SAEMS

BURN STANDING ORDER

Self-Learning Module

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PURPOSE

This SAEMS Standing Order Training Module has been developed to serve as a template for EMS provider training. The intent is to provide consistent and concise information to all providers practicing within the SAEMS Region. The content of the Training Module has been reviewed by the Protocol Development and Review Sub-Committee, and includes the specific standing order, resource and reference material, and instructions for completing the Training Module to obtain continuing education credit. One hour of SAEMS continuing education credit may be issued following successful completion of the module.

OBJECTIVES

Upon completion of this learning module the participant will be able to:

1. Define the magnitude and severity of the injury
2. Identify and establish priorities of treatment
3. Identify those patients who qualify for the SAEMS Burn Standing Order
4. Outline prehospital treatment priorities
5. Discuss burn patient triage

INSTRUCTIONS

1. Read the self-learning module and any additional reference material as necessary.
2. Complete the attached post test and return it to your supervisor or base hospital manager for continuing education credit.

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INTRODUCTION

For many years the SAEMS Region was fortunate to have the support and resources of the St. Mary's Burn Center. Following the closure of the burn unit at St. Mary's, SAEMS has been reliant on the Maricopa Burn Center in Phoenix for in-patient care of major burn victims. As a result, our regional burn triage protocol was replaced with the Burn Standing Order.

BURN INJURIES

Incidence

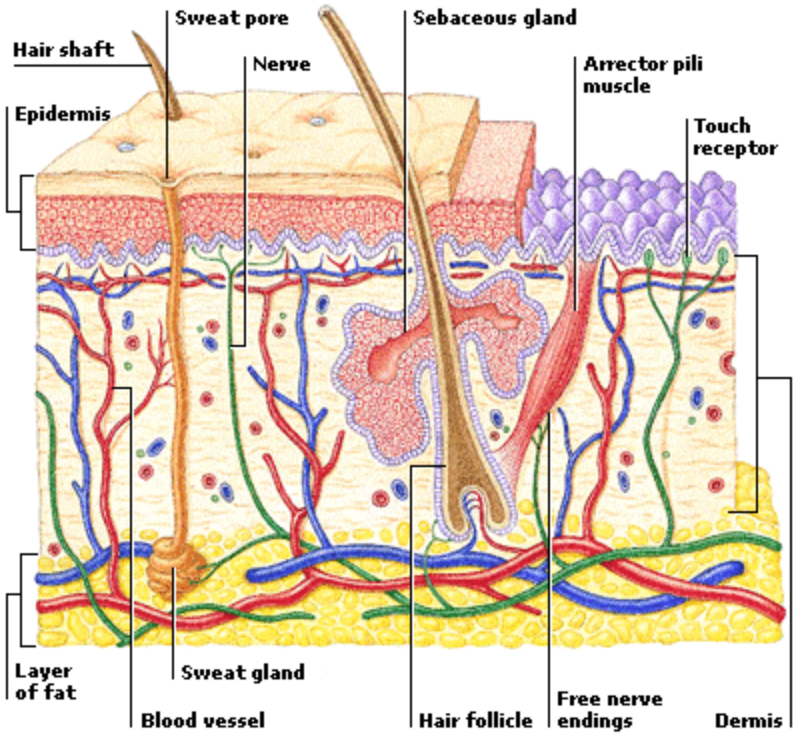
Although advances in burn prevention strategies (smoke alarms, public education, fire-retardant products, and safety codes) have decreased the overall incidence of burn injuries, this fifth most common cause of unintentional death, injury and disability remains a substantial problem in our society. According to the American Burn Association (ABA), approximately 1.1 million burn injuries require medical attention each year; 50,000 of these individuals require hospitalization and 4,500 die from their burn injuries. Of the approximately six percent of burn injury patients who do not survive, most have sustained an inhalation injury. Children and the elderly are more likely to suffer a thermal injury than any other age group, with the largest number of burn victims under the age of six.

Survival after a thermal injury has improved over the past few decades. In 1970, a patient with a 50% total body surface area (TBSA) burn had a 40% chance of survival. Today a patient with a 75% TBSA burn has a 50% chance of survival. These improvements are related to several factors: more rapid intervention and transportation by EMS, rapid triage to burn centers, advances in fluid resuscitation, improvements in treatments such as wound management, infection control, and inhalation injury.

Skin Anatomy and Physiology

The skin is the largest organ of the body and serves four primary functions: to protect against infection and injury, to prevent the loss of fluids, to regulate body temperature, and to provide sensory contact with the environment. When a thermal injury disrupts the integrity of the skin, the victim may suffer from disturbances in appearance, fluid status, infection, and temperature regulation.

The skin is divided into three layers. The outermost layer is about as thick as a piece of paper and is extremely durable. This is the epidermis and it's your birthday suit! Beneath the epidermis is the dermis. This second layer of skin is thicker and contains several structures such as hair follicles, sebaceous glands, nerve fibers, and capillaries. Blister formation and weeping of fluid are associated with thermal injury to this layer of skin, and because of the nerve endings within the dermis, injury is also very painful. The third layer of skin is referred to as the subcutaneous layer and provides thermal insulation for the bones and muscles. It contains connective tissue and body fat.



Burn Pathology

Tissue injury in a burn results form the coagulation of cellular protein in response to the heat generated by thermal, electrical, chemical, or radiation energy. The depth of the coagulative necrosis depends on the heat generated by the causative agent and the length of contact with the tissues. Thermal burns, the most common type of burn injury, can be further subdivided into flame, flash, scald, and contact burns. Most major injuries are the result of flame burns.

Types of Burns

Thermal Burns are caused by exposure to some form of heat, such as flames, hot liquids, or hot solid objects. Many flame burns are also associated with inhalation injury. Inhalation injury is a type of thermal injury caused by superheated gasses that enter the airway. The National Fire Protection Association (NFPA) estimates that there are one million fires annually, and that 73% of the deaths in these fires result from smoke inhalation. Damage to the lungs can occur by direct inhalation of the superheated gas, steam, smoke, or other toxic fumes. Indirectly, pulmonary injury may be the result of burns to the neck, chest and face, aspiration, or impaired oxygenation. Flash burns result from brief exposure to extremely high temperatures, such as those resulting from an explosion. Scalding occurs following exposure to a hot liquid or molten substance. Contact burns result from touching a hot solid object, such as a stove or oven.

Tissue damage (protein coagulation) resulting from a **chemical burn** is related to the type, strength, concentration, duration of contact, and the mechanism of action of the chemical on the tissue. Most chemicals are commonly categorized into two broad groups: acidic or alkaline. These agents can be solids, liquids, powders, and gases. Alkali burns cause tissue damage by liquefaction necrosis and protein denaturation.

Continuous irrigation is necessary to prevent further damage. Acids cause coagulation necrosis. Immediate irrigation decreases the concentration and duration of contact. Initial management of a chemical burn involves removal of contaminated clothing, brushing off the skin if the agent is a powder, and careful irrigation so as not to spread the chemical to adjacent uncontaminated skin.

Attempts to neutralize some agents can result in increased thermal injury and extent of tissue damage. In addition to localized injury, systemic reactions can occur. Some chemical exposure situations may require the expertise of the hazardous materials team.

Electrical injury to the tissues is influenced by amperage, resistance, and alternating versus direct current. Electrical injuries often fit the “tip-of-the-iceberg” description; the majority of the damage being hidden beneath the surface. Deep tissues such as muscle, nerves, and blood vessels can be destroyed while the skin on the surface appears normal. Electrical injury can also ignite clothing causing associated flame injury.

Alternating current is considered the most dangerous and may cause tetany, ventricular fibrillation, and respiratory muscle paralysis. These burns have a positive contact site but no true entrance or exit site. Direct current travels in one direction and presents with visible entrance and exit sites.

Radiation burns are the least common type of burn injury and occur as a result of exposure to ultraviolet (UV) radiation or ionizing radiation from a radioactive substance. Ultraviolet rays are found in the sun and are relatively harmless, although prolonged exposure may lead to thermal injury. Ionizing radiation is the second form of radiation. Tissue damage can result from therapeutic levels of radiation used for cancer therapy or larger, laboratory or industrial incidents resulting in unintentional exposure.

Associated trauma often complicates the management of burn victims. Whether the patient was involved in a car crash, a burning building, or an explosion, fractures, lacerations, and blunt trauma is often seen. *These associated injuries may be more serious than the tissue damage from the thermal injury and should take precedence over the management of the burns.*

BURN ASSESSMENT

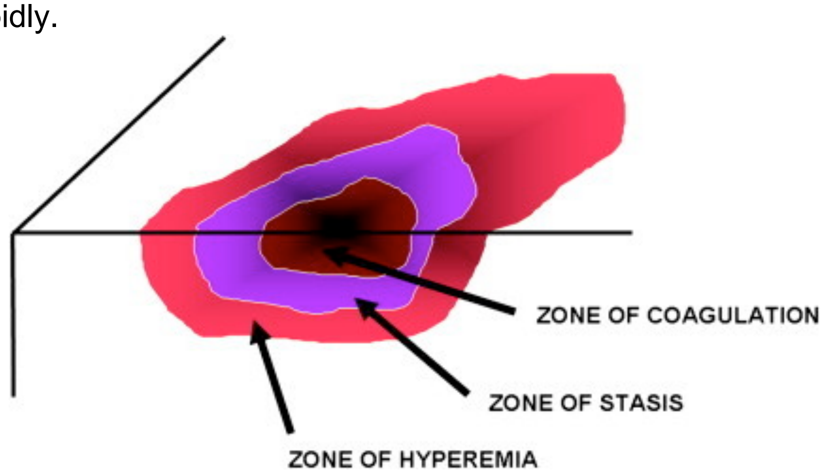
Two important concepts in the assessment of burn injuries are the extent and depth of the burn. The classification of the depth and extent of a burn is relatively simple and requires only a general estimate for EMS triage and treatment decision making. More accurate determinations can be made after arrival at the hospital. The **extent of burn** refers to the total body surface area (TBSA) of injured tissue. This may be simply calculated by the rule-of-nines formula which is printed on the reverse side of the SAEMS Burn Standing Order. It is easy to remember and provides a rapid, gross estimate of the extent of burn. Partial thickness, 1st degree burns are not calculated in the percent of TBSA. Another option, particularly for irregularly shaped burns is to use the size of the patient’s hand, assuming that the palmar surface of the hand is roughly

1% of the TBSA. Visualizing the patient's hand covering the burn wound approximates the body surface area involved. It is also important to include which areas of the body are burned as the hands, feet, face, perineum, and major joints are high-risk areas. Injuries to thee areas are more significant and more difficult to treat because of problems with mobility, cosmetics, and infection. These calculations can be subjective with instances of clinical discrepancy. The primary goals in estimating the TBSA involved include EMS triage, and the ability to predict mortality, morbidity, fluid resuscitation requirements, metabolic and immunologic responses. Children require special consideration in burn care because airway management is complicated by anatomical differences, hypoglycemia may occur due to limited glycogen stores, children have thinner skin and a larger body surface area.

The concept of **depth of burn** injury is an important predictor of survival and overall morbidity, to include surgical management, functional outcome, and cosmesis. Determining the depth can be challenging when other contaminates such as dirt or molten substances are present. Descriptions of the depth of a burn are often confusing because a variety of nomenclature is used. In general, burn wound depth describes tissue damage according to the anatomic thickness of the skin involved.

Typically, burns are thought of as first, second, and third-degree. The terms partial thickness and full thickness are also used. First and second-degree burns are usually considered partial thickness burns, which can also be divided into superficial or deep categories. Third-degree burns are categorized as full thickness burns. Some authorities also refer to fourth-degree burns as those involving deep muscle, tissue and bone.

Regardless of the causative agent, the resulting tissue damage creates a three-zone injury pattern. The central zone of coagulation is an area of irreversible necrosis, or full thickness burn. Immediately surrounding the necrotic area is the zone of stasis, characterized by impaired blood flow. The tissue in this area may become necrotic if tissue perfusion is not restored during the resuscitation period. The zone of stasis is an area of particular concern as it can convert to a much deeper, larger wound with greater loss of tissue. The outer zone of hyperemia usually sustains minimal tissue damage and often heals rapidly.



Classification of Depth of Burn Injury				
	First Degree	**Second Degree**	**Third Degree**	
By skin thickness	Superficial	Superficial Partial thickness	Deep partial thickness	Full thickness
By anatomic description	Epidermal	Epidermal & superficial dermal	Deep dermal	Full dermal tissue loss & possibly subdermal (fat, muscle, bone)
Appearance/description of depth	Pink to red; no blisters; skin remains intact when gently rubbed; may appear slightly edematous	Red or mottled red to pink; blisters; skin easily rubbed off; moist, weeping, edematous; hair remains intact if pulled; blanches with pressure	Pink to pale ivory, may appear dry; contains blisters & bullae; hair removes easily; does not blanch with pressure or return of color is slow	White, cherry red, brown or black; may or may not contain blisters; may contain thrombosed vessels; appears dry, hard, leathery; may be depressed
Pain response	Uncomfortable or painful to touch	Very painful	Pain response is variable	Insensate or aching in nature

BURN MANAGEMENT

Pulmonary Injury

Pulmonary injury may result from inhaling the byproducts of smoke which may or may not injure lung tissue directly. One possible component of inhalation injury is carbon monoxide (CO) poisoning. Carbon monoxide does not affect the lining of the lung but competes with oxygen causing asphyxiation. This poisoning reduces oxygen delivery to the tissues causing anoxia and brain injury. In addition, CO also produces muscle weakness and coma, respectively. The initial effects of muscle weakness and confusion from hypoxia occur within about 5 minutes of exposure and may contribute to a person's inability to escape a fire. Carbon monoxide has a half-life of 4 if the patient breaths room air, and 1 hour on 100% oxygen. Caution must be exercised with the use of pulse oximetry equipment in suspected CO poisoning as oxygen saturation readings may remain normal.

Other components of inhalation injury are upper airway injury and chemical injury to the lung parenchyma. Upper airway injury results from the inhalation of superheated air which may cause blisters and edema in the area around the vocal chords resulting in upper airway occlusion. The best management for this situation is early endotracheal intubation. Chemicals inhaled into the lungs from the byproducts of combustion may cause bleeding and fluid buildup in the lung tissue. This, coupled with damage to the ciliated epithelial cells can lead to severe pulmonary complications. Early suctioning may be necessary to avoid mechanical obstruction of the airways. Assessment of tube placement should occur frequently as airway soft tissue structures swell.

Often, the burn patient who requires intubation has such facial burns or tissue swelling that vision is obscured by swelling. The addition of an endotracheal tube prevents verbalization which increases their already altered sensory perception. These patients will likely become more agitated and require frequent explanation, sedation, and reassurance. Contact with medical direction may be needed to obtain orders for concurrent sedation with diazepam or midazolam.

As mentioned, most of the 6% of all burn victims who don't survive suffered from inhalation injury. Suspicion of inhalation injury is based on the patient's presentation; look for the following characteristics:

- Burn injury occurred in an enclosed space
- Edema and redness of the oropharynx/nasopharynx
- Hoarse, brassy voice
- Shortness of breath
- Tachypnea, wheezing, stridor
- Chest wall retractions in children
- Carbonaceous sputum, singed nasal or facial hair
- Anxiety
- Disorientation progressing to obtundation and coma

The treatment of inhalation injury is supportive; maintain an open airway for oxygenation and ventilation. Circumferential constriction of the chest wall by full-thickness eschar may impede adequate ventilation and oxygenation by restricting chest wall excursion. Escharotomies may be necessary to allow for chest wall movement.

Fluid Resuscitation

A primary goal in the initial management of a patient with a burn injury focuses on providing adequate fluid resuscitation to restore circulating volume and minimize conversion of the zone of stasis to necrosis or full thickness tissue injury. Other initial goals focus on maintaining normal tissue oxygenation, preventing hypothermia, and managing pain. Tissue injury related to burns refers to not only the local response of the coagulation produced by the heat but also to the local and systemic responses that lead to inflammation, immunocompromise, fluid shifts, and ultimately multiple organ dysfunction syndrome if proper treatment is not provided.

The body's initial response to a burn injury leads to a shift in fluids form the vascular space into the interstitial and intracellular spaces. When the burn involves large areas of skin (more than 20% TBSA), this massive fluid shift may result in hypovolemic shock. Fluid resuscitation is essential in preventing shock. Because of the early release of catecholamine's and vasoconstriction during burn shock states, blood pressure may be artificially elevated in relation to the degree of hypovolemia. Also, noninvasive blood pressure measurements (using a BP cuff) may be inaccurate because of significant edema formation in the interstitium. Thus, pulse pressure may be a more accurate assessment of tissue perfusion and shock status. Pulse pressure is easy to measure: it is obtained by subtracting diastolic pressure from systolic pressure. Narrowing or decreasing pulse pressure (less than 25mm Hg) is an earlier indicator of shock than is a decline in systolic blood pressure in the prehospital setting.

There are a number of fluid resuscitation formulas that provide guidelines based on the TBSA burned. All formulas calculate the amount of fluid replacement from the time of the burn injury and estimated TBSA burn injury size. There is controversy over which resuscitation formula to use as well as over which parameters to use to determine the adequacy of resuscitation. Therefore, in the prehospital setting the Burn Standing Order requires an IV/IO of LR, with an initial fluid bolus of 20 ml/kg. Fluid requirements are increased when patients also have inhalation injury, require ventilatory support, have increased full thickness injury, have electrical burn injury, experience a delay in resuscitation, and are dehydrated. In these situations, consultation with the receiving facility (trauma or burn center) may provide additional resuscitation orders. *Balancing adequate fluid resuscitation without over resuscitating a burn patient remains a challenge.* Complications seen in the hospital from significant fluid overload include compartment syndrome of the extremities and abdomen.

Assessment of neurovascular status is essential for circumferential extremity burns. For compromised limbs (full thickness, circumferential burns in which the injured area can not expand during edema formation) an escharotomy or fasciotomy, or both are typically needed to release the pressure and restore perfusion.

In summary, appropriate fluid resuscitation limits the extent of burn injury and reduces morbidity.

Wound Management

The skin acts as a natural barrier, protecting us from infection. After burn injury this protective barrier is lost and the burned tissue provides an excellent medium for microorganism growth.
In the past, the goal of wound care was to cover the burn with an antimicrobial cream to prevent infection and allow the wound to slowly heal. Eventually the wound is grafted, thereby closing the burn wound. Today, antimicrobial agents, synthetic dressings, and advanced wound healing products are available, with more advances in the science of wound management developing rapidly. Efforts to cover and close wounds decrease the patient's risk of infection, thereby enhancing overall survival. Cleansing the wound is typically not an EMS intervention. Because the severity of the burn is directly related to the length of exposure, stopping the burning process and removing smoldering clothing, leather or metal items, and jewelry is expected. Molten substances can continue to burn if not removed, yet can also cause more tissue damage when removed. If fabric is adhered to burned tissue, cut around the fabric. Contact with medical direction for guidance in rinsing, cooling or removing molten material may be necessary.

Rinsing burns greater than 10% TBSA with cool water is no longer recommended as the risk of hypothermia is already great from the loss of skin integrity, large amounts of resuscitation fluids, and exposure to the environment during care. Ice should never be used on burned tissue either as a cooling technique or for pain relief. Covering the patient with a clean, dry sheet is appropriate. Maintaining normothermia during the prehospital phase is important. Hypothermia can:

- Impair perfusion
- Induce shivering (exacerbating hypermetabolism)

- Impair white blood cell function (increasing risk of infection)
- Impair platelet function (increasing risk of bleeding)
- Lower cardiac output by 25%
- Create electrolyte imbalance

Interventions to maintain normothermia are necessary to prevent adverse complications associated with hypothermia. Warming the external room environment, covering the patient with dry sheets, and warming fluids used for resuscitation are suggested

Pain Management

Pain management is an important consideration for the burn patient. Because of the massive fluid shifts and hypermetabolic state in burned patients the pharmacokinetics of many drugs change. Opioids remain the mainstay of pain management in the burn patient; intravenous or intraosseous morphine sulfate is easily administered and titrated in both children and adults. Intramuscular routes of medication administration should be avoided due to unpredictable absorption. Remember, the more superficial the burn wound, the greater the pain because of the associated exposed nerve fibers. Also, when assessing the patient for pain, use a pain scale and observe for tachycardia, diaphoresis, agitation, grimacing, rhythmic movements or lack of movement may indicate pain in a verbally unresponsive patient. Typically, the burn patient is alert. If not, consider associated injuries, CO poisoning, substance abuse, hypoxia, or a pre-existing medical condition such as diabetes.

IMPLEMENTING THE BURN STANDING ORDER

The SAEMS Burn Standing Order was developed to assist with triage and treatment of burn patients who meet the American Burn Association (ABA) serious burn criteria Standing Order inclusion criteria). All patients should be managed with immediate supportive care to include oxygen, venous access, and cardiac monitoring. There are no age restrictions.

Pulse oximetry is unreliable in the presence of carbon monoxide poisoning, as is skin color, and possibly blood pressure measurements. High flow oxygen using a non-rebreather mask is essential for any burn patient with suspected CO poisoning. End tidal CO_2 monitoring may be useful, but should never replace direct patient assessment.

Volume replacement can be managed with an IV/IO of Lactated Ringers. If possible, avoid starting the IV through burned tissue, although this may not always be possible.

A cardiac monitor is applied on all patients suffering from major burns. It may take some ingenuity to locate nonburned areas where electrodes will stick. Electrical burns, in particular, may cause cardiac dysrhythmias which are treated according to ACLS standards.

Patients who have associated trauma (as defined by the SAEMS Trauma Triage Protocol) are excluded from the Burn Standing Order. These patients pose unusual and complex problems and initial management should focus on trauma assessment, not on the burn injury.

Interventions on the Burn Standing Order address stopping the burning process and covering burned tissue, establishing an airway and maintaining oxygenation and ventilation, initiating fluid resuscitation, and managing pain. Close monitoring of the airway is essential. Always reassess after each intervention.

Transport destinations are determined by time and distance to a level one trauma center or burn center, as well as the condition of the patient. If airway measures are unsuccessful (unable to ventilate) transport to the closest hospital may be necessary to secure an airway.

Communication

As with any standing order, the receiving facility requires certain information to allow them to prepare for the patient's arrival. Relay the following essential information to the hospital:

- Age
- Sex
- Burn Standing Order
- Mechanism of injury/type of burn
- Percent of burn
- Location of burn
- Transporting Unit
- Estimated Time of Arrival
- Stable or Unstable patient

This information will maintain continuity of care and facilitate patient transfer upon arrival.

BURN STANDING ORDER

Initiate immediate supportive care:
- Assure ABC's
- 100% oxygen
- IV/IO LR
- Cardiac Monitor

INCLUSION

Use standing order on **ALL** patients with these symptoms:
- Partial thickness burns greater than 10% total body surface area (TBSA)
- **F**ull thickness burns greater than 5% TBSA
- Significant burns that involve the face, hands, feet, genitalia, perineum, or major joints
- Electrical burns, including lightning injury
- Inhalation injury
- Significant burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality, such as: diabetes, cardiac disease, pulmonary disorders, pregnancy, cirrhosis, morbid obesity, immunosuppression, bleeding disorders

EXC

Patients with burns who also meet any of SAEMS Trauma Triage Decision Scheme criteria should be transported to a trauma center for initial stabilization following on-line medical direction.

ORDERS

- Stop the burning process, remove smoldering clothing and jewelry
- Continually monitor airway
- Cover burn area with a clean dry dressing. Prevent hypothermia (warm fluids/environment). Never use ice
- Estimate involved body surface area (BSA) using an appropriate burn estimation guide
- IV/IO LR: administer initial fluid bolus of 20 ml/kg
- **Consider early aggressive airway management in patients at risk for inhalation injury**

ADULT Pain/Nausea Management
- Consider Morphine Sulfate 5-10 mg every 5min up to a max dose of 20mg, until pain is lessened or respiratory/mental status depression occur
- Consider Ondansetron 4-8 mg IV over 2-5 minutes if nausea occurs

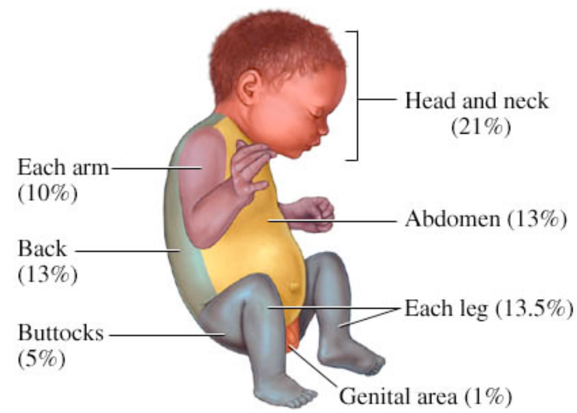
PEDS Pain/Nausea Management
- Consider Morphine Sulfate 0.1 mg/kg in increments of 1-2 mg every 5min to a max dose of 10 mg, until pain is lessened or respiratory/mental status depression occur
- Consider Ondansetron 0.1 mg/kg up to 4 mg IV over 2-5 minutes id nausea occurs

Relay information to include percent, location, and type of burn

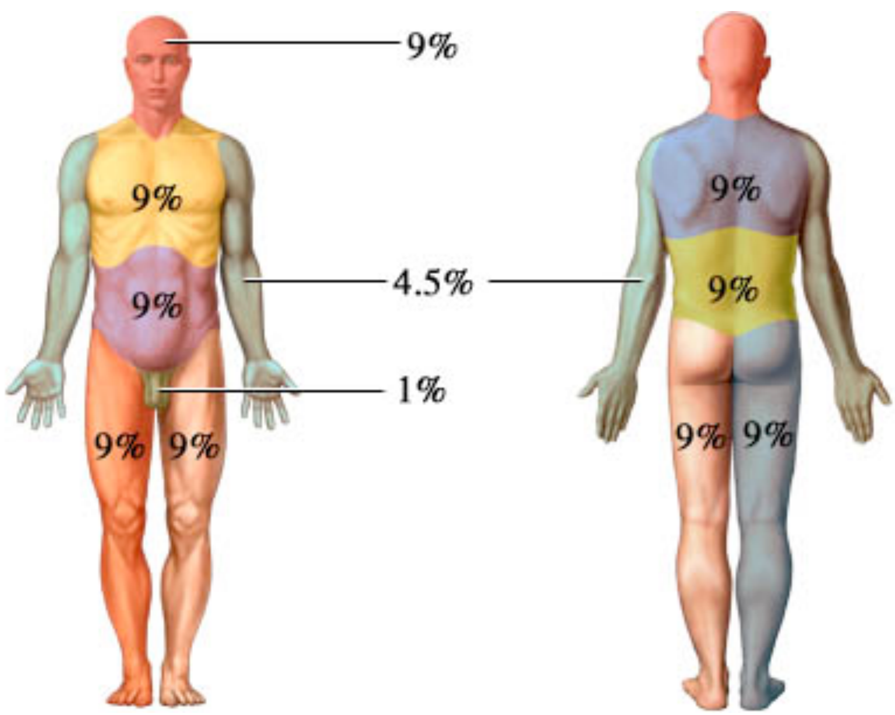
Patients meeting inclusion criteria should be transported to the Level One Trauma Center or considered for air transport to the Arizona Burn Center at Maricopa Medical Center in Phoenix.

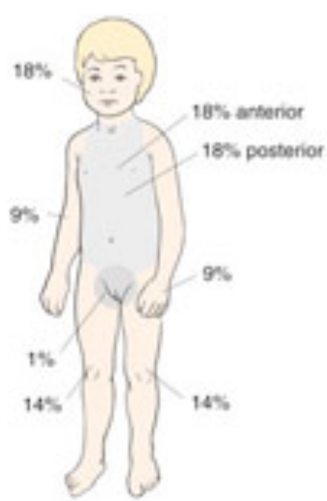
If appropriate airway measures are not successful in the field transport to closest facility.

In outlying areas with a transport time of greater than 30 minutes to the Level One Trauma Center, transport the patient to the closest facility or, consider air transport directly to the Arizona Burn Center at Maricopa Medical Center in Phoenix.



INFANT 0 – 1 YEAR





CHILD 1 – 8 YEARS

SUMMARY

Burn injuries can present a major EMS challenge and can be a terrifying experience for both the patient and the provider. Priority setting and rapid transport are imperative. Adopting a systematic approach will simplify assessment and management of the burn patient, and by using the SAEMS Burn Standing Order treatment and triage decision making can be facilitated. Stopping the burning process, early and aggressive airway management, oxygenation, fluid resuscitation, wound management and pain control are the priorities of care.

REFERENCES

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GENERIC NAME: MORPHINE SULFATE

BRAND NAME: Morphine Sulfate
CLASS: narcotic agonist

Mechanism of Action:

Alleviates pain by acting on the pain receptors in the brain; elevates pain threshold.
Depresses central nervous system; depresses brainstem respiratory centers; decreases responsiveness to changes in $PaC0_2$.
Increases venous capacitance (venous pooling), vasodilates arterioles, reducing preload and afterload.
Histamine release.

Indications and Field Use:

Analgesia, especially in patients with burns, myocardial infarction, or renal colic.
Pulmonary edema (cardiogenic).

Contraindications:

Respiratory depression
Head injuries
Elevated Intra cranial pressure
Asthma, relative
Abdominal pain, relative

Adverse Reactions:

CV: Brady or tachydysrhythmias, orthostatic hypotension
Resp: Respiratory depression or arrest
CNS: Excess sedation, seizures to coma and arrest, pupillary constriction
GI: Nausea and vomiting, GI spasm
Derm: Histamine release may cause local urticaria

NOTES ON ADMINISTRATION

Incompatibilities/Drug Interactions:

CNS side effects (including respiratory depression) can be reversed by naloxone.

Adult Dosage:

IV Dose: Administer 1-3 mg increments slow IV PUSH (over 1-5 minutes) until desired effect.

Pediatric Dosage:

100-200 μg/kg slow IV push

Routes of Administration:

Usually given IV in the field, can be given IM or SC.

** IV infusion may be transported on interfacility transfers, infusion pump required.

Onset of Action:

Seconds

Peak Effects:

20 minutes

Duration of Action:

2-4 hours

Dosage Forms/Packaging:

10 mg/ml ampules, **only**

Arizona Drug Box Supply Range:

PARAMEDIC:	2 (20 mg)
INTERMEDIATE:	2 (20 mg)

Special Notes:

> Schedule II narcotic.
> Watch for histamine effects (wheals, urticaria) proximal to IV site; contact medical control
> Correct hypotension before administration.
> Maximum respiratory depression 7-10 minutes after administration; can be reversed with naloxone; use caution in patients with emphysema.
> Infusions: IV infusions of morphine sulfate may be transported, however an infusion pump is required.

** Indicates special training requirement

Generic Name: Ondansetron

Class: ***Antiemetic agent***

Mechanism of Action:

Selectively blocks serotonin 5-HT_3 receptors located in the CNS at the chemoreceptor trigger zone and in the peripheral nervous system on nerve-terminals of the vagus nerve

Indications for use:

Nausea and vomiting

Contraindications:

Hypersensitivity
Use with caution in patients with hepatic impairment

Adverse Reactions:

CNS:	Headache, malaise, fatigue, dizziness, fever, sedation, extrapyramidal syndrome
Cardiovascular:	Chest pain, arrhythmias
Respiratory:	Hypoxia
GI & Hepatic:	Diarrhea, constipation, abdominal pain, xerostomia, decreased appetite
Skin:	Rash

Notes on Administration

Incompatibilities/Drug Interactions:

Inducers or inhibitors of P450 drug metabolizing enzymes may alter the clearance of Ondansetron. No dosage adjustment is recommended.

Adult Dosage:

4 – 8 mg IV slow push over 2 – 5 minutes
8 mg PO ODT or tablet

Pediatric Dosage: (1 month to 12 years old)

Greater than 40 kg- 4 mg IV slow push over 2 – 5 minutes

Less than 40 kg- 0.1 mg/kg IV slow push over 2 – 5 minutes
4-12 years old 4 mg PO ODT or ODT

Route of Administration:

IV, IM, PO

Onset of Action:

Unknown but probably 10 to 30 minutes

Peak effects:

Unknown

Duration of Action:

Half life is approximately 4 hours. Exact duration unknown but appears to be prolonged compared to half-life

Dosage Forms/Packaging:

4 mg/2 mL vial
4 or 8 mg ODT or tablet

Arizona Drug Box Standard Minimum Supply:

Optional- 4 mg

Special Notes:

Instructions for Use/Handling ZOFRAN ODT Orally Disintegrating Tablets: Do not attempt to push ZOFRAN ODT Tablets through the foil backing. With dry hands, PEEL BACK the foil backing of 1 blister and GENTLY remove the tablet. IMMEDIATELY place the ZOFRAN ODT Tablet on top of the tongue where it will dissolve in seconds, then swallow with saliva. Administration with liquid is not necessary.
Bottles: Store between 2°and 30°C (36° and 86°F). Protect from light. Dispense in tight, light-resistant container as defined in the USP.
Unit Dose Packs: Store between 2° and 30°C (36°and 86°F). Protect from light. Store blisters in cartons.

POSTTEST NAME: DATE:

1. A partial thickness burn can be characterized by:
   a. Charred skin
   b. Erythematous and blistered skin
   c. White brown leathery appearance
   d. Lack of sensation

2. A full thickness burn can be characterized by:
   a. Moist weepy skin
   b. Brown leathery appearance
   c. Intact epidermis

3. Neutralizing agents are not recommended for treatment of chemical injuries because:
   a. It delays treatment
   b. Copious flushing with water or normal saline is the best initial treatment
   c. An exothermic (heat producing) reaction can be produced, increasing the depth of tissue damage
   d. All of the above

4. Lactated ringers is the fluid of choice for burn resuscitation
   a. True
   b. False

5. A 45-year-old male sustains partial thickness burns to both arms circumferentially and to the anterior torso. What is the approximate total body surface area burn?
   a. 45%
   b. 18%
   c. 36%

6. The American Burn Association referral criteria include which of the following:
   a. Burns with suspected inhalation injury
   b. Burns of the face, hands, feet, genitalia, perineum, and major joints
   c. Second degree burns of more than 10% TBSA
   d. All of the above

7. Before transporting a burn patient, the following should be carried out to protect the burn wound:
   a. Cover in wet sheets to stop the burning process and to keep the wound moist.
   b. Debride all of the eschar and apply an occlusive dressing
   c. Cover the patient in a dry, clean, or sterile sheet

   d. Apply a thin layer of lubefax and cover with a sterile sheet

8. Children require special consideration in burn care because:
   a. Airway management is complicated by anatomical differences in the child and adult.
   b. Hypoglycemia may occur due to limited glycogen
   c. Children have thinner skin
   d. All of the above

9. Carbon Monoxide inhalation:
   a. Requires pulse Oximetry monitoring in all cases
   b. Requires 100% oxygen
   c. Is rarely fatal
   d. Is diagnosed by the patient's cherry red appearance

10. The SAEMS Burn Standing Order can not be implemented on pregnant women.
    a. True
    b. False

11. Pain management for the burn patient consists of all of the follow *except:*
    a. Covering the burn with a clean, dry sheet
    b. Titrating intravenous morphine sulfate
    c. Applying ice packs to painful areas
    d. Stopping the burning by removing clothing

12. The largest number of burn injuries occur in:
    a. The elderly
    b. Children under the age of six
    c. Adolescent boys
    d. All age groups equally

13. Second degree partial thickness injuries are typically not painful as nerve endings are no longer intact.
    a. True
    b. False

14. Noninvasive blood pressure readings may be inaccurate (artificially elevated) in assessing the fluid status of a patient with a major burn.
    a. True
    b. False

15. Inducing hypothermia in the burn setting can be used to stop the burning process and manage pain.
    a. True
    b. False

EVALUATION

Please answer the following questions by marking the appropriate response:

		Lowest Worst Least				Highest Best Most
1.	To what extend did this module meet your needs?	1	2	3	4	5
2.	There was a balance between theoretical and practical information.	1	2	3	4	5
3.	The time required was appropriate to the content.	1	2	3	4	5
4.	The module increased my knowledge and understanding of the topic.	1	2	3	4	5
5.	References or audiovisuals were adequate.	1	2	3	4	5
6.	Overall, this program was worthwhile.	1	2	3	4	5

7. Additional comments: