Respiratory Difficulty After Surgery

You arrive for your shift on the intensive care step-down unit and receive a change-of-shift report from the previous nurse about Mr. E. Mr. E is a 26-year-old who was admitted 2 days ago with acute abdominal pain and had an emergency appendectomy. Mr. E's appendix had ruptured by the time he came to the hospital, so his surgery was lengthy and required multiple irrigations of the peritoneal cavity. He has a Jackson-Pratt drain in place near his abdominal incision that has been draining moderate amounts of brown purulent fluid. He has a few bowel sounds and has been taking sips of water and ice chips without any nausea or abdominal discomfort. His abdominal dressing is dry and intact. Mr. E's wife and sister are sitting with him in his room.

Mr. E is receiving oxygen at 1 L/min via nasal cannula. His pulse oximetry reading had been running at 95% to 99%, but over the last 4 hours it has decreased to 89% to 90%. There is an order to titrate oxygen to keep his oxygen saturation at 90% or higher. His breath sounds have been decreased at the bases, with a few scattered crackles audible bilaterally. He cooperates when asked to cough, but his cough has been nonproductive. His indwelling catheter is draining clear yellow urine. The intake for the last 8 hours was 800 mL; his urine output was 625 mL.

Mr. E's cardiac monitor shows a sinus tachycardia with a rate of 102 beats/min. When his vital signs were measured an hour ago, his blood pressure was 148/76 mm Hg, pulse rate was 108 beats/min, respiratory rate was 28 breaths/min, and temperature was 101.4°F (38.6°C) orally.

Mr. E is receiving gentamicin (Gentacidin) 100 mg intravenously (IV) every 8 hours and ceftriaxone (Rocephin) 1 g IV every 12 hours. He used 26 mg of morphine sulfate from his patient-controlled analgesia (PCA) pump over the previous 8 hours. He has an IV line with 5% dextrose in normal saline infusing through a dual-lumen subclavian catheter at 80 mL/hr.

Samples for arterial blood gas (ABG) analysis and a complete blood count (CBC) have just been drawn, but results are not yet available on the electronic medical record. In addition, blood has been drawn for measurement of electrolyte, blood urea nitrogen (BUN), creatinine, and glucose levels. Determination of gentamicin peak and trough levels has been ordered for today, but blood samples have not yet been obtained.

1. Based on the information you have been given during change-of-shift report, what is your greatest concern for Mr. E?
   1. Purulent abdominal drainage
   2. Sinus tachycardia
   3. Decreased oxygen saturation
   4. Elevated temperature

2. You review Mr. E's medications and note that he has a dose of gentamicin scheduled at 10 AM. When will you ask the laboratory to draw blood for determination of gentamicin trough level?
   1. 9:00 AM
   2. 9:45 AM
   3. 11:30 AM
   4. 2:00 PM

   When you go into Mr. E's room to assess him, you find him sitting in a chair at the bedside. His respirations look labored, with a rate of 30 breaths/min. His continuous pulse oximetry readings indicate that his oxygen saturation is 88% to 89%. He looks anxious and says, "I'm having a little trouble catching my breath." His lung sounds are still decreased at the bases, with persistent fine crackles.

3. What action will you take next?
   1. Assist him back to bed
   2. Increase the oxygen flow rate to 6 L/min
   3. Administer morphine IV
   4. Finish the rest of his head-to-toe assessment

The ABG analysis is completed and the following results are faxed to the unit:

- Arterial partial pressure of carbon dioxide ($P_{\text{CO}_2}$) 30 mm Hg
- Arterial partial pressure of oxygen ($P_{\text{O}_2}$) 54 mm Hg
- Bicarbonate ($\text{HCO}_3^-$) 20 mEq/L
- $O_2$ saturation 88%
- pH 7.34
4. Which action do you anticipate next based on the ABG results?
   1. Place Mr. E on oxygen at 15 L/min via a nonrebreather mask
   2. Administer sodium bicarbonate 50 mEq IV
   3. Administer morphine to slow the respiratory rate
   4. Continue to monitor Mr. E’s respiratory status and vital signs

5. The CBC results are now also available. Which result causes you most concern?
   1. Hematocrit of 37%
   2. Hemoglobin level of 10.5 g/dL
   3. White blood cell count of 24,000/mm³
   4. Platelet count of 120,000/mm³

You realize that Mr. E’s condition is unstable and that you will not have time to assess or provide care for your other assigned client, Ms. O. Ms. O is a diabetic patient who was admitted yesterday with pyelonephritis and hyperglycemia. She is receiving a regular insulin infusion (Novolin R) using the hospital’s standard insulin sliding-scale protocols and needs to have a blood glucose monitoring every hour. Her temperature has decreased from 102° F to 100.6° F (38.9° C to 38.1° C) since IV cefazolin (Cefzox) was started yesterday.

6. Which staff member is best to assign to care for Ms. O?
   1. An RN who has 10 years of experience on the pediatric unit and has floated to the step-down unit for the day
   2. A newly graduated RN who has finished a 3-month orientation and is scheduled for the first day without a preceptor
   3. An on-call RN with 5 years of experience on the step-down unit who will be able to arrive in about 1 hour
   4. An experienced RN from a staffing agency who is on orientation to the unit today in preparation for a 6-month assignment

7. After 15 minutes of oxygen administration using the nonrebreather mask, Mr. E’s pulse oximeter still indicates that the oxygen saturation is 88% to 89%. What complication is most likely, based on your ongoing assessments of this client?
   1. Aspiration pneumonia
   2. Pulmonary embolism
   3. Spontaneous tension pneumothorax
   4. Acute respiratory distress syndrome (ARDS)

8. Using the SBAR (situation, background, assessment, recommendation) format, indicate the order in which you will communicate your concerns about Mr. E to the physician.
   1. “Today, Mr. E’s pulse oximetry reading is only 88% to 90%, although he is receiving oxygen by a nonrebreather mask. I am concerned he may be developing ARDS.”
   2. “This is the nurse caring for Mr. E. I’m calling because the client is complaining of dyspnea and has increasing hypoxemia.”
   3. “I think that you need to come and evaluate this client as soon as possible; he may need mechanical ventilation.”
   4. “Mr. E had an emergency appendectomy 2 days ago and has had purulent abdominal drainage, but has not had any respiratory difficulty until today.”

9. Mr. E’s surgeon arrives and asks the hospital intensivist to consult. The intensivist gives these orders after assessing Mr. E. Which one will you implement first?
   1. Place the client on bilevel positive airway pressure (BiPAP) ventilation.
   2. Obtain an intubation tray and assist with client intubation.
   3. Administer nebulized albuterol (Proventil) every 4 hours.
   4. Obtain blood, urine, and abdominal drainage samples for culture.

   The intensivist orders that Mr. E be transferred to the intensive care unit (ICU) and tells you to obtain the necessary equipment for intubation and mechanical ventilation. After the transfer, the intensivist proceeds to intubate Mr. E.

10. Which of these is the most accurate way to confirm correct placement of the endotracheal (ET) tube?
    1. Obtain a chest radiograph
    2. Auscultate bilateral breath sounds
    3. Use an end-tidal carbon dioxide detector
    4. Check pulse oximetry level

   Mr. E’s ET tube placement is confirmed and the ET tube is secured. You note that the 23-cm mark on the ET tube is at the level of Mr. E’s teeth. Mr. E is connected to a positive pressure ventilator with the following settings:

   | Fraction of inspired oxygen (FiO₂) | 60% |
   | Mode | Synchronized intermittent mandatory ventilation |
   | Positive end-expiratory pressure | 10 cm |
   | Respiratory rate | 14 breaths/min |
   | Tidal volume (V₁) | 800 mL |
The following ABG values are obtained 30 minutes after Mr. E is placed on the ventilator:

- HCO₃⁻ = 20 mEq/L
- O₂ saturation = 90%
- Paco₂ = 50 mm Hg
- PaO₂ = 60 mm Hg
- pH = 7.31

11. Which ventilator change do you anticipate based on your analysis of these ABG values?
   1. Increase the FIO₂ to 70%
   2. Change the rate on the ventilator to 20 breaths/min
   3. Increase the VT to 1000 mL
   4. Change to continuous mandatory ventilation (CMV) mode

You assist with the insertion of Mr. E's pulmonary artery catheter (Swan-Ganz catheter) so that pulmonary artery wedge pressure (PAWP) can be monitored. An arterial line is also inserted into the left radial artery. In addition, you insert a nasogastric (NG) tube and connect it to low intermittent suction.

When you reassess Mr. E, he has scattered crackles audible throughout both lung fields. He is restless and needs frequent reminding not to pull on the ET tube or NG tube. His urine output over the last 2 hours has been 50 mL of clear amber urine. His bowel sounds are slightly hypoactive but are audible in all four abdominal quadrants. His abdominal dressing is still dry and intact, and the drainage in the Jackson-Pratt drain is unchanged. You obtain the following vital sign and PAWP values for Mr. E:

- Blood pressure = 100/46 mm Hg
- Heart rate = 124 beats/min (sinus tachycardia)
- O₂ saturation = 90%
- PAWP = 3 mm Hg
- Respiration = 24 breaths/min
- Temperature = 102.1°F (38.9°C)

12. Based on these data, which collaborative interventions will you anticipate for Mr. E? (Select all that apply.)
   1. Increase IV rate to 150 mL/hr
   2. Administer furosemide (Lasix) 40 mg IV
   3. Start norepinephrine (Levophed) infusion
   4. Give diltiazem (Cardizem) 5 mg IV
   5. Infuse total parenteral nutrition at 70 mL/hr
   6. Administer high-calorie enteral feeding at 25 mL/hr
   7. Obtain blood, sputum, and urine specimens for culture

13. Although his oxygen saturation remains at 90%, Mr. E continues to be restless and needs frequent reminders not to pull at the ET tube. Which method to reduce his anxiety and decrease the risk for accidental extubation will you try first?
   1. Obtain an order to restrain his hands, and apply soft wrist restraints
   2. Administer neuromuscular blockade medications and sedatives
   3. Have a family member stay at Mr. E's bedside and reassure him
   4. Remind Mr. E frequently that he needs the ET tube to breathe

14. You are working with a student who is preparing to suction Mr. E's ET tube. Which action by the student requires that you intervene immediately?
   1. The student increases the FIO₂ to 100% for 5 minutes before suctioning.
   2. The student uses an open-suction technique to perform the suctioning.
   3. The student administers morphine 2 mg IV per standing order before suctioning.
   4. The student applies suction to the catheter while inserting it into the ET tube.

15. Which action is most important to implement to prevent Mr. E from developing ventilator-associated pneumonia (VAP)?
   1. Change the ventilator tubing and humidifier daily
   2. Avoid giving intermittent bolus enteral feedings
   3. Keep the head of the bed elevated to at least 30 degrees
   4. Use continuous pulse oximetry monitoring

16. All of these activities are included in the standard plan of care for a client with ARDS. Which activities can you delegate to an experienced LPN/LVN? (Select all that apply.)
   1. Provide oral care every 2 hours
   2. Place the client in the prone position for 4 hours every shift
   3. Check residuals for enteral feedings every 4 hours
   4. Assess breath sounds every 4 hours
   5. Check rectal temperature every 4 hours
   6. Suction the ET tube as needed
   7. Educate the client and family about routine nursing care
   8. Check the PAWP every 2 hours
   9. Obtain arterial pressures from the arterial line every hour

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You are documenting the events of the morning at the ICU nurse's station when you hear the ventilator alarm. You enter the room and find that the high pressure alarm is sounding and that Mr. E appears very agitated, with a respiratory rate of 40 breaths/min. The continuous pulse oximeter indicates an oxygen saturation of 81%. The blood pressure displayed on the arterial line monitor is 98/44 mm Hg. Mr. E's cardiac monitor shows a sinus tachycardia with a rate of 142 beats/min.

17. What action will you accomplish first?
   1. Listen to Mr. E's breath sounds
   2. Increase the FIO2 setting to 100%
   3. Check the ventilator settings and readouts
   4. Suction Mr. E's ET tube after hyperoxygenating him

18. You do not hear any breath sounds over Mr. E's right side, and the right side does not expand much with inspiration. When you check the location of the ET tube at the client's teeth, you find that it is still at the 23-cm mark. What complication of intubation and mechanical ventilation do you suspect?
   1. Inadvertent extubation
   2. Tension pneumothorax
   3. ET tube displacement
   4. Aspiration pneumonia

19. The intensivist arrives quickly and inserts a chest tube into the right anterior chest at the second intercostal space. You assess Mr. E after the chest tube insertion. Which finding is most important to report to the physician?
   1. A large number of air bubbles appear in the water-seal chamber during expiration.
   2. Continuous bubbling occurs throughout the respiratory cycle in the suction control chamber.
   3. 100 mL of blood drains into the collection chamber immediately after the chest tube insertion.
   4. The client indicates that he has pain with every ventilator-assisted inspiration.

20. Just before you prepare to give a change-of-shift report to the oncoming RN, you review Mr. E's other laboratory test results for today. Which information is most important to communicate to the physician?
   1. Blood glucose level of 140 mg/dL
   2. Potassium level of 5.1 mEq/L
   3. Sodium level of 134 mEq/L
   4. BUN level of 52 mg/dL