1. A 14-year-old male presents to the emergency department via EMS after a structural fire. His respiratory rate is 35 bpm, heart rate is 130 bpm, blood pressure is 90/60 mmHg, and oxygen saturation is 92% on nasal cannula at 3 liters/minute. You note singed eyelashes and nose hairs, and there is soot in his nose and mouth. What is the next best step in management?

A. Non-invasive ventilation
B. Intravenous crystalloids
C. Discharge to home
D. Early intubation

ANSWER: D, early intubation. This patient has signs on his physical exam of inhalation burns, including singed nose hairs and carbonaceous sputum. There is often delayed onset of airway edema after inhalation burns, and thus (D) early intubation is warranted because this poses compromise of the patient's airway. (A) non-invasive ventilation might serve as a bridge to intubation if the patient's hypoxia does not resolve with less invasive means of increasing his oxygenation (such as turning up the nasal cannula or trying a non-rebreather), but it will not fix the underlying issue (the need for a secure airway). This patient will need (B) intravenous crystalloids, but this is not the next best step; airway comes before circulation. Given the soft blood pressures, you will probably hang fluids will you are intubating the patient, but his blood pressure is not soft enough to pose an immediate risk to his life. (C) discharge to home would likely be fatal for this patient.

2. A 45-year-old man presents to the emergency department after being rescued from a house fire. The patient is unresponsive on arrival and intubated for airway protection. Vital signs are remarkable for oxygen saturation of 87%, HR 55, RR 38, and BP 85/55. On physical examination the patient has partial and full thickness burns noted on 30% of his body sparing the mouth and face. There were no airway burns. He has an elevated anion gap acidosis with a lactate 12 mmol/L. What is the most likely cause of his acidosis?

A. Carbon monoxide poisoning
B. Cyanide toxicity
C. Inhalation injury
D. Methemoglobinemia

ANSWER: (B), cyanide toxicity. Cyanide toxicity may present with altered mental status, vital sign abnormalities (bradycardia, tachypnea, hypotension), and lactic acidemia. "The patient's ABCs require attention and supportive measures which include securing the patient's airway as needed and giving intravenous fluids and vasopressors if indicated. However, the **treatment** of cyanide toxicity relies on administering an antidote. Historically cyanide toxicity has been treated with sodium nitrite and sodium thiosulfate. This induces a methemoglobinemia which removes cyanide from cytochrome and increases cyanide's metabolism to a less toxic metabolite. The new treatment involves administering **hydroxocobalamin intravenously** and can be repeated every 15 minutes as clinically indicated. There may be additional benefit if given with sodium thiosulfate but these must be run through separate IV lines." Patients with (A) carbon monoxide poisoning will typically present awake, not unconscious, but may have altered mental status, headaches, vision changes, focal neuro deficits such as ataxia, nausea, and vomiting. Coma/unconsciousness is entirely plausible when cases are severe. The lactic

acidemia is not typically as extreme as with cyanide toxicity. The treatment is supplemental oxygen (hyperbarics for carboxyhemoglobin > 25% with severe symptoms). (C) inhalation injury should present with carbonaceous sputum, airway swelling, and respiratory compromise. This patient did not have these signs on exam. (D) methemoglobinemia may present with headache, nausea, fatigue, angina, dysrhythmias, and shortness of breath. Lactic acidemia is not usually severe with methemoglobinemia.

Question Adapted from Rosh Review.

3. A 63-year-old female with COPD on chronic home oxygen was smoking a cigarette and caused a fire. She was intubated in the field by EMS. On arrival to the emergency department, you note burns to her entire face and anterior torso. She weighs 60 kg. What volume of crystalloid fluids should she receive in the first 8 hours based on the Brooke formula?

A. 1300 mL
B. 1350 mL
C. 1400 mL
D. 1450 mL

ANSWER: 1350 mL. 2 * 60 kg * (18 + 4.5 = 22.5% TBSA burned) = 2700 ml needed in the first 24 hours. 2700 ml / 2 = 1350 ml in the first 8 hours of resuscitation.

4. A 14-year-old female presents after an alkaline chemical exposure to the left eye. Irrigation is started with normal saline. Which of the following is the most proper endpoint of irrigation?

A. Absence of fluorescein uptake
B. Normal intraocular pressure
C. pH 7.0–7.4
D. Two liters of crystalloid irrigation

ANSWER: C, pH 7.0-7.4. The pH of the eye should be checked at the end of every liter of fluid to ensure that all of the chemical has been removed. There should not be (A) fluorescein uptake if there is no corneal abrasion/ulcer/foreign body/open globe injury present. (B) elevated intraocular pressure would not be expected with an acute chemical exposure to the eye; delayed glaucoma is a possibility. There is not a specific volume of fluid (D) that is standard for all types of chemical exposures to the eye.

Question Adapted from Rosh Review.

5. A 42-year-old male is involved in a high-voltage direct current industrial electrical accident. He is exhibiting labored breathing with a respiratory rate of 30 bpm, heart rate of 120 bpm, blood pressure of 100/60 mmHg, and oxygen saturation 90% on room air. He has circumferential burns around his chest. What is the next best step in management?

A. Intubation
B. Chest x-ray
C. Escharotomy

D. Positive-pressure ventilation

ANSWER: C, escharotomy. The patient's respirations are restricted by his chest wall burns; he is unable to oxygenate and ventilate effectively, and thus his breathing is compromised. We need to intervene on breathing with an escharotomy before moving on. Escharotomy and supplemental oxygen via nasal cannula or non-rebreather should be tried prior to (A) intubation or (D) positive-pressure ventilation. This patient will likely need a (B) chest x-ray to evaluate for pulmonary contusions, pneumothorax, or other thoracic trauma in light of his burns, but a chest x-ray is not going to fix his breathing.

6. You are the first person to arrive on scene after a lightning strike, and you are conducting triage. Which of the following patients should be attended to FIRST?

A. 56-year-old female thrown into a building by the lightning blast with multiple fractures. RR 18, capillary refill < 2 seconds, follows commands
B. 35-year-old male with keraunoparalysis. RR 12, capillary refill < 2 seconds, follows commands
C. 80-year-old female who is confused but talkative and is not following commands. RR 15, capillary refill < 2 seconds
D. 15-year-old female who is not breathing despite airway repositioning. No pulses

ANSWER: D

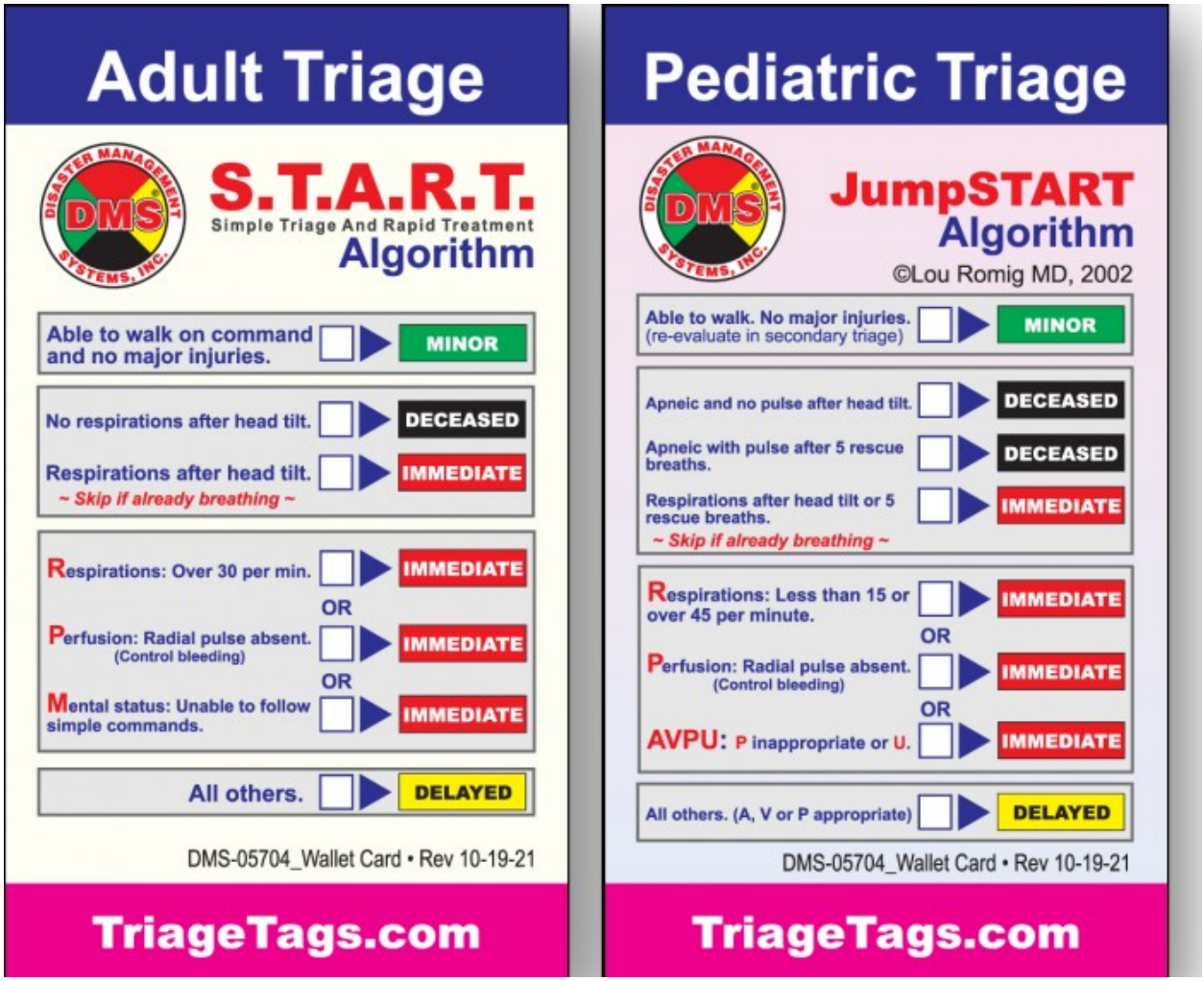
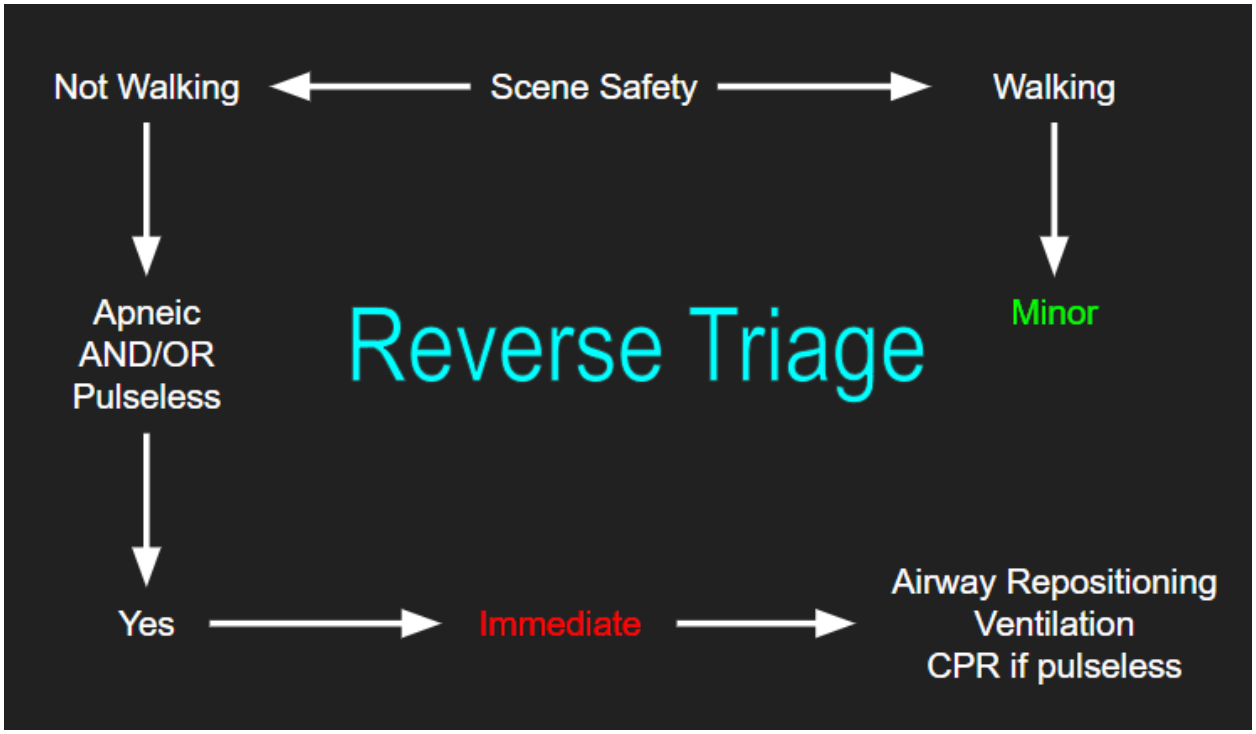


Image reference: Disaster Management Systems, 2022

Remember that we use JumpSTART for pediatric patients and START for adult patients. A 15-year-old is physiologically an adult, so take a look at the algorithm on the left.

With our typical triage algorithms, someone with no respirations after airway repositioning maneuvers is tagged black (deceased or expectant).



The difference with reverse triage - which we use for lightning and electrical injuries - is that apneic and pulseless patients are actually evaluated FIRST because there is a good chance they can be resuscitated!

7. A 30-year-old female presents to the emergency department after sustaining a high-voltage, alternating current electrical burn. Which of the following should guide his fluid resuscitation?

A. Compartment pressures
B. Hourly urine output in urinary catheter
C. Time exposed to the electrical current
D. Total body surface area burned

ANSWER: B, Hourly urine output in urinary catheter. Electrical injuries can cause much deeper tissue damage than expected. If we only base their fluid resuscitation off of external surface burn percentage, we will likely underestimate their fluid needs. Remember that adult UOP should be 1-1.5 ml/kg/hr and pediatric UOP should be 1.5-2 ml/kg/hr. "**Compartment pressures (A)** should be measured based on clinical suspicion for compartment syndrome and would guide the decision to perform fasciotomies. **Time exposed to the electrical current (C)** is important and will likely determine the extent of internal burns, but does not guide the resuscitation directly. **Total body surface area burned (D)** will likely underestimate this patient's injuries and the majority of electrical burns cause significant internal injuries out of proportion to what is seen externally."

Question Adapted from Rosh Review.

Please see presentation references for further reference details.

https://docs.google.com/presentation/d/1Asqhsoq6P583ZAImcBV-HV81VHC5Y2-fZdZArFp4Otg/edit?usp=sharing

Please feel free to provide feedback on the presentation or these questions here: https://docs.google.com/forms/d/e/1FAIpQLScauiZ0VRvu2GFByCUUk7peYSyM2017YOT-M5TdczjkDjBgUw/viewform?usp=sf_link