**Take Home Assignment**

Mr. E, 22 years of age, has sustained a significant burn to his body as a result of an indoor explosion in the factory where he is employed. He arrived at a large teaching hospital within 30 minutes of sustaining his burn. The initial assessment data was obtained at 1410 in the Emergency room.

* Soot around mouth, singed nasal hairs, and a hoarse voice
* Edema noted to his upper and lower lips
* Inspissated mucus secretions
* A/E to bilateral bases
* Arrived with 100% humidified oxygen via nonbreather mask but is now being intubated
* A/O x 3
* Vitals: HR – 120, RR – 26, Bp – 110/80, spO2 – 90%, T – 36.1o C per rectum
* Combination of partial thickness and full thickness burns (see attached diagram)
* Full thickness burn are dry, hard, and leathery in appearance – these areas are not painful
* Partial thickness areas vary in colour from white to a cherry red. The cherry red areas do not blanch. Generally, these burns are described as extremely painful.
* All peripheral pulses are palpable at +3
* Catheterized for 50 mls clear yellow urine
* The carboxyhemaglobin (COHb) comes back at 1% and the client is a nonsmoker

**Order:**

▪10,000 units of nebulized Heparin in 3mls NS Q4H x 7 days  
▪20% nebulized N-acetyl-cysteine (Mucomyst) and 0.5 ml albuterol sulphate in 3mls NS

Q4H x 7 days

**Questions:**

1. What is the significance of the following assessment findings: soot around the mouth, singed nasal hairs, hoarse voice, edema to lips, and inspissated mucus secretions? (2)
   1. Assessment findings such as soot around the mouth, singed nose hairs, and edematous lips are consistent with findings that likely indicate a smoke inhalation injury (Healthlink BC, 2018). In addition, other symptoms of smoke inhalation that are consistent with the assessment findings include hoarse voice and discoloured and thick mucous from the nose of mouth (Healthlink BC, 2018). If the smoke inhalation is not properly assessed and diagnosed, patients can experience airway edema which may lead to serious respiratory injury (Healthlink BC, 2018).
2. Why was it important to do a COHb and what does the result indicate? (1)
   1. Carboxyhemoglobin (COHb) is a stable complex of carbon monoxide (CO) that forms in the red blood cells when carbon monoxide is inhaled (eMedicine, 2019). Carbon monoxide binds to hemoglobin two-hundred times more readily than oxygen (EBMConsult, 2014).When CO binds to the hemoglobin, it can result in significant hypoxemia which makes it crucial that serum carbon monoxide levels are tested as soon as possible (EBMConsult, 2014) if carbon monoxide or methylene chloride poisoning is suspected (eMedicine, 2019). Elevated levels of serum COHb of at least 304% in non-smoker and 10% in smokers is considered to be outside of the expected physiological range (Hampson, Piantadosi, Thom & Weaver, 2012). With this in mind, our patient’s results indicate that the patient does not have CO poisoning.
3. What is the rationale for using heparin, acetylcysteine, and albuterol delivered as nebulized medications? (3)
   1. Acetylcysteine, or N-acetylcysteine, can be used as an antioxidant to reduce inflammation within the bronchial tubes and lung tissues (Healthline, 2020) and more specifically, it is used for patients with smoke inhalation injuries to treat mucolysis and to decrease pulmonary inflammation (Ashraf, Bajantri, Roa-Gomez, Venkatram, Cantin, & Diaz-Fuentes, 2018). Nebulized heparin is used as a localized anticoagulant within the lungs to inhibit pulmonary fibrin clot formation (Ashraf et al., 2018). Aerolized heparin therapy is beneficial for combating the increased procoagulatory activity that follows a smoke inhalation injury (Ashraf et al., 2018). Albuterol is a bronchodilator that is used to prevent and treat conditions that induce dyspnea (MedicinePlus, 2019). A bronchodilator is used to decrease airway resistance and improve respiratory mechanics, particularly, when suffering from a smoke inhalation injury (Rehberg, Maybauer, Enkhbaatar, Maybauer, Yamamoto & Traber, 2009). The use of nebulized medications allows for the rapid administration of the medication directly to the bronchioles, lungs, and respiratory tissue as needed (Galan, 2019). It had been noted that the combination therapy of nebulized heparin, acetylcysteine, and albuterol can significantly decreased the incidence of atelectasis and mortality following a smoke inhalation injury (Rehberg et al., 2009).
4. It was determined that Mr. E had approximately 53% of his Total Body Surface Area (TBSA) burned. Using the TBSA diagram (posted on Moodle) determine what percentage of the burns were partial thickness and what percentage were full thickness burns. (1)
   1. Partial-thickness = 22.65%
      1. Left thigh anterior = 3.15%
      2. Genitalia = 1%
      3. Posterior head = 3.5%
      4. Posterior neck = 1%
      5. Posterior trunk = 13%
      6. Right left posterior = 1%
   2. Full-thickness = 30.35%
      1. Anterior head = 3.5%
      2. Left upper anterior arm = 2%
      3. Right upper anterior arm = 2%
      4. Left lower anterior arm = 1.5%
      5. Left lower anterior arm = 1.5%
      6. Left anterior hand = 1.25%
      7. Right anterior hand = 1.25%
      8. Right upper posterior arm = 2%
      9. Left upper posterior arm= 2%
      10. Right lower posterior arm = 1.5%
      11. Left lower posterior arm = 1.5%
      12. Right posterior hand = 1.25%
      13. Left posterior hand = 1.25%
      14. Right posterior thigh = 4.75%
      15. Left posterior thigh = 3.15%
5. What are the differences between a partial thickness and full thickness burn wound? Make sure you comment on depth and healing capacity. (2)
   1. A full thickness burn, or third-degree burn, is a burn that involves all skin layers including the epidermis, dermis, hypodermis, and subcutaneous tissue (Healthline, 2016). The skin damage is extensive in a full-thickness burn and often penetrates below the adipose tissue (Healthline, 2016). Full-thickness burns also severely damage the nerve endings found within the affected area which reduces sensation and patient’s often don’t experience any pain (Healthline, 2016). The affected area often appears white, gray, and waxy or charred, back, and leathery (Healthline, 2016). Full thickness burns often require surgery to debride the wound and promote new tissue growth and may also require multiple skin grafts to cover the affected area (Healthline, 2016). In many cases, a full-thickness burn will heal by contraction and scar deposition which is why a full-thickness burn will also require long-term scar care throughout the healing process (Healthline, 2016). In addition, patients with full-thickness burns require IV fluids and medications to maintain blood pressure and reduce the risk of shock (Healthline, 2016). A partial-thickness, or second-degree burn, extends into both the epidermis and the dermis regions, including the papillary region of the dermis (WordSource, 2016). A burn that is a *deep* partial-thickness burn extends down into the reticular region of the dermis which can lead to significant scarring (WordSource, 2016). Partial-thickness burns are often erythematous due to inflammation of the dermal tissue (Johnson & Richard, 2003). In contrast to full-thickness burns, partial-thickness burns can develop fluid-filled blisters that expose sensitive nerve endings when they burst (Johnson & Richard, 2003). Because of this, partial-thickness burns can be extremely painful (Johnson & Richard, 2003). Partial-thickness wounds are often bright pink or red with brisk capillary refill and are characterized by moist blisters that are extremely painful (Johnson & Richard, 2003). A *superficial* partial-thickness burn will consist of moderate edema, spontaneous healing, and skin discolouration following the healing process whereas a *deep* partial-thickness burn will consist of significant edema, a slow healing process, and hypertrophic scars (Johnson & Richard, 2003).

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