Burns have always been considered one of the most demanding injuries that we take care of in the pre-hospital arena. This is not only because of the severe physical injuries that occur, but also because of the devastating emotional response, both of the patient and crew members, that accompany them.

We all know that the quality of care during the first hours after a burn injury has a major impact on long-term outcome. In this learning activity we will discuss the dos and don’ts of burn management.

**DO:**

*Airway Assessment and Management*

Just like every other illness and injury that EMS assesses and treats, management of a burn starts with A - *Airway*. Airway stabilization is a priority. In an inhalation injury it does not take long for edema to form and obstruction to occur. Inhalation and airway injuries are easy to miss if we do not pay close attention. Injuries occurring in an enclosed space, following an explosion or causing facial burns should make you suspicious of an inhalation injury. Other findings associated with inhalation injuries include:

- Singed eyebrows or nasal hares
- Black nasal/oral discharge
- Grossly swollen lips
- Hoarse voice
- Carbonaceous “soot” in back of the throat or sputum
- Agitation, anxiety, stupor, cyanosis or other general signs of hypoxemia
- Increased respiratory rate, flaring nostrils, grunting or guttural respiratory sounds
- Rales, Rhonchi or distant breath sounds
- Erythema or swelling of the tissues of the oropharynx or nasopharynx
- Inability to swallow

Burn victims have a tendency to gasp when they are burned. Think how they breathe. They are anxious and scared. That along with hypoxia causes them to increase their respiratory rate exposing their airways to superheated air, smoke, carbon monoxide and toxic chemicals. The respiratory tract’s heat exchange capability is so efficient that most absorption of heat and tissue damage occurs above the true vocal cords. Heat damage of the pharynx is often severe enough to produce upper airway obstruction and may cause obstruction at any time during resuscitation. Once fluid resuscitation begins edema will occur at an even faster rate. When there is concern about airway edema, management
needs to be aggressive. Notify the hospital enroute that you are coming in with a patient that will need to have their airway secured upon arrival and assist ventilations as needed. Not all patients present with airway emergencies that require intubation. An alert and oriented patient with no respiratory distress and no visible airway injury is unlikely to need intubation.

Carbon monoxide poisoning should be presumed in all patients where smoke inhalation is present. We know that carbon monoxide binds to hemoglobin with an affinity 200 times greater than oxygen. If sufficient hemoglobin is bound to carbon monoxide, tissue hypoxia will occur. For this reason all patients who have been exposed to smoke inhalation should be placed on 100% oxygen. The half-life of carbon monoxide in the blood is 4 hours, it decreases to about one hour on 100% oxygen.

**Fluid Resuscitation**

The body’s initial response to a burn injury leads to a shift in fluids from the vascular space into the interstitial and intracellular spaces. When the burn involves large areas of skin (e.g., more than 20% TBSA), there is an overall systemic response, with fluids shifting into interstitial spaces throughout the body. This massive fluid shift along with the fluid volume lost from the burn may lead to hypovolemic shock. Prompt administration of adequate amounts of resuscitation fluid is essential to prevent the occurrence of burn shock and organ failure.

Starting an IV on a burn patient can be challenging. It is preferred that an IV be started in a non-burned area utilizing a large vein. However, you do not always have that luxury and an IV may certainly be started through burned tissue if necessary. In actuality for a severely burned patient an IO may be your best bet. Remember the IO space does not collapse as does the vascular space in a shock situation. Since infection is always a concern, placing vascular access in burned areas should be avoided unless there is no alternative. There should never be a delay in transporting burn victims to an emergency facility due to an inability to establish intravenous (IV) access.

The American Burn Association criteria for placement of IV access in the prehospital arena include:

⇒ Burns with greater than 20% TBSA
⇒ Hypovolemic shock from associated injuries
⇒ Management of life-threatening ventricular dysrhythmias
⇒ Potential exists for life-threatening airway obstruction or cardiac arrest.

While the Parkland formula (4ml x weight in kg x % of TBSA burn) is used as a guideline for fluid resuscitation, it is often difficult to use in the field as accurate weights are not available and you are usually at the hospital or the helicopter has arrived by the time you or medical control have the time to calculate the formula. Our current Region IX protocol simply recommends solution should be infused at 500 ml/h for those over 15 years of age, 250 ml/h in a child 5 to 15 years of age and
150cc/hr for patients under 5 years of age. Regardless of how you determine the amount of fluid you resuscitate your patient with, you must have an accurate total of the volume you delivered as this will be included in the total sum of fluids the patient will need for resuscitation once they arrive at the hospital.

**Temperature and Dressings**

Stop the burning process. Burned clothing can initially be moistened to extinguish heat and then be removed. This needs to be done in a manner that does not unnecessarily cool the patient. **We need to cool the burn not the patient.** A burn patient can easily become hypothermic. This results from:

- Evaporative fluid losses from tissue loss
- Wet clothing and ambient temperature of the surroundings
- Rapid fluid resuscitation

Maintaining normothermia is a priority because hypothermia can:

- Impair microcirculatory perfusion
- Induce shivering, which exacerbates hypermetabolism
- Impair neutrophil function, increasing the risk of infection
- Impair platelet function, increasing the risk of bleeding
- Lower cardiac output by up to 25%
- Cause low levels of magnesium, potassium and calcium

Interventions to maintain normal body temperature are needed to prevent these complications. They include:

- Removing all wet clothes
- Warming the temperature in the ambulance
- Covering the patient with dry sheets
- Using warm IV fluids when possible

Infants and children especially are more at risk for hypothermia. They can lose significant amounts of heat from their large heads, so wrapping a towel around their head helps to minimize heat loss.

Do not forget any jewelry the patient may have on. It should be removed as soon as possible for two reasons:

1. The earlier it is removed, the less chance it will have to be cut off later as the patient becomes more edematous. We do not want the piece of jewelry to act as a tourniquet.
2. Jewelry can retain heat and continue the burning process.
**Pain Control**

Pain is a major problem for the burn patient. Pain is related to tissue injury and is complicated by fear and anxiety. As EMS providers we need to be advocates for the patients assuring all is being done to obtain pain control.

Changes in fluid volume and tissue blood flow make absorption of any drug given intramuscularly or subcutaneously unpredictable. Therefore intramuscular and subcutaneous routes should not be used, and narcotics should only be given intravenously. Don’t be fooled by third degree burns. It is true that the actual tissue involved in a third degree or full-thickness burn does not hurt since all nerves have been destroyed. However it is rare that extensive burns are all third degree. Most of the time they are surrounded by partial thickness or 2nd degree burns which are very painful and require the administration of narcotics to achieve acceptable pain control. Administer Fentanyl if SBP >90 (MAP >65) 1mcg/kg (max single dose 100mcg)IV/IO/IN/IM. The dose may be repeated in 5 min 0.5 mcg/kg (max dose 50mcg) to a max dose of 150mcg. If additional pain meds are needed, contact medical control for permission to administer further doses to a maximum total dose of 300mcg. As with anytime you administer Fentanyl IV the patient should be on the cardiac monitor with SpO2 and EtCO2 being monitored. A bag-valve mask device ready in case the patient’s respirations become inadequate.

**Transport Decision**

Transport decisions are made by the treating providers at the scene keeping in mind, our protocols state severe burns without a trauma mechanism can be triaged directly to a burn center. Mild to moderate and/or with a trauma mechanism should be transported to a trauma center for evaluation. Any patient without a secure airway needs to be transported without delay to the closest facility.

The American Burn Association and the American College of Surgeons have identified the following injuries as those requiring referral to a burn center. Keep in mind, these patients may be initially evaluated and stabilized at the closest hospital depending on the extent and nature of their injuries. **Not all of these patients need to be flown from the scene:**

- Partial thickness burns greater than or equal to 20% total body surface area in patients 10 to 50 years of age
- Partial thickness burns greater than or equal to 10% total body surface area in patients less than 10 and greater than 50 years of age
- Burns that involve the face, hands, feet, genitalia, perineum or major joints
- Third-degree burns greater than 5% TBSA in persons of any age group
- Electrical burns, including lightning injury
- Chemical burns
- Inhalation injury
- Burn injury in patients with pre-existing medical disorders that could complicate management, prolong recovery, or affect mortality
- Any patient with burns and concomitant trauma (such as fractures) 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 initially stabilized in a
trauma center before being transferred to a burn unit. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols
⇒ Burn injury children in hospitals without qualified personnel or equipment for the care of children.
⇒ Burn injury in patients who will require special social, emotional and/or long-term rehabilitative intervention.

NOW SOME OF THE BIG DON’TS

⇒ **Don’t forget the airway**

⇒ Don’t pull stuck clothing off the burn. We should attempt to remove all clothing, however if they stick to the wound just leave them

⇒ Every family member seems to know some magic burn cure from grandma or the Internet. Try to intercept them before they contaminate the wound further with their good intentions

⇒ Don’t let the patient get cold

⇒ Don’t delay transport to the emergency facility if you are having difficulty establishing vascular access.

⇒ Don’t forget pain control

⇒ Don’t forget that patients who can not speak can probably still hear and understand you.

⇒ **Don’t forget the airway (just in case I haven’t mentioned that enough)**

References:


MCHENRY WESTERN LAKE COUNTY EMS SYSTEM
2016 OPTIONAL CE FOR ALL PRIMARY AND PROBATIONARY ALS PROVIDERS

BURN MANAGEMENT

NAME: ______________________________________
DATE:  ______________________________________
DEPARTMENT: __________________________________

1. You should be suspicious of an inhalation injury when injuries occur involving
   ___________________________ or ___________________________.

2. List assessment 5 findings associated with inhalation burns.
   A. ________________
   B. ________________
   C. ________________
   D. ________________
   E. ________________

3. Explain how upper airway obstruction occurs in a smoke inhalation patient.

4. Management of suspected carbon monoxide poisoning for a patient with a stable airway includes
   A. Oxygen by nasal cannula  4 – 6L
   B. Room air oxygen
   C. 100% O2 by NRB
   D. Albuterol neb.

5. Vascular access may be obtained through burned tissue if you have not other option.
   A. True
   B. False
6. The American Burn Association’s criteria for placement of IV access in the prehospital arena include:
   A. __________________________________
   B. __________________________________
   C. __________________________________

7. Administration of adequate amounts of resuscitation fluid is essential to prevent ________________ and ________________.

8. Explain how you would determine how much fluid to administer to a severe burn patient enroute to the hospital.

9. List three factors that contribute to the development of hypothermia in a burn patient:
   A. __________________________________
   B. __________________________________
   C. __________________________________

10. List 6 complications of hypothermia:
    A. __________________________________
    B. __________________________________
    C. __________________________________
    D. __________________________________
    E. __________________________________
    F. __________________________________

11. Interventions to help prevent hypothermia in a burn patient include ____________________________, ____________________________, and ____________________________.

12. Explain why it is important to remove jewelry on a burn patient as soon as possible.
13. It is appropriate to give pain medication IM to a burn patient if you cannot start an IV.
   A. True
   B. False

14. The correct dose of Fentanyl for an adult burn patient is ________________.

15. You are called to the scene of a local factory for a fire and burn victim. Upon your arrival you find a patient who was brought outside by his co-workers. The co-workers tell you they found him unresponsive in a maintenance room where they think the fire started and was filled with smoke. Your primary assessment reveals an approx. 40 year old male who you estimate to be approximately 200lbs. He is unresponsive, with a grunting respirations at a rate of about 32. He has weak peripheral pulses. You note partial thickness burns to the left side of his face and head. His clothes are partially burned off on the left side of his body and you note partial thickness burns to his left arm, left side of his chest and left leg. **Discuss your plan of care in detail for this patient.**

IF YOU ARE NOT A MEMBER OF THE MCHENRY WESTERN LAKE COUNTY EMS SYSTEM, PLEASE INCLUDE YOUR ADDRESS ON EACH OPTIONAL QUIZ TURNED INTO OUR OFFICE. WE WILL FORWARD TO YOUR HOME ADDRESS VERIFICATION OF YOUR CONTINUING EDUCATION HOURS.
IF YOU ARE A MEMBER OF OUR EMS SYSTEM, YOUR CREDIT WILL BE ADDED TO YOUR IMAGE TREND RECORD. PLEASE REFER TO IMAGE TREND TO SEE YOUR LIST OF CONTINUING EDUCATION CREDITS.
ANY QUESTIONS REGARDING THIS CAN BE ADDRESSED TO THE EMS OFFICE AT 815/759-8040. THANK YOU.