lead to recurrent episodes of bacteremia
- **Avoid the obvious critical care infections: line infections, ventilator associated event/pneumonia, etc...and identify and treat these infections early**

Hypothermia

- **Thermoregulatory control is dependent on inputs from the:**
 - Skin (the ultimate breathable insulating garment!)
 - Central nervous system stimulation
 - External interpretations of the environment by the brain
- **With large burns, the body is unable to use these thermoregulatory pathways resulting in hypothermia**
- **Prevention is the best treatment**
 - Heat rooms to >80 degrees Fahrenheit
 - Warm fluids
 - Bair huggers, and external heating devices may be required to maintain normothermia

Objectives



Special Circumstances

- **Electrical injuries**
- **Inhalation injuries**
- **Chemical burns**



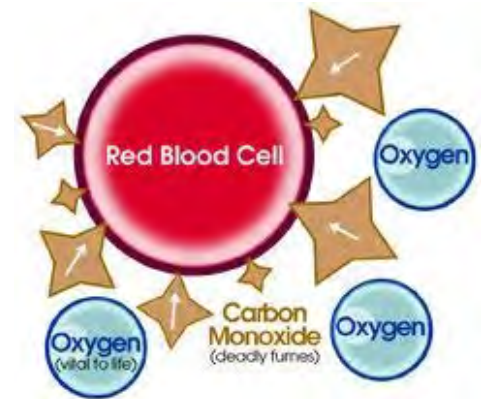
NOTE: Radiation injuries not included here as the burn component is a minor issue compared to the acute radiation exposure issues – Contact on call specialists at MN Regional Poison Center 800-222-1222 for chemical and radiation issues.

Electrical injuries

- **Injury is largely considered an inside-outside injury**
 - Meaning muscle and internal compartment damage may be major but the external signs are often minor
 - Monitor for compartment syndromes:
 - This may be present in extremities that are not initially thought to be affected
 - Monitor CMS checks closely on all extremities, not just affected extremities
 - **May require fasciotomies rather than escharotomies**
- **Considered significant when involved Voltage > 1000 volts**
- **Cardiac monitor and EKG required**
- **Monitor CK levels and rhabdomyolysis, treat with increased IVF and urine alkalization**

Inhalation Injury

- **Smoke inhalation is a ‘toxic soup’**
 - Particles and chemicals
- **Carbon Monoxide (CO) poisoning**
 - 200x > affinity for Hgb than O₂
 - SpO₂ abnormally elevated (normal on monitor)
 - Half life
 - Room air: 250 mins
 - 100% FiO₂: 40-60 mins
 - 3 atm HBO: 20 mins



CO Poisoning

CO Hgb Saturation (%)	Symptoms
0-9%	None
10-20%	Headache, vasodilation
20-30%	Headache, pulsating temples
30-40%	Severe headache, nausea/vomiting, weakened sight, prostration
40-50%	As above, increased RR and HR, asphyxiation
50-60%	As above, coma, seizure, cheyne-Stoke breathing
> 60%	Coma, seizure, cardiopulmonary collapse, death

Inhalation Injury

- **Cyanide (CN) poisoning**
 - Commonly produced by synthetic compounds (i.e. burning carpet, vinyl and household goods)
 - Binds to cytochrome oxidase
 - Blocks cellular respiration
 - Synergy with CO
 - Effects within seconds of inhalation
 - Persistent lactic acidosis resistant to resuscitation
 - ALWAYS consider with closed space smoke exposure

Inhalation Injury

Treating CN Poisoning

“Old” Cyanide kit (Lilly Cyanide Antidote)

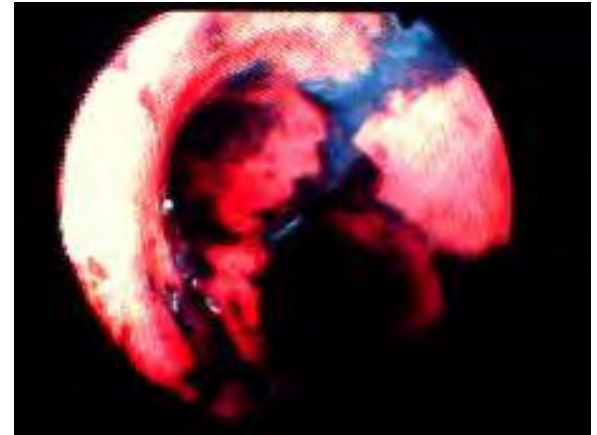
- Amyl nitrate, thiosulfate, sodium nitrite
- Methemoglobin generators

“New” Cyanide kit (Cyanokit)

- Hydroxycobalamine (Vit B12 precursor) 5 mg x1
- May repeat dose x1
- Side effects – flushing, HTN, lab interference

Inhalation Injury

- **Diagnosis**
 - History
 - Enclosed environment
 - Escape impeded
 - Loss of consciousness
 - Exam
 - Hoarseness or voice change
 - Barking cough
 - Sooty airways, carbonaceous sputum
 - Burns inside mouth

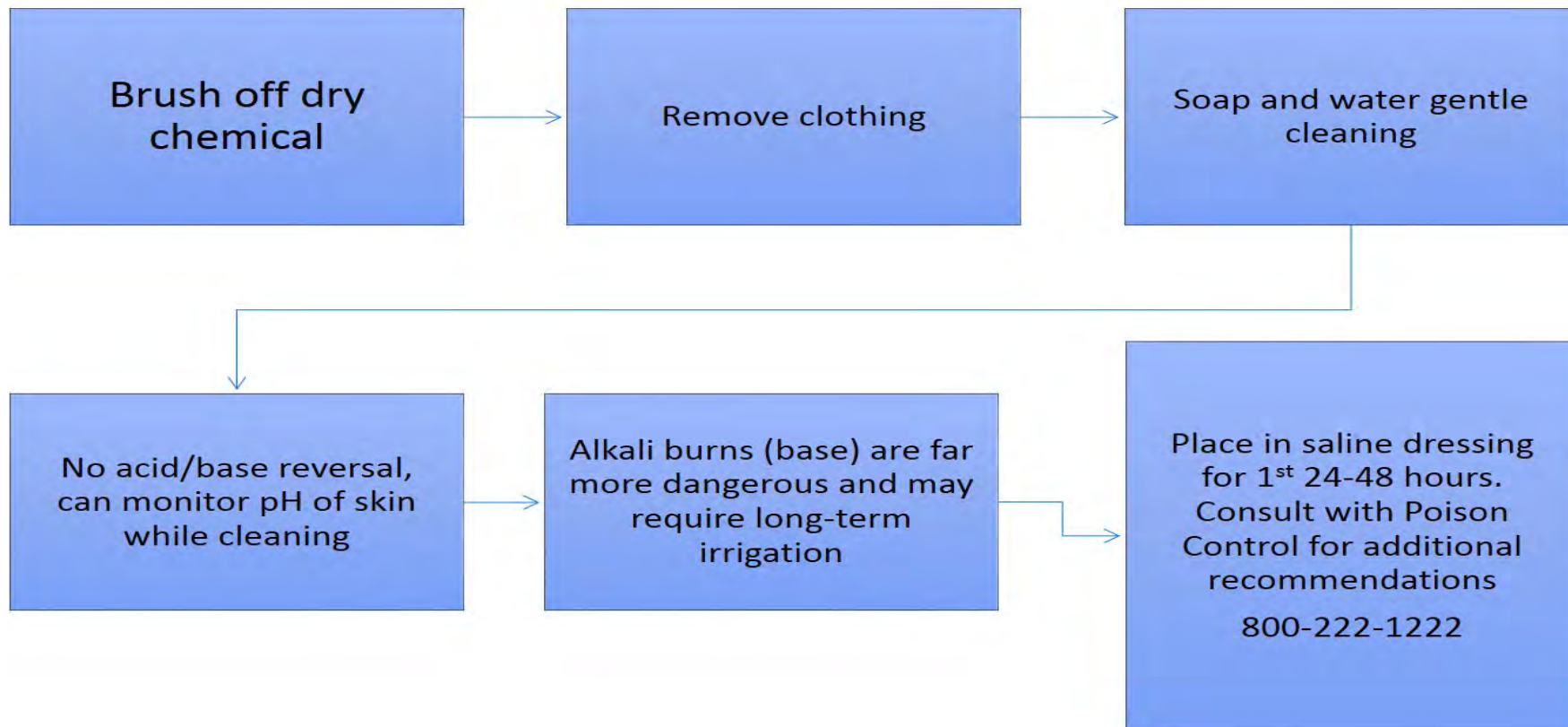


Inhalation Injury

- Airway management (if indicated)
 - SECURE!!
- Protective vent settings
- Pulmonary toilet
- Inhaled medications
 - Bronchodilators
 - Heparin
 - Acetylcysteine
- Percussive ventilation
- ECMO
- Bronchoscopy

Chemical Burns

Initial treatment of Chemical Injuries



Hydrofluoric acid

(main thing here is to recognize the exposure)

- **Consult Poison Control!**
- **Topical and IV calcium**
- **Intra-arterial calcium may be needed**
- **Continued pain = continued calcium need**
- **Monitor electrolytes every eight hours and correct as needed, particularly potassium and calcium**
- **Cardiac monitor**
- **Local wound cares once initial exposure is treated, usually go on to require surgery or amputation as burn are very deep (4th degree)**

Objectives

Threats to the Burn Patient



Discuss special situations pertaining to burn mechanism



Escharotomy

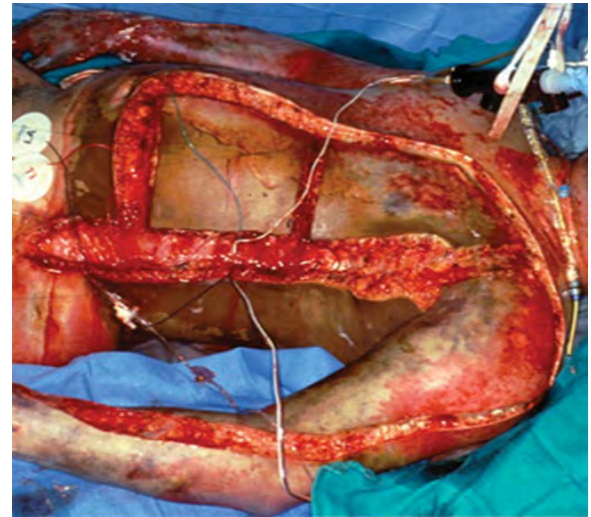


Adjunctive Treatments

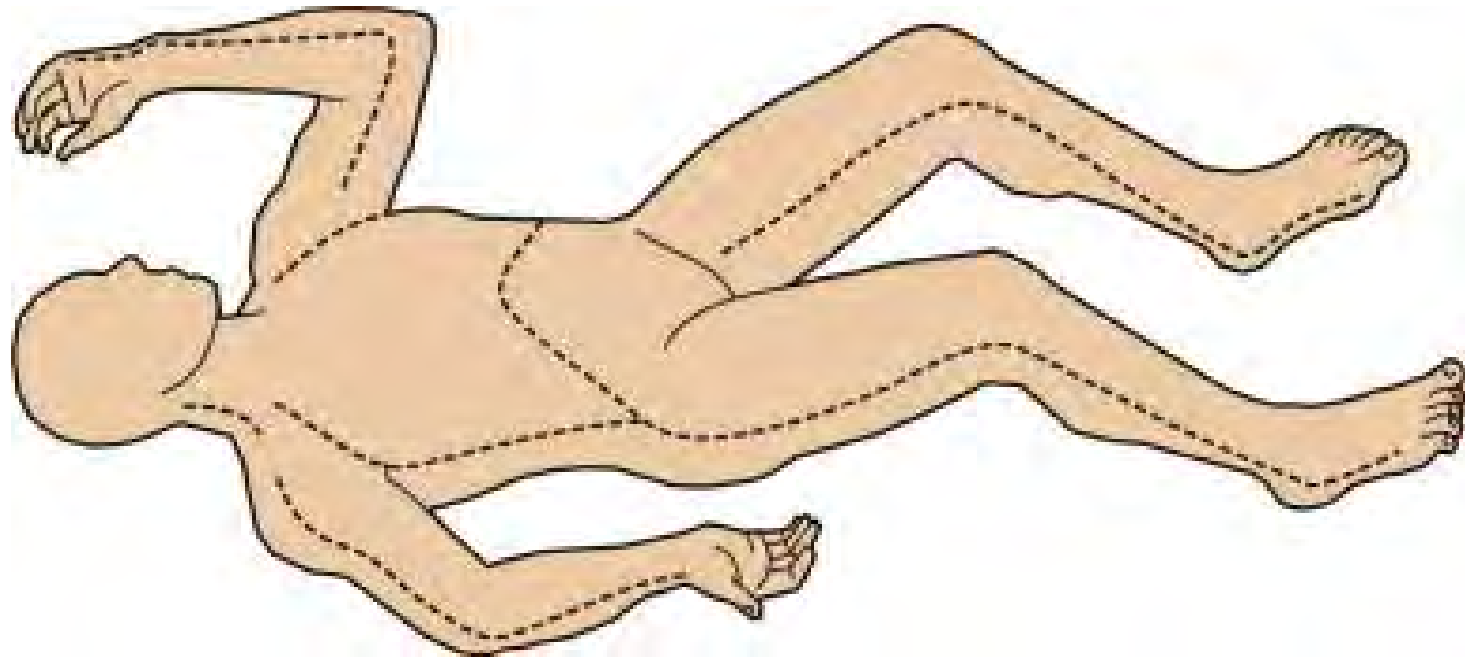


Laboratory Pitfalls

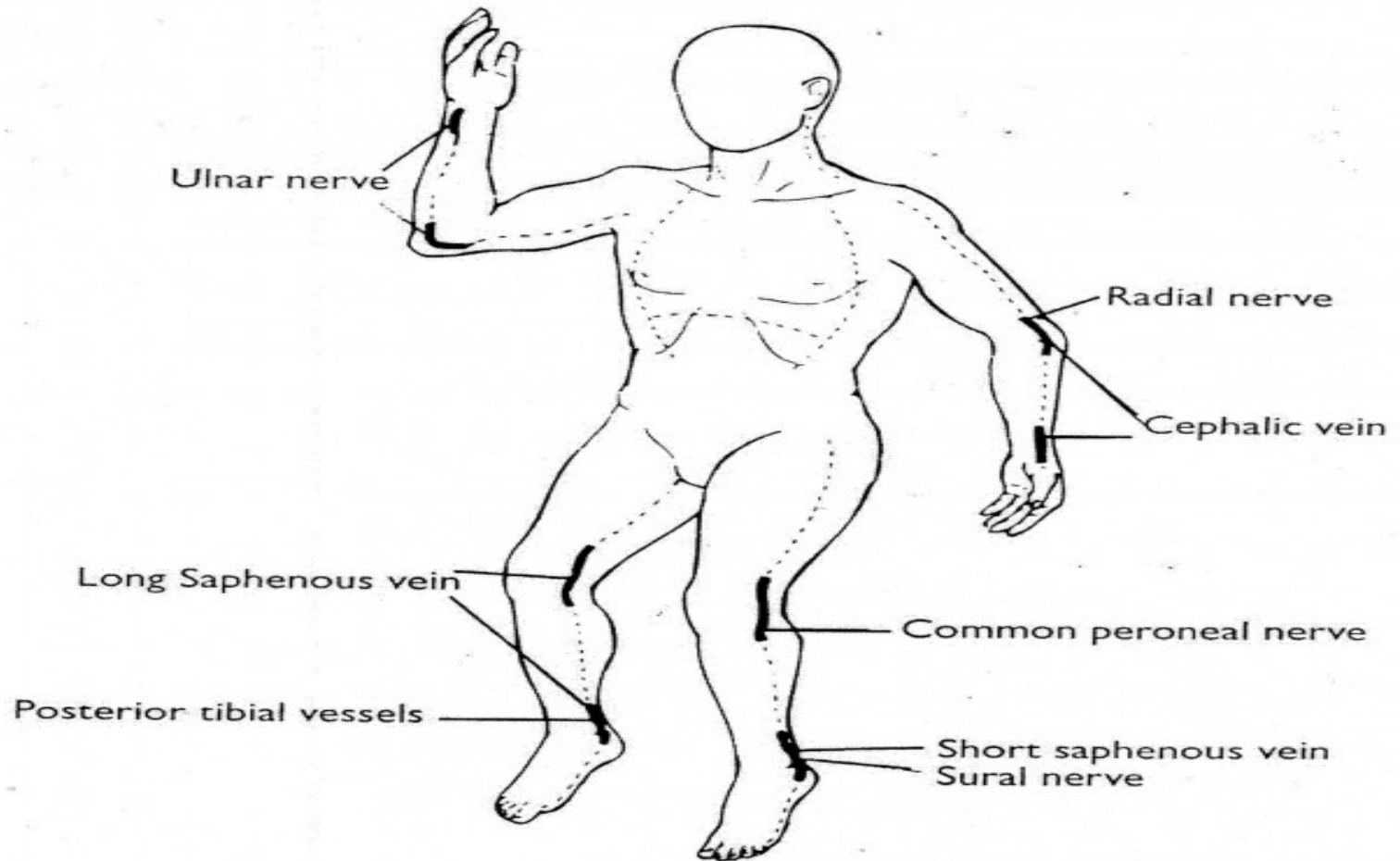
Escharotomy



Proper Placement of Escharotomies



Escharotomy Pitfalls



Escharotomy

Prep eschar with betadine solution prior to performing

Increase sedation prior to performing procedure

Perform with bedside or in operating room with electrocautery

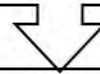
- Release should transect the entire thickness of the eschar and dead dermis
- Release should open approximately 2 cm
- Control bleeding with electrocautery

Monitor for pulses and completeness of procedure as patient continues to resuscitate and edema progresses

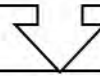
May need to repeat or extend escharotomies

Objectives

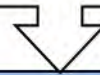
Threats to the Burn Patient



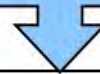
Discuss special situations pertaining to burn mechanism



Escharotomy



Adjunctive Treatments



Laboratory Pitfalls

Adjunctive Treatments

Thrombophlebitis

- Monitor IV sites daily
- IVs placed in the field should be replaced within 24 hours
- Frequent lab draws and progressive edema may necessitate central venous access and arterial line placement

Infection Control

- Catheter associated blood stream infections (CLABSI)
 - Use antimicrobial impregnated catheters if possible
 - Place lines through intact skin if possible
 - Change catheter dressings often and as needed and reassess for rewiring or replacement of the line
 - Always use sterile technique

Adjunctive Treatments

- **Infection Control cont....**
 - **NO need for Prophylactic administration of antibiotics, this only leads to increased microbial resistance**
 - Urinary catheter related infections typically not an issue within the first 72 hours
 - Monitor for ventilator associated events/pneumonias
 - Assess for QBAL and culturing bronchial aspirates prior to initiating empiric antibiotics
 - Give all burn patients a Tetanus booster

Adjunctive Treatments

Hyperglycemia control

- Stress hyperglycemia is common, treat with insulin drip or subcutaneous insulin as needed to achieve serum blood sugars of 100-180

Metabolic Adjuncts

- Begin enteral feeds at trophic rates for all burns > 20% TBSA at 24 hours
- Begin to increase tube feeding rates as the resuscitation comes to an end, usually around 72 hours post burn
- Use a high protein, low fat tube feeding formula
- OK to feed the stomach as long as stomach residuals are monitored, post pyloric feeds are preferred

Objectives

Threats to the Burn Patient



Discuss special situations pertaining to burn mechanism



Escharotomy



Adjunctive Treatments



Laboratory Pitfalls

Laboratory Issues and Pitfalls



Falling Platelets can be an example of sepsis and overall poor prognosis

Elevated Hgb and HCT are an example of hypovolemia and early burn shock

Persistent lactic acidosis refractory to resuscitation can be an indication of CN poisoning

Normal CO levels do not rule out CO exposures

Low Calcium should not be treated unless ionized calcium is checked

WBC initially elevated and may decline over 24-72 hours, sometimes resulting in neutropenia

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THANK YOU

For more information, please contact:

Angie Koch, MPH

Planning Director State – Medical Surge

Minnesota Department of Health

Emergency Preparedness and Response

Health.hpp@state.mn.us

651-201-5700



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Department of Health

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