**STUDENT NAME**:_____
Case Study- Medical Surgical I- Simulated Virtual Clinical Summer 2020
Week 4: Asthma

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***Scenario***

B.T., a 22-year-old man who lives in a small mountain town in Colorado, is highly allergic to dust and pollen; anxiety appears to play a role in exacerbating his asthma attacks. B.T's wife drove him to the clinic when his wheezing was unresponsive to fluticasone (Flovent) and ipratropium bromide (Atrovent) inhalers, he was unable to lie down, and he began to use accessory muscles to breathe. On arrival, his vital signs (VS) are 152/84, 124, 42, 38.0° C. B.T. is started on 4 L oxygen by nasal cannula ($O_2$/NC), an IV of $D_5W$ at KVO (keep vein open). His arterial blood gases (ABGs) are pH 7.31, $PaCO_2$ 48 mm Hg, $HCO_3$ 26 mmol/L, $PaO_2$ 55 mm Hg, $SaO_2$ 88%.

1. Identify the underlying pathophysiology of asthma.

Chronic inflammatory disorder that causes reversible bronchospasm because of bronchial hyperreactivity. Leukotrienes develop bronchoconstriction, bronchial hyperreactivity, edema, and eosinophilia. Histamine contributes to bronchospasm and inflammation. T cells release cytokines that maintain the damaging effects of asthma attack. Eosinophils migrate to reactive airway, compounding cell damage and airway edema. A cholinergic effect maintains bronchoconstriction, increased mucus production, and vasodilation.

2. The inflammatory response involves what mechanisms?

- Activated immunologic response
  -stimulates production of IgE
- Increased airway resistance
  -mucus fills the airway and inhibits the movement of air
- Decreased lung compliance
  -increased swelling of tissue makes it more difficult to expand lungs with inspiration
- Altered gas exchange
  -decreased VT means air doesn't reach alveoli and cannot take part in gas exchange, resulting in decreased PaO2
  -this may result in increased PaCO2

3. Are B.T.'s VS acceptable? State your rationale.

No his VS are not acceptable. His pulse is at 124 and his respirations are at 42. His blood pressure is elevated which could be due to the stress his body is currently under. His ABG'S are abnormal and he is acidotic. His oxygen levels are 88% which means he is not receiving a proper amount of oxygen.

4. Comment on B.T.'s $SaO_2$.

B.T. lives at high altitude
-although his PaO2 will be decreased at this altitude, his SaO2 should be above 90%; 88% or lower is the Medicare standard for home O2
-check the Centers for Medicare and Medicaid Services (CMS) for the latest regulations

5. Identify the drug classifications and actions of fl uticasone and ipratropium bromide.

Fluticasone is a corticosteroid. It stimulates glucocorticoid receptors in humans that produces a potent anti-inflammatory response. It is an oral inhalation that is used to treat chest tightness, difficulty breathing, wheezing and coughing. It works by decreasing swelling and irritation in the airways. Ipratropium bromide is an anticholinergic (parasympatholytic) agent, which blocks the muscarinic receptors of acetylcholine. It works by causing smooth muscles to relax helping patients to breathe more easily.

6. Are fluticasone and/or ipratropium appropriate for use during an asthma attack? Explain.

They are used to decrease swelling and irritation in the airways which helps to promote easier breathing which in BT's case would help improve his vital signs and improve his RR.

7. The physician orders albuterol 2.5 mg plus ipratropium 250 mcg nebulizer treatment STAT (immediately). What is the rationale for this order?

Albuterol is a bronchodialator used to treat his wheezing and shortness of breath. Ipratropium is used relaxes the muscles around airways to open up which will help BT to breathe more easily.

8. What is the rationale for immediately starting B.T. on $O_2$?

His body is under a lot of stress to try and breathe right now and he is not getting an adequate supply of oxygen to the body which is causing a build-up of CO2 in the body making him acidotic. He needs to immediately start receiving a proper amount of oxygen.

9. List five short-term interventions that may help relieve B.T.'s symptoms.

Short term interventions could be elevating the head of the bed, promoting deep breathing exercises, administering PRN medications, putting him on a continuous pulse ox reading, and putting him on oxygen.

**CASE STUDY PROGRESS**

After several hours of IV and PO rehydration and a second albuterol treatment, B.T.'s wheezing and chest tightness resolve, and he is able to expectorate his secretions. The physician discusses B.T.'s asthma management with him, and the patient says that his inhalers meet his needs on a day-to-day basis but fail him when he has an asthma attack. The physician discharges B.T. with a prescription for oral steroid "burst" (prednisone 40 mg/day ¥5 days) and albuterol metered-dose inhaler (MDI) 2 puffs q6h prn using a spacer and recommends that he call the pulmonary clinic for follow-up (F/U) with a pulmonary specialist.

10. What issues would you address in discharge teaching with B.T.?

Discuss what his triggers for his asthma are and encourage him to try his best to stay away from these. Discuss if he is properly taking his medications. Ask him to demonstrate how he takes his inhaler. Encourage him to make an asthma action plan to help keep is asthma under control.

**CASE STUDY PROGRESS**

You ask B.T. to demonstrate the use of his MDI. He vigorously shakes the canister, holds the aerosol-izer at an angle (pointing toward his cheek) in front of his mouth, and squeezes the canister as he takes a quick, deep breath.

11. What common mistakes has B.T. made when using the inhaler?

BT needs to sit or stand up straight shake his inhaler and tilt his head back slightly and breathe out all the way before putting the inhaler in his mouth. He also needs to breathe in slowly for 3 to 5 seconds not a quick deep breath. He then needs to hold breath for 10 seconds to allow medicine to go deeper into his lungs.

12. What would you teach B.T. about the use of his MDI?

It is important to keep track of how much medicine is left in his inhaler so he doesn't run out. Tech proper technique of using his MDI. Tech him to be using is regularly as prescribed.

13. B.T.’s wife asks about the possibility of B.T. having another attack. How would you respond?

With BT’s condition it is important to watch out for triggers and be diligent with taking his medications as prescribed and in the proper way. With doing these things he can significantly reduce his chances of having attacks.

14. If you have a postoperative patient with a history of asthma, what early signs and symptoms (S/S) would indicate respiratory distress? (List at least six.)

SIGNS/SYMPTOMS:
1. breathlessness
2. body position
3. respiratory rate
4. use of accessory respiratory muscles
5. breath sounds
6. heart rate (beats/min)
7. pulses paradoxus
8. mental status
9. PEF % predicted
10. $SaO_2$ on room air
11. $PaO_2$ on room air
12. $PaCO_2$ on room air

MODERATE:
1. talking
2. prefers sitting
3. increased
4. commonly
5. loud throughout expiration
6. 100-120
7. 10-25 mm Hg
8. usually agitated
9. 50-80%
10. 91-95%
11. >60 mm Hg
12. <42 mm Hg

SEVERE:
1. at rest
2. unable to recline
3. >30 breaths/min
4. usually
5. little air movement
6. >120
7. >25 mm Hg

8. usually agitated
9. <50% or response to therapy lasts <2 hrs
10. <91%
11. <60 mm Hg
12. >42 mm Hg

15. Identify four S/S of impending respiratory failure.

Difficulty breathing or shortness of breath, especially when active. coughing up mucous. wheezing. bluish tint to **the** skin, lips, or fingernails.