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| **Maryland Next Gen NCLEX Test Bank Project**  **September 1, 2022** | | |
| **Case Study Topic**:  (& standalone bowtie) | Tension pneumothorax | **Author:** Denyce Watties-Daniels, DNP RN  Coppin State University |

**Case Summary**

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| A 58-year-old female was involved in a severe motor vehicle accident. The seat belt pressed against her chest during the collision impact. The client has labored breathing and chest pain with inhalation. She is admitted to the ICU and diagnosised with a tension pneumothorax. |

**Objectives**

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| 1. Recognize complications of chest trauma. 2. Identify signs of rapid deterioration in respiratory status. 3. Assist with invasive procedures. 4. Monitor and maintain devices used for chest drainage. 5. Evaluate the effectiveness of nursing interventions. |

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| **Case Study Link** | **Case Study QR Code** |
| <https://umaryland.az1.qualtrics.com/jfe/form/SV_3fOyPrYYPe4DUKq> |  |
| **Bow-tie QR Code** | **Bow-tie Link**  <https://umaryland.az1.qualtrics.com/jfe/form/SV_3UTFzmsmqzPdKey> |

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| **Case References** |
| Ignatavicius, D. D. & Workman, M. L. (2021). Medical-surgical nursing: Patient-centered collaborative care. (10th Edition). St. Louis: Elsevier. |
| Capriotti, T. (2020). *Pathophysiology: Introductory concepts and clinical perspectives, 2nd ed*. Pennsylvania: F. A. Davis |

**Case Study 1 of 6**

A 58-year-old female in a severe motor vehicle accident was admitted to the ICU with fractured ribs.

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| --- | --- |
| **Nurses’ Notes** | |
| **1500:** Lethargic but easy to arouse. Has chest pain with inspiration and difficulty breathing. Chest pain increases to 5/10 with inspiration. Absent breath sounds on anterior and posterior left lower chest wall. Asymmetrical chest movement- less on the left side; Cyanosis of the lips and fingertips. Bruising on the anterior chest from the seat belt. IV started 0.9 NS at 100 ml/hr in left arm. Started on 4 liters oxygen per nasal cannula. | | | |
| **Vital Signs** | |
| Time | **1500** | |
| Temp | 98.4 (F) 36.8 (C) | |
| P | 98/ min | |
| RR | 28/min | |
| B/P | 138/90 | |
| Pulse oximeter | 89% | |
| Pain | 5/10 | |

* Which assessment findings require immediate follow-up? Select all that apply.
* Heart rate of 98/ min
* Respiratory rate of 28/min \*
* Pulse oximeter of 89% \*
* Blood Pressure of 138/90
* Pain 5/10 with inspiration\*
* Temperature of 98.4 (F) 36.8 (C)
* Absent breath sounds \*
* Bruising on the anterior chest
* Cyanosis of lips and fingertips \*

**Scoring Rule: +/-**

**Rationale:** The nurse should assess the client’s airway, breathing, and circulation. The client’s respiratory rate is high and the pulse oximeter is below normal. intervention. Absent breath sounds and cyanosis indicate respiratory compromise and require immediate intervention. Pain assessment that increases with inspiration requires further assessmessment and intervention.

**Case Study 2 of 6**

A 58-year-old female in a severe motor vehicle accident was admitted to the ICU with fractured ribs.

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| --- | --- | --- |
| **Nurses’ Notes** | | |
| **1500:** Lethargic but easy to arouse. Has chest pain with inspiration and difficulty breathing. Chest pain increases to 5/10 with inspiration. Absent breath sounds on anterior and posterior left lower chest wall. Asymmetrical chest movement- less on the left side; Cyanosis of the lips and fingertips. Bruising on the anterior chest from the seat belt. IV started 0.9 NS at 100 ml/hr in left arm. Started on 4 liters oxygen per nasal cannula.  **1530:** Client has increasing shortness of breath, labored breathing, tachycardic, and dropping blood pressure. Muffled heart sounds. Client stuporous. Tracheal deviation noted. | | | | | | | |
| **Vital Signs** | | |
| Time | **1500** | | | **1530** | |
| Temp | 98.4 (F) 36.8 (C) | | | 98.0 (F) 36.6 (C) | |
| P | 98/ min | | | 112/ min | |
| RR | 28/min | | | 36/min | |
| B/P | 138/90 | | | 98/60 | |
| Pulse oximeter | 89% | | | 80% 4L NC | |
| Pain | 5/10 | | | 10/10 | |
| **Laboratory Report** | |
| **Lab** | | **Results** | | | **Reference range** | |
| ABG pH | | 7.25 | | | 7.35-7.45 | |
| ABG P02 | | 50 mm Hg | | | 75-100 mm Hg | |
| ABG PC02 | | 80 mm Hg | | | 35-45 mmHg | |
| ABG SaP02 | | 84 % | | | 95-100% | |
| ABG HC03 | | 27 mEq/L | | | 22-26 mEq/L | |

The nurse reviews the blood gas report and reassesses the client.

* For each client finding, click to indicate if the finding is consistent with pulmonary contusion, cardiac tamponaide, or tension pneumothorax. Each findings may be consistent with more than on condition. Each column must have at least one finding.

|  |  |  |  |
| --- | --- | --- | --- |
| **Finding** | **Pulmonary Contussion** | **Cardiac**  **Tamponaide** | **Tension**  **Pneumothorax** |
| Absent breath sounds |  |  | \* |
| Asymmetrical chest movement |  |  | \* |
| Blood gas | \* |  | \* |
| Hypotension | \* | \* | \* |
| History of chest trauma | \* | \* | \* |
| Muffled heart sounds |  | \* | \* |
| Chest pain | \* | \* | \* |
| Tracheal deviation |  |  | \* |

**Scoring Rule: +/-**

**Rationale:** Pulmonary contusions, cardiac tamponade, and a pneumothorax all may result after severe chest trauma and may present as labored breathing and chest pain. All can cause tachycardia and hypotension but by different mechanisms. Pulmonary contusions are associated with frank bleeding that can lead to shock. A pneumothorax and cardiac tamponade are associated with decreased cardiac output. Respiratory acidosis can be seen with pulmonary contusions and pneumothorax but not a cardiac tamponade Asymmetrical chest movement, absent breath sounds, and tracheal deviation are symptoms of a pneumothorax.

**Case Study 3 of 6**

A 58-year-old female in a severe motor vehicle accident was admitted to the ICU with fractured ribs.

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| **Nurses’ Notes** | | |
| **1500:** Lethargic but easy to arouse. Has chest pain with inspiration and difficulty breathing. Chest pain increases to 5/10 with inspiration. Absent breath sounds on anterior and posterior left lower chest wall. Asymmetrical chest movement- less on the left side; Cyanosis of the lips and fingertips. Bruising on the anterior chest from the seat belt. IV started 0.9 NS at 100 ml/hr in left arm. Started on 4 liters oxygen per nasal cannula.  **1530:** Client has increasing shortness of breath, labored breathing, tachycardic, and dropping blood pressure. Muffled heart sounds. Client stuporous. Tracheal deviation noted. | | | | | | | |
| **Vital Signs** | | |
| Time | **1500** | | | **1530** | |
| Temp | 98.4 (F) 36.8 (C) | | | 98.0 (F) 36.6 (C) | |
| P | 98/ min | | | 112/ min | |
| RR | 28/min | | | 36/min | |
| B/P | 138/90 | | | 98/60 | |
| Pulse oximeter | 89% | | | 80% 4L NC | |
| Pain | 5/10 | | | 10/10 | |
| **Laboratory Report** | |
| **Lab** | | **Results** | | | **Reference range** | |
| ABG pH | | 7.25 | | | 7.35-7.45 | |
| ABG P02 | | 50 mm Hg | | | 75-100 mm Hg | |
| ABG PC02 | | 80 mm Hg | | | 35-45 mmHg | |
| ABG SaP02 | | 84 % | | | 95-100% | |
| ABG HC03 | | 27 mEq/L | | | 22-26 mEq/L | |

* Complete the following sentence by choosing from the list of options.

|  |  |
| --- | --- |
| The client is most likely experiencing a | cardiac tamponade |
| pulmonary contusion |
| tension pneumothorax \* |
| as most evidenced by the | laboratory report |
| respiratory assessment\* |
| cardiovascular assessment |

**Scoring Rule: Rationale**

**Rationale:** The client is most likely experiencing tension pneumothorax most evidenced by increasing shortness of breath, hypoxia, lung sounds, and tracheal deviation.

**Case Study 4 of 6**

A 58-year-old female in a severe motor vehicle accident was admitted to the ICU with fractured ribs.

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| **Nurses’ Notes** | | |
| **1500:** Lethargic but easy to arouse. Has chest pain with inspiration and difficulty breathing. Chest pain increases to 5/10 with inspiration. Absent breath sounds on anterior and posterior left lower chest wall. Asymmetrical chest movement- less on the left side; Cyanosis of the lips and fingertips. Bruising on the anterior chest from the seat belt. IV started 0.9 NS at 100 ml/hr in left arm. Started on 4 liters oxygen per nasal cannula.  **1530:** Client has increasing shortness of breath, labored breathing, tachycardic, and dropping blood pressure. Muffled heart sounds. Client stuporous. Tracheal deviation noted. | | | | | | | |
| **Vital Signs** | | |
| Time | **1500** | | | **1530** | |
| Temp | 98.4 (F) 36.8 (C) | | | 98.0 (F) 36.6 (C) | |
| P | 98/ min | | | 112/ min | |
| RR | 28/min | | | 36/min | |
| B/P | 138/90 | | | 98/60 | |
| Pulse oximeter | 89% | | | 80% | |
| Pain | 5/10 | | | 10/10 | |
| **Laboratory Report** | |
| **Lab** | | **Results** | | | **Reference range** | |
| ABG pH | | 7.25 | | | 7.35-7.45 | |
| ABG P02 | | 50 mm Hg | | | 75-100 mm Hg | |
| ABG PC02 | | 80 mm Hg | | | 35-45 mmHg | |
| ABG SaP02 | | 84 % | | | 95-100% | |
| ABG HC03 | | 27 mEq/L | | | 22-26 mEq/L | |

* Which of the following orders the nurse anticipate? Select all that apply
* Assist with thoracentesis\*
* Administer pain medication\*
* Insert foley
* Obtain a stat chest X-ray\*
* Set up a chest drainage system\*
* Transfuse a unit of blood

**Scoring Rule: +/-**

**Rationale:** The client is most likely experiencing a tension pneumothorax. The nurse must prepare for immediate thoracentesis to relieve chest pressure. Treatment then will include inserting a chest tube and connecting it to low intermittent suction via a chest drainage system to re-inflate the lung. ChestXray is done before chest tube placement if time allows. If not it is obtained soon after. The nurse should administer pain medication before the provider performs the thoracentesis and inserts the chest tube. Decisions on whether the client needs blood will be made if the client still has shock or evidence of internal bleeding after the pneumothorax is evacuated. There is no need to insert a foley catheter

**Case Study 5 of 6**

A 58-year-old female in a severe motor vehicle accident was admitted to the ICU with fractured ribs.

|  |  |  |
| --- | --- | --- |
| **Nurses’ Notes** | | |
| **1500:** Lethargic but easy to arouse. Has chest pain with inspiration and difficulty breathing. Chest pain increases to 5/10 with inspiration. Absent breath sounds on anterior and posterior left lower chest wall. Asymmetrical chest movement- less on the left side; Cyanosis of the lips and fingertips. Bruising on the anterior chest from the seat belt. IV started 0.9 NS at 100 ml/hr in left arm. Started on 4 liters oxygen per nasal cannula.  **1530:** Client has increasing shortness of breath, labored breathing, tachycardic, and dropping blood pressure. Muffled heart sounds. Client stuporous. Tracheal deviation noted.  **1545**: Chest Xray obtained. Medicated with morphine. The provider used a 14 gauge spinal needle to aspirate air from the chest cavity and inserted a 28F chest tube in the left lower chest wall. Chest tube was connected to 20 cm wall suction and water seal drainage. Fluctuations noted in water seal chamber. 20 ml of light red drainage collected in drainage chamber. Rales are heard in right lung fields. Diminished breath sounds on the left. | | | | | | | | |
| **Vital Signs** | | |
| Time | **1500** | | | **1530** | | **1545** |
| Temp | 98.4 (F) 36.8 (C) | | | 98.0 (F) 36.6 (C) | | 98.0 (F) 36.6 (C) |
| P | 98/ min | | | 112/ min | | 80/ min |
| RR | 28/min | | | 36/min | | 22/min |
| B/P | 138/90 | | | 98/60 | | 128/70 |
| Pulse oximeter | 89% | | | 80% 4L NC | | 95% 4L NC |
| Pain | 5/10 | | | 10/10 | | 5/10 |
| **Laboratory Report** | |
| **Lab** | | **Results** | | | **Reference range** | | |
| ABG pH | | 7.25 | | | 7.35-7.45 | | |
| ABG P02 | | 50 mm Hg | | | 75-100 mm Hg | | |
| ABG PC02 | | 80 mm Hg | | | 35-45 mmHg | | |
| ABG SaP02 | | 84 % | | | 95-100% | | |
| ABG HC03 | | 27 mEq/L | | | 22-26 mEq/L | | |
| **Diagnostic Reports** | |  | | | | | |
| Chest Xray: Fracture of #6-7 ribs on left chest and large tension pneumo thorax | | | | | | | |

The client is diagnosed with a pneumothorax and the provider places a chest tube.

* For each nursing action, click to specify if the action is indicated/ not indicated.

|  |  |  |
| --- | --- | --- |
| **Nursing Action** | **Indicated** | **Not indicated** |
| Morphine sulfate IV as needed | \* |  |
| Position drainage system at heart level |  | \* |
| Ambulate in hallway |  | \* |
| Monitor fluctuations in water seal chamber | \* |  |
| Obtain a repeat chest Xray in morning | \* |  |
| Document chest tube drainage every shift | \* |  |
| Dressing change to chest dressing every shift |  | \* |

**Scoring Rule: 0/1**

**Rationale:** The nurse should administer pain medications to manage the client’s pain before and after the insertion of the chest tube and as needed after. If the chest tube is connected to a water seal drainage, the system should be kept below the level of the insertion to promote drainage. The nurse should monitor the water seal for fluctuations which indicate the system is functioning properly. Any drainage should be recorded as output. A chest X-ray in the morning will document progressive inflation of the lung. The client is stuporous and should not ambulate. An occlusive dressing is applied to the chest tube insertion site to prevent air from leaking around the tube. This dressing should not be manipulated to avoid the possibility of air entering the chest cavity.

**Case Study 6 of 6**

A 58-year-old female in a severe motor vehicle accident was admitted to the ICU with fractured ribs.

|  |  |  |
| --- | --- | --- |
| **Nurses’ Notes** | | |
| **1500:** Lethargic but easy to arouse. Has chest pain with inspiration and difficulty breathing. Chest pain increases to 5/10 with inspiration. Absent breath sounds on anterior and posterior left lower chest wall. Asymmetrical chest movement- less on the left side; Cyanosis of the lips and fingertips. Bruising on the anterior chest from the seat belt. IV started 0.9 NS at 100 ml/hr in left arm. Started on 4 liters oxygen per nasal cannula.  **1530:** Client has increasing shortness of breath, labored breathing, tachycardic, and dropping blood pressure. Muffled heart sounds. Client stuporous. Tracheal deviation noted.  **1545**: Chest Xray obtained. Medicated with morphine. The provider used a 14 gauge spinal needle to aspirate air from the chest cavity and inserted a 28F chest tube in the left lower chest wall Chest tube was connected to 20 cm wall suction and water seal drainage. Fluctuations noted in water seal chamber. 20 ml of light red drainage collected in drainage chamber. Rales are heard in right lung fields. Diminished breath sounds on the left.  **1600**: Client resting in bed. Chest tube draining a small amount of light red drainage in the collection chamber. Symmetrical chest movement noted. Lips and fingertips are pink. | | | | | | | | | |
| **Vital Signs** | | |
| Time | **1500** | | | **1530** | | **1545** | **1600** | |
| Temp | 98.4 (F) 36.8 (C) | | | 98.0 (F) 36.6 (C) | | 98.0 (F) 36.6 (C) | 98.0 (F) 36.6 (C) | |
| P | 98/ min | | | 112/ min | | 80/ min | 72/min | |
| RR | 28/min | | | 36/min | | 22/min | 20/min | |
| B/P | 138/90 | | | 98/60 | | 128/70 | 124/74 | |
| Pulse oximeter | 89% | | | 80% 4L NC | | 95%4L NC | 98% RA | |
| Pain | 5/10 | | | 10/10 | | 5/10 | 5/10 | |
| **Laboratory Report** | |
| **Lab** | | **Results** | | | **Reference range** | | |
| ABG pH | | 7.25 | | | 7.35-7.45 | | |
| ABG P02 | | 50 mm Hg | | | 75-100 mm Hg | | |
| ABG PC02 | | 80 mm Hg | | | 35-45 mmHg | | |
| ABG SaP02 | | 84 % | | | 95-100% | | |
| ABG HC03 | | 27 mEq/L | | | 22-26 mEq/L | | |
| **Diagnostic Reports** | |  | | | | | |
| Chest Xray: Fracture of #6-7 ribs on left chest and large tension pneumo thorax | | | | | | | |

The nurse reassesses the client

* Complete the following sentence by choosing from the list of options.

|  |  |
| --- | --- |
| The nurse determines the client’s status is | improving \* |
| deteriorating |
| unchanged |
| The nurse should now | check for air leaks |
| obtain a stat blood gas |
| monitor breath sounds\* |

**Scoring Rule: 0/1**

**Rationale**: The vital signs indicate the client is improving. The nurse should continue monitoring the client, including assessing the lung sounds for improvement in airflow in the damaged lung. A blood gas may not be needed if the client shows enough improvement. There is no need to cahck for air leaks in the system appears to be functioning.

**Bowtie**

A 58-year-old female in a severe motor vehicle accident was admitted to the ICU with fractured ribs.

|  |  |  |
| --- | --- | --- |
| **Nurses’ Notes** | | |
| **1500:** Lethargic but easy to arouse. Has chest pain with inspiration and difficulty breathing. Chest pain increases to 5/10 with inspiration. Absent breath sounds on anterior and posterior left lower chest wall. Asymmetrical chest movement- less on the left side; Cyanosis of the lips and fingertips. Bruising on the anterior chest from the seat belt. IV started 0.9 NS at 100 ml/hr in left arm. Started on 4 liters oxygen per nasal cannula.  **1530:** Client has increasing shortness of breath, labored breathing, tachycardic, and dropping blood pressure. Muffled heart sounds. Client stuporous. Tracheal deviation noted. | | | | | | | |
| **Vital Signs** | | |
| Time | **1500** | | | **1530** | |
| Temp | 98.4 (F) 36.8 (C) | | | 98.0 (F) 36.6 (C) | |
| P | 98/ min | | | 112/ min | |
| RR | 28/min | | | 36/min | |
| B/P | 138/90 | | | 98/60 | |
| Pulse oximeter | 89% | | | 80% 4L NC | |
| Pain | 5/10 | | | 10/10 | |
| **Laboratory Report** | |
| **Lab** | | **Results** | | | **Reference range** | |
| ABG pH | | 7.25 | | | 7.35-7.45 | |
| ABG P02 | | 50 mm Hg | | | 75-100 mm Hg | |
| ABG PC02 | | 80 mm Hg | | | 35-45 mmHg | |
| ABG SaP02 | | 84 % | | | 95-100% | |
| ABG HC03 | | 27 mEq/L | | | 22-26 mEq/L | |

The nurse assesses the client 30 minutes after admission.

* Complete the diagram below by dragging the choices provided to specify what condition the client is most likely experiencing, and two actions the nurse should take to address the condition, and parameters the nurse should monitor to assess the client’s progress.

|  |  |  |
| --- | --- | --- |
| **Action to take** |  | **Parameters to monitor** |
|  | **Condition most likely experiencing** |  |
| **Action to take** |  | **Parameters to Monitor** |
|  | | |
| **Action to take** | **Potential Conditions** | **Parameters to Monitor** |
| Obtain a Stat Chest Xray\* | Cardiac tamponade | Blood pressure\* |
| Administer a diuretics | Pulmonary contusion | Pain levels |
| Call Rapid Response Team \* | Pulmonary embolism | Breath sounds\* |
| Administer a fluid bolus | Tension pneumothorax \* | Urine output |
| Prepare for intubation |  | Hourly blood gases |

**Scoring Rule: 0/1**

**Rationale**: The vital signs, absent breath sounds, and tracheal deviations indicate the client is developing a tension pneumothorax. The nurse should call the rapid response team to administer emergency treatment to the client, such as inserting a chest tube. A stat chest Xray can help confirm the diagnosis. Improved respiratory status and improved hemodynamic status(blood pressure/pulse) are the best indicators the tension pneumo thorax is resolved. Pain may stay elevated because of rib fractures. Blood gases are obtained as needed. If the respiratory improves another blood gas may not be needed after treatment.