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| **Maryland Next Gen NCLEX Test Bank Project**  **September 1, 2022; Revised April 17, 2023** | | | |
| **Case Study Topic**:  (& stand-alone bowtie) | Liver Failure | **Author:** | Mary DiBartolo, PhD, RN-BC, CNE, FGSA, FAAN  Salisbury University |

**Case Summary**

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| 67-year-old male client with history of alcohol use disorder and recent episode of binge drinking is admitted to medical-surgical unit with ascites and symptoms of confusion. Learner should recognize symptoms of worsening cirrhosis and be alert to development of hepatic encephalopathy and other complications with liver failure, and recognize indicators of changes in condition. |

**Objectives**

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| 1. Understands pathophysiologic basis of portal hypertension and symptoms of cirrhosis  2. Identifies abnormal physical and laboratory findings associated with cirrhosis  3. Prioritizes actions to address abnormal assessment findings and symptoms  3. Plans care for the client with cirrhosis  4. Monitors for complications in the client with cirrhosis  5. Recognizes positive and adverse outcomes from treatment for complications of cirrhosis |

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| **Case Study Link** | **Case Study QR Code** |
| <https://umaryland.az1.qualtrics.com/jfe/form/SV_6DPuGJHvhYznZqK> |  |
| **Bow-tie QR Code** | **Bow-tie Link** |
|  | <https://umaryland.az1.qualtrics.com/jfe/form/SV_elnE0QTNJ9wuZLw> |

**Case References**

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| 1. Ignatavicius et al. (2021). *Medical-Surgical Nursing: Concepts for Interprofessional Collaborative Care* |

**Case Study Question 1 of 6**

The nurse is caring for a 67-yr-old male with history of alcohol use disorder and cirrhosis admitted to the medical-surgical unit.

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| **Nurses’ Notes** |
| **DAY 1 1000**. Admitted with ascites and confusion; oriented to person only. Has 25-yr history of alcohol use disorder, mild hypertension, and gastroesophageal reflux disease. Drowsy and dozing off and on, mildly dyspneic, appears thin and malnourished; somewhat agitated answering questions. States has not had a drink in a few weeks; sister who accompanied him notes recent drinking binge a week ago. Placed on oxygen 2 L per nasal cannula. Bulging flanks and peripheral edema noted. Bloodwork sent to lab. Admission weight 142 lbs (64.5 kg). | | | | | | | |
| **Vital Signs** |
| Time | Day1: 1000 | |
| Temp | 98.4F/36.8C | |
| P | 85 | |
| RR | 22 | |
| B/P | 142/72 | |
| Pulse oximeter | 92 on 2L NC | |
| Glasgow Coma (3-15) | 12 | |
| Abdominal girth | 95 cm/37.5in | |
| **Medications** |
| Medication | | Dosage/Frequency/ Route | | | Time | | |
| metoprolol XL | | 50 mg daily | | | 1000 |  |  |
| **Laboratory Report** |
| Lab | Results | | | Reference range | | | |
| BUN | 22 mg/dL | | | 10-20 mg/dL | | | |
| Glucose (fasting) | 70 mg/dL | | | Normal < 99 mg/dL | | | |
| Ammonia | 94 mcg/dL | | | 10-80 mcg/dL | | | |
| Albumin | 3.2 g/dL | | | 3.4-5.4 g/dL | | | |

The nurse assesses the client upon admission to the unit.

* Which 2 findings are the **most** concerning?
* Blood pressure
* BUN
* Neurologic assessment\*
* Peripheral edema
* Dyspnea\*
* Albumin level
* Glucose

**Scoring Rule: 0/1**

**Rationale:** The most concerning signs are dyspnea which indicates hepatopulmonary syndrome from worsening ascites, as well as a decline in neurologic function (drowsy off and on, oriented to name only, slightly agitated, etc.). BUN slightly elevated but due to dehydration vs. acute kidney failure as creatinine is normal. A low serum albumin level is expected due to cirrhosis and malnourished condition from alcohol use disorder.

**Case Study Question 2 of 6**

The nurse is caring for a 67-yr-old male with history of alcohol use disorder and cirrhosis admitted to the medical-surgical unit.

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| **Nurses’ Notes** |
| **DAY 1 1000.** Admitted with ascites and confusion; oriented to person only. Has 25-yr history of alcohol use disorder, mild hypertension, and gastroesophageal reflux disease. Drowsy and dozing off and on, mildly dyspneic, appears thin and malnourished; somewhat agitated answering questions. States has not had a drink in a few weeks; sister who accompanied him notes recent drinking binge a week ago. Placed on oxygen 2 L per nasal cannula. Bulging flanks and peripheral edema noted. Bloodwork sent to lab. Admission weight 142 lbs (64.5 kg). | | | | | | | |
| **Vital Signs** |
| Time | Day1: 1000 | |
| Temp | 98.4F/36.8C | |
| P | 85 | |
| RR | 22 | |
| B/P | 142/72 | |
| Pulse oximeter | 92 on 2L | |
| Glasgow Coma (3-15) | 12 | |
| Abdominal girth | 95 cm/37.5in | |
| **Medications** |
| Medication | | Dosage/Frequency/ Route | | | Time | | |
| metoprolol XL | | 50 mg daily | | | 1000 |  |  |
| **Laboratory Report** |
| Lab | Results | | | Reference range | | | |
| BUN | 22 mg/dL | | | 10-20 mg/dL | | | |
| Glucose (fasting) | 70 mg/dL | | | Normal < 99 mg/dL | | | |
| Ammonia | 94 mcg/dL | | | 10-80 mcg/dL | | | |
| Albumin | 3.2 g/dL | | | 3.4-5.4 g/dL | | | |

* For each finding, click to specify if the finding is most consistent with the condition of ascites or elevated ammonia.

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| --- | --- | --- |
| Assessment/Finding | Ascites | Elevated ammonia |
| Abdominal girth | * \* |  |
| Agitation |  | * \* |
| Bulging flanks | * \* |  |
| Dozing off and on |  | * \* |
| Dyspnea | * \* |  |
| Peripheral edema | * \* |  |
| Pulse oximetry | * \* |  |
| Serum albumin | * \* |  |

**Scoring Rule: 0/1**

**Rationale:** Ascites (a complication of portal hypertension and low albumin from cirrhosis/liver damage) can result in respiratory compromise while deterioration in neurologic status (confusion and agitation) results from increased ammonia levels causing hepatic encephalopathy.

**Case Study Question 3 of 6**

The nurse is caring for a 67-yr-old male client with history of alcohol use disorder and cirrhosis admitted to the medical-surgical unit.

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| **Nurses’ Notes** |
| **DAY 1 1000.** Admitted with ascites and confusion; oriented to person only. Has 25-yr history of alcohol use disorder, mild hypertension, and gastroesophageal reflux disease. Drowsy and dozing off and on, mildly dyspneic, appears thin and malnourished; somewhat agitated answering questions. States has not had a drink in a few weeks; sister who accompanied him notes recent drinking binge a week ago. Placed on oxygen 2 L per nasal cannula. Bulging flanks and peripheral edema noted. Bloodwork sent to lab. Admission weight 142 lbs (64.5 kg). | | | | | | | |
| **Vital Signs** |
| Time | Day1: 1000 | |
| Temp | 98.4F/36.8C | |
| P | 85 | |
| RR | 22 | |
| B/P | 142/72 | |
| Pulse oximeter | 92% on 2L NC | |
| Glasgow Coma (3-15) | 12 | |
| Abdominal girth | 95 cm/37.5in | |
| **Medications** |
| Medication | | Dosage/Frequency/ Route | | | Time | | |
| metoprolol XL | | 50 mg daily | | | 1000 |  |  |
| **Laboratory Report** |
| Lab | Results | | | Reference range | | | |
| BUN | 22 mg/dL | | | 10-20 mg/dL | | | |
| Glucose (fasting) | 70 mg/dL | | | Normal < 99 mg/dL | | | |
| Ammonia | 94 mcg/dL | | | 10-80 mcg/dL | | | |
| Albumin | 3.2 g/dL | | | 3.4-5.4 g/dL | | | |

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

|  |  |
| --- | --- |
| The client is most likely experiencing | Select  esophageal varices  hepatorenal failure  hepatic encephalopathy \*  acute cholecystitis |
| as evidenced by | Select |
| vital signs |
| neurologic assessment\* |
| respiratory assessment  glucose level |

**Scoring Rule: Rationale**

**Rationale:** Hepatic encephalopathy is a common complication of cirrhosis and is caused by inability of the liver to detoxify protein by-products. This results in increased ammonia levels which can be toxic to the CNS. Abnormal neurological findings which are common indicators of hepatic encephalopathy include confusion, lethargy, dozing on and off, restlessness and agitation.

**Case Study Question 4 of 6**

The nurse is caring for a 67-yr-old male client with history of alcohol use disorder and cirrhosis admitted to the medical-surgical unit.

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| **Nurses’ Notes** |
| **DAY 1 1000.** Admitted with ascites and confusion; oriented to person only. Has 25-yr history of alcohol use disorder, mild hypertension, and gastroesophageal reflux disease. Drowsy and dozing off and on, mildly dyspneic, appears thin and malnourished; somewhat agitated answering questions. States has not had a drink in a few weeks; sister who accompanied him notes recent drinking binge a week ago. Placed on oxygen 2 L per nasal cannula. Bulging flanks and peripheral edema noted. Bloodwork sent to lab. Admission weight 142 lbs (64.5 kg).  **1400**. Remains alert at times but confused, mumbling off and on; mild hand flap noted. Moderately dyspneic on 2 L nasal oxygen, RR 26. Bulging flanks and prominent veins around umbilicus noted; provider notified. | | | | | | | | |
| **Vital Signs** |
| Time | Day1: 1000 | | Day1: 1400 | |
| Temp | 98.4F/36.9C | | 98.6F/37C | |
| P | 85 | | 86 | |
| RR | 22 | | 26 | |
| B/P | 142/72 | | 145/78 | |
| Pulse oximeter | 92% on 2L NC | | 89% on 2L NC | |
| Glasgow Coma (3-15) | 12 | | 12 | |
| Abdominal girth | 95 cm/37.5in | |  | |
| **Medications** |
| Medication | | Dosage/Frequency/ Route | | | | Time | | |
| metoprolol XL | | 50 mg daily | | | | 1000 |  |  |
| **Laboratory Report** |
| Lab | Results | | | Reference range | | | | |
| BUN | 22 mg/dL | | | 10-20 mg/dL | | | | |
| Glucose (fasting) | 70 mg/dL | | | Normal < 99 mg/dL | | | | |
| Ammonia | 94 mcg/dL | | | 10-80 mcg/dL | | | | |
| Albumin | 3.2 g/dL | | | 3.4-5.4 g/dL | | | | |

The client receives the diagnosis of hepatic encephalopathy.

* For each potential intervention, click to specify whether the intervention is indicated, not indicated, contraindicated in the plan of care.

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| --- | --- | --- | --- |
| Potential Intervention | Indicated | Not Indicated | Contraindicated |
| Neuro assessment every 4 hrs | * \* |  |  |
| Record abdominal girth daily | * \* |  |  |
| Administer acetaminophen 650 mg PRN for temp > 101 |  |  | * \* |
| Monitor pulse oximetry every 4 hrs | * \* |  |  |
| Administer sedative PRN agitation |  |  | * \* |
| Daily weights | * \* |  |  |
| Supine position when in bed |  |  | * \* |
| Low sodium diet | * \* |  |  |
| Point of care glucose every 6 hrs |  | * \* |  |
| Lactulose 30 ml every 4 hrs X 3 doses | * \* |  |  |

**Scoring Rule: 0/1**

**Rationale:** Interventions are focused on treating both ascites and hepatic encephalopathy. Acetaminophen and sedatives are contraindicated as is placing the client flat in bed when dyspneic due to ascites. Glucose monitoring would not harm the client but is not necessary.

**Case Study Question 5 of 6**

The nurse is caring for a 67-yr-old male client with history of alcohol use disorder and cirrhosis admitted to the medical-surgical unit.

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| **Nurses’ Notes** |
| **DAY 1 1000**. Admitted with ascites and confusion; oriented to person only. Has 25-yr history of alcohol use disorder, mild hypertension, and gastroesophageal reflux disease. Drowsy and dozing off and on, mildly dyspneic, appears thin and malnourished; somewhat agitated answering questions. States has not had a drink in a few weeks; sister who accompanied him notes recent drinking binge a week ago. Placed on oxygen 2 L per nasal cannula. Bulging flanks and peripheral edema noted. Bloodwork sent to lab. Admission weight 142 lbs (64.5 kg).  **1400.** Remains alert at times but confused, mumbling off and on; mild hand flap noted. Moderately dyspneic on 2 L nasal oxygen, RR 26. Bulging flanks and prominent veins around umbilicus noted; provider notified. | | | | | | | | |
| **Vital Signs** |
| Time | Day1: 1000 | | Day1: 1400 | |
| Temp | 98.4F/36.9C | | 98.6F/37C | |
| P | 85 | | 86 | |
| RR | 22 | | 26 | |
| B/P | 142/72 | | 145/78 | |
| Pulse oximeter | 92% on 2L NC | | 89% on 2L NC | |
| Glasgow Coma (3-15) | 12 | | 12 | |
| Abdominal girth | 95 cm/37.5in | |  | |
| **Medications** |
| Medication | | Dosage/Frequency/ Route | | | | Time | | |
| metoprolol XL | | 50 mg daily | | | | 1000 |  |  |
| **Laboratory Report** |
| Lab | Results | | | Reference range | | | | |
| BUN | 22 mg/dL | | | 10-20 mg/dL | | | | |
| Glucose (fasting) | 70mg/dL | | | Normal < 99 mg/dL | | | | |
| Ammonia | 94 mcg/dL | | | 10-80 mcg/dL | | | | |
| Albumin | 3.2g/dL | | | 3.4-5.4 g/dL | | | | |

At 1430, the provider assesses the client, reviews the chart and writes orders.

* Click to highlight the three orders that the nurse should implement immediately.

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| **Orders** |
| * VS, pulse oximetry and neuro assessment every 4 hours and PRN * Low sodium diet * Record weight & abdominal girth daily * Oxygen per nasal cannula to maintain pulse oximetry at 95 or greater * IV normal saline at 30 ml/hr * Lactulose 30 ml PO every 4 hrs X 3 doses * Furosemide 20 mg IV * Spironolactone 100 mg PO daily | |

Key

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| * VS, pulse oximetry and neuro assessment every 4 hours and PRN * Low sodium diet * Record weight & abdominal girth daily * Oxygen per nasal cannula to maintain pulse oximetry at 95 or greater\* * IV normal saline at 30 ml/hr * Lactulose 30 ml PO every 4 hrs X 3 doses\* * Furosemide 20 mg IV\* * Spironolactone 100 mg PO daily |

**Scoring Rule: +/-**

**Rationale:** Priorities are to reduce the ammonia level with first dose of lactulose and promote prompt diuresis of excess fluid with IV furosemide. Oxygenation is another priority so increasing his oxygen in meantime to improve pulse oximetry/oxygenation

**Case Study Question 6 of 6**

The nurse is caring for a 67-yr-old male client with history of alcohol use disorder and cirrhosis admitted to the medical-surgical unit.

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| **Nurses’ Notes** |
| **DAY 1** 1000. Admitted with ascites and confusion; oriented to person only. Has 25-yr history of alcohol use disorder, mild hypertension, and gastroesophageal reflux disease. Drowsy and dozing off and on, mildly dyspneic, appears thin and malnourished; somewhat agitated answering questions. States has not had a drink in a few weeks; sister who accompanied him notes recent drinking binge a week ago. Placed on oxygen 2 L per nasal cannula. Bulging flanks and peripheral edema noted. Bloodwork sent to lab. Admission weight 142 lbs (64.5 kg).  **1400**. Remains alert at times but confused, mumbling off and on; mild hand flap noted. Moderately dyspneic on 2 L nasal oxygen, RR 26. Bulging flanks and prominent veins around umbilicus noted; provider notified.  **1700** Pulse oximetry 93% on 4 L oxygen. 2nd dose lactulose given; 2 large loose brown stools since first dose. Alert, coherent and cooperative with assessment. 400 ml urine output since 1400.  **DAY 2 0900**: Pulse oximetry 95 on RA; no dyspnea noted. Alert and oriented X3 with no signs of agitation. Urine clear yellow at 30-40 ml/hr since 0600. Weight 138 lbs (62.7 kg) and abd. girth recorded. Am medications (metoprolol and spironolactone) given. Ammonia level now 72. | | | | | | | | | | |
| **Vital Signs** |
| Time | Day1: 1000 | | | Day1: 1400 | | Day1: 1800 | | | Day 2 0800 | |
| Temp | 98.4F/36.9C | | | 98.6F/37C | | 97.8F/36.5C | | | 98.6F/37C | |
| P | 85 | | | 86 | | 88 | | | 85 | |
| RR | 22 | | | 26 | | 18 | | | 16 | |
| B/P | 142/72 | | | 145/78 | | 139/72 | | | 132/64 | |
| Pulse oximeter | 92% on 2L NC | | | 89% on 2L NC | | 93% on 4L NC | | | 95% on RA | |
| Glasgow Coma (3-15) | 12 | | | 12 | | 14 | | | 14 | |
| Abdominal girth | 95 cm/37.5in | | |  | |  | | | 88 cm / 34.5in | |
| **Medications** |
| Medication | | | Dosage/Frequency/ Route | | | | Time | | | |
| metoprolol XL | | | 50 mg daily | | | | 1000 |  | |  |
| **Laboratory Report** |
| Lab | Results | | | | Reference range | | | | | |
| BUN | 22 mg/dL | | | | 10-20 mg/dL | | | | | |
| Glucose (fasting) | 70mg/dL | | | | Normal < 99 mg/dL | | | | | |
| Ammonia | 94 mcg/dL | | | | 10-80 mcg/dL | | | | | |
| Albumin | 3.2g/dL | | | | 3.4-5.4 g/dL | | | | | |
| **Orders** | |
| 1. VS, pulse oximetry and neuro assessment every 4 hours and PRN  2. Low sodium diet  3. Record weight & abdominal girth daily  4. Oxygen per nasal cannula to maintain pulse oximetry at 95 or greater  5. IV normal saline at 30 ml/hr  6. Lactulose 30 ml PO every 4 hrs X 3 doses  7. Furosemide 20 mg IV  8. Spironolactone 100 mg PO daily | | | | | | | | | | |

On the second day,the nurse documents and reviews the morning vital signs, urine output and updated ammonia level after implementing the treatment plan.

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

|  |  |
| --- | --- |
| The nurse determines the client’s status is | Select |
| Improving\* |
| Deteriorating |
| Unchanged |
| The nurse should now | Select  Request order for more lactulose  Apply restraints  Explore readiness to stop drinking\* |

**Scoring Rule: 0/1**

**Rationale:** Client’s overall condition has improved. Prescribed interventions of IV furosemide and sodium restriction were effective in reducing ascites; the ammonia level and neurologic status also improved after 3 doses of lactulose.

**Bowtie**

The nurse is caring for a 67-yr-old male with history of alcohol use disorder and cirrhosis admitted to the medical-surgical unit

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| **Nurses’ Notes** |
| **DAY 1 1000.** Admitted with ascites and confusion; oriented to person only. Has 25-yr history of alcohol use disorder, mild hypertension, and gastroesophageal reflux disease. Drowsy and dozing off and on, mildly dyspneic, appears thin and malnourished; somewhat agitated answering questions. States has not had a drink in a few weeks; sister who accompanied him notes recent drinking binge a week ago. Placed on oxygen 2 L per nasal cannula. Bulging flanks and peripheral edema noted. Bloodwork sent to lab. Admission weight 142 lbs (64.5 kg). | | | | | | | |
| **Vital Signs** |
| Time | Day1: 1000 | |
| Temp | 98.4F/36.8C | |
| P | 85 | |
| RR | 22 | |
| B/P | 142/72 | |
| Pulse oximeter | 92% on 2L NC | |
| Glasgow Coma (3-15) | 12 | |
| Abdominal girth | 95 cm/37.5in | |
| **Medications** |
| Medication | | Dosage/Frequency/ Route | | | Time | | |
| metoprolol XL | | 50 mg daily | | | 1000 |  |  |
| **Laboratory Report** |
| Lab | Results | | | Reference range | | | |
| BUN | 22 mg/dL | | | 10-20 mg/dL | | | |
| Glucose (fasting) | 70mg/dL | | | Normal < 99 mg/dL | | | |
| Ammonia | 94 mcg/dL | | | 10-80 mcg/dL | | | |
| Albumin | 3.2g/dL | | | 3.4-5.4 g/dL | | | |

* Complete the diagram by dragging from the choices below to specify what condition the client is most likely experiencing, 2 actions the nurse should take to address that condition, and 2 parameters the nurse should monitor to assess the client’s progress.

|  |  |  |
| --- | --- | --- |
| Action to take |  | Parameter to monitor |
|  | Condition most likely experiencing |  |
| Action to take |  | Parameter to monitor |
|  |  |  |
| **Actions to take** | **Potential conditions** | **Parameters to monitor** |
| Administer lactulose\* | Esophageal varices | Serum glucose |
| Request order for sedative | Hepatic encephalopathy\* | Neurologic status\* |
| Institute safety precautions\* | Acute cholecystitis | Serum ammonia\* |
| Administer IV furosemide | Acute alcohol intoxication | Serum creatinine |
| Educate patient about alcohol cessation |  | Blood pressure |

**Scoring Rule: 0/1**

**Rationale:** Based on neurologic status/confusion and agitation due to elevated ammonia level, the client is experiencing hepatic encephalopathy. Interventions include giving lactulose to lower ammonia levels by inducing diarrhea and maintaining safety/preventing injury until confusion and agitation subsides. While furosemide may be ordered the purpose of this medication is to reduce ascites and alleviate potential for pulmonary complications. Sedatives are contraindicated in persons with liver failure. Client is acutely ill therefore not appropriate to perform education on alcohol cessation until more stable and when readiness can be assessed.