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| **Maryland Next Gen NCLEX** | | | |
| **Case Study Topic**: | Type II diabetes & ketoacidosis | **Author:** | DeNiece Bennett, DNP, MSN-Ed  University of Maryland, School of Nursing |

**Case Summary**

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| A 73-year-old male client with a history of type II diabetes presented to the emergency department for a change in mental status. Client is diagnosed with ketoacidosis. |

**Objectives**

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| 1. Assess the client for complications of type II diabetes 2. Manage care of a client with ketoacidosis 3. Evaluate client responses to interventions |

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| **Case Study Link** | **Case Study QR Code** |
| <https://umaryland.az1.qualtrics.com/jfe/form/SV_b28egVeIF5tG5F4> |  |
| **Bow-tie QR Code** | **Bow-tie Link** |
|  | <https://umaryland.az1.qualtrics.com/jfe/form/SV_87comjCnj3OOyOi> |

**Case References**

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| 1. Uren, L.D., Stacy, K.M., Lough, M.E. (2022). *Critical Care Nursing: Diagnosing and Management.* Elsevier 2. Workman, M.L., Ignatavicius, D. (2021) *Medical-Surgical Nursing: Concepts for Interprofessional Collaborative Care*. 10th Ed. Elsevier Health Sciences |

**Case Study Question 1 of 6**

A 73-year-old male with a history of type II diabetes presented to the emergency department due to a change in mental status.

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| **Nurses' Notes** |
| **1200** 73-year-old male with a history of diabetes type II brought to the emergency department by spouse for changes in mental status from his baseline. The client's wife reports that he woke at 0600 to complete his morning routine. At approximately 1100 he became unaware of his surroundings and began sweating profusely and slurring his words. Breath sounds are clear but noted with a fruity citrus odor and deep rapid respirations. Sinus tachycardia per cardiac monitor**.** He is awake and alert, pupils equal and reactive to light. | | | | | |
| **Vital Signs** | |
| Time | | 1200 | |
| Temp | | 99.5° F (37.5 °C) | |
| P | | 118 | |
| RR | | 32 | |
| B/P | | 97/66 | |
| Pulse oximeter | | 89% on RA | |
| **Medications** | | |
| Empagliflozin 10 mg PO daily | | | | |
| Sitagliptin / metformin 50-1000 mg PO daily | | | | |
| Valsartan 160 mg PO daily | | | | |

Which 4 findings are **most** significant?

* Lung sounds
* History of type II diabetes
* Respiratory status
* Circulation
* Pupils
* Temperature
* Mental status
* Medications

**Case Study Question 2 of 6**

A 73-year-old male with a history of type II diabetes presented to the emergency department due to a change in mental status.

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| **Nurses' Notes** |
| **1200.** 73-year-old male with a history of diabetes type II brought to the emergency department by spouse for changes in mental status from his baseline. The client's wife reports that he woke at 0600 to complete his morning routine. At approximately 1100 he became unaware of his surroundings and began sweating profusely and slurring his words. Breath sounds are clear but noted with a fruity citrus odor and deep rapid respirations. Sinus tachycardia per cardiac monitor**.** He is awake and alert, pupils equal and reactive to light. Weight 205lbs (93kg)  **1215**. Voided 30mL dark amber urine sent for urinalysis. Comprehensive metabolic panel, CBC, and ABG. IV of normal saline started. 2L O2 started per NC. Capillary glucose is 440. | | | | | | | | |
| **Vital Signs** | |
| Time | | 1200 | | | 1215 | |
| Temp | | 99.5° F (37.5 °C) | | | 99.5° F (37.5 °C) | |
| P | | 118 | | | 115 | |
| RR | | 32 | | | 30 | |
| B/P | | 97/66 | | | 98/70 | |
| Pulse oximeter | | 89% on RA | | | 92% on 2L NC | |
| **Medications** | | |
| Empagliflozin 10 mg PO daily | | | | | | | |
| Sitagliptin / metformin 50-1000 mg PO daily | | | | | | | |
| Valsartan 160 mg PO daily | | | | | | | |
| **Laboratory Report** | | |
| Lab | | | | Results | | Reference range | | | |
| ABG pH | | | | 7.20 | | 7.35-7.45 | | | |
| ABG PC02 | | | | 45 | | 35-45 mmHg | | | |
| ABG HC03 | | | | 32 | | 22-26 mEq/L | | | |
| Creatine (Serum) | | | | 1.9 | | 0.9 to 1.4 mg/dL | | | |
| Glucose random | | | | 435 | | 70- 140 mg/dL | | | |
| Other (urine) | | | | Positive ketones | | Negative | | | |
| Potassium(serum) | | | | 3.4 | | * 1. to 5 mEq/L | | | |

The nurse starts an IV and reviews the labs.

* For each finding highlight to specify if it is consistent with ketoacidosis or hyperglycemic hyperosmolar syndrome. Each finding may support more than one condition. Each column must have at least 1 correct option.

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| **Laboratory Report** | **Ketoacidosis** | **Hyperglycemic hyperosmolar**  **syndrome** |
| Ph |  |  |
| Blood glucose |  |  |
| Serum creatinine |  |  |
| Urine |  |  |

**Case Study Question 3 of 6**

A 73-year-old male with a history of type II diabetes presented to the emergency department due to a change in mental status.

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| **Nurses' Notes** |
| **1200.** 73-year-old male with a history of diabetes type II brought to the emergency department by spouse for changes in mental status from his baseline. The client's wife reports that he woke at 0600 to complete his morning routine. At approximately 1100 he became unaware of his surroundings and began sweating profusely and slurring his words. Breath sounds are clear but noted with a fruity citrus odor and deep rapid respirations. Sinus tachycardia per cardiac monitor**.** He is awake and alert, pupils equal and reactive to light. Weight 205lbs (93kg)  **1215**. Voided 30mL dark amber urine sent for urinalysis. Comprehensive metabolic panel, CBC, and ABG. IV of normal saline started. Capillary glucose is 440. | | | | | | | | |
| **Vital Signs** | |
| Time | | 1200 | | | 1215 | |
| Temp | | 99.5° F (37.5 °C) | | | 99.5° F (37.5 °C) | |
| P | | 118 | | | 115 | |
| RR | | 32 | | | 30 | |
| B/P | | 97/66 | | | 98/70 | |
| Pulse oximeter | | 89% on RA | | | 92% on 2L NC | |
| **Medications** | | |
| Empagliflozin 10 mg PO daily | | | | | | | |
| Sitagliptin / metformin 50-1000 mg PO daily | | | | | | | |
| Valsartan 160 mg PO daily | | | | | | | |
| **Laboratory Report** | | |
| Lab | | | | Results | | Reference range | | | |
| ABG pH | | | | 7.20 | | 7.35-7.45 | | | |
| ABG PC02 | | | | 45 | | 35-45 mmHg | | | |
| ABG HC03 | | | | 32 | | 22-26 mEq/L | | | |
| Creatine (Serum) | | | | 1.9 | | 0.9 to 1.4 mg/dL | | | |
| Glucose random | | | | 435 | | 70- 140 mg/dL | | | |
| Other (urine) | | | | Positive ketones | | negative | | | |
| Potassium(serum) | | | | 3.4 | | * 1. to 5 mEq/L | | | |

* Complete the sentence from the list of drop-down options.

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| The problem the nurse should address first is | Correcting pH  Restoring volume  Lowering glucose |

**Case Study Question 4 of 6**

73-year-old male with a history of type II diabetes presented to the emergency department due to a change in mental status.

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| **Nurses' Notes** |
| **1200.** 73-year-old male with a history of diabetes type II brought to the emergency department by spouse for changes in mental status from his baseline. The client's wife reports that he woke at 0600 to complete his morning routine. At approximately 1100 he became unaware of his surroundings and began sweating profusely and slurring his words. Breath sounds are clear but noted with a fruity citrus odor and deep rapid respirations. Sinus tachycardia per cardiac monitor**.** He is awake and alert, pupils equal and reactive to light. Weight 205lbs (93kg)  **1215**. Voided 30mL dark amber urine sent for urinalysis. Comprehensive metabolic panel, CBC, and ABG. IV of normal saline started. Capillary glucose is 440. | | | | | | | | |
| **Vital Signs** | |
| Time | | 1200 | | | 1215 | |
| Temp | | 99.5° F (37.5 °C) | | | 99.5° F (37.5 °C) | |
| P | | 118 | | | 115 | |
| RR | | 32 | | | 30 | |
| B/P | | 97/66 | | | 98/70 | |
| Pulse oximeter | | 89% on RA | | | 92% on 2L NC | |
| **Medications** | | |
| Empagliflozin 10 mg PO daily | | | | | | | |
| Sitagliptin / metformin 50-1000 mg PO daily | | | | | | | |
| Valsartan 160 mg PO daily | | | | | | | |
| **Laboratory Report** | | |
| Lab | | | | Results | | Reference range | | | |
| ABG pH | | | | 7.20 | | 7.35-7.45 | | | |
| ABG PC02 | | | | 45 | | 35-45 mmHg | | | |
| ABG HC03 | | | | 32 | | 22-26 mEq/L | | | |
| Creatine (Serum) | | | | 1.9 | | 0.9 to 1.4 mg/dL | | | |
| Glucose random | | | | 435 | | 70- 140 mg/dL | | | |
| Other (urine) | | | | Positive ketones | | negative | | | |
| Potassium(serum) | | | | 3.4 | | * 1. to 5 mEq/L | | | |

The client is diagnosed with ketoacidosis and the nurse begins to plan care.

* For each nursing intervention, highlight to specify whether the intervention is indicated, contraindicated or non-essential.

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| **Nursing Intervention** | **Indicated** | **Contraindicated** | **Non-Essential** |
| Obtain glycosylated hemoglobin A1C |  |  |  |
| Teach the client pursed-lipped breathing |  |  |  |
| Administer insulin glargine subcutaneous |  |  |  |
| Insert dwelling foley catheter |  |  |  |
| Administer IV potassium |  |  |  |
| Monitor EKG |  |  |  |

**Case Study Question 5 of 6**

73-year-old male with a history of type II diabetes presented to the emergency department due to a change in mental status.

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| **Nurses' Notes** |
| **1200.** 73-year-old male with a history of diabetes type II brought to the emergency department by spouse for changes in mental status from his baseline. The client's wife reports that he woke at 0600 to complete his morning routine. At approximately 1100 he became unaware of his surroundings and began sweating profusely and slurring his words. Breath sounds are clear but noted with a fruity citrus odor and deep rapid respirations. Sinus tachycardia per cardiac monitor**.** He is awake and alert, pupils equal and reactive to light. Weight 205lbs (93kg)  **1215**. Voided 30mL dark amber urine sent for urinalysis. Comprehensive metabolic panel, CBC, and ABG. IV of normal saline started. Capillary glucose is 440. | | | | | | | | | |
| **Vital Signs** | |
| Time | | 1200 | | | | 1215 | |
| Temp | | 99.5° F (37.5 °C) | | | | 99.5° F (37.5 °C) | |
| P | | 118 | | | | 115 | |
| RR | | 32 | | | | 30 | |
| B/P | | 97/66 | | | | 98/70 | |
| Pulse oximeter | | 89% on RA | | | | 92% on 2L NC | |
| **Medications** | | |
| Empagliflozin 10 mg PO daily | | | | | | | | |
| Sitagliptin / metformin 50-1000 mg PO daily | | | | | | | | |
| Valsartan 160 mg PO daily | | | | | | | | |
| **Laboratory Report** | | |
| Lab | | | | Results | | | Reference range | | | |
| ABG pH | | | | 7.20 | | | 7.35-7.45 | | | |
| ABG PC02 | | | | 45 | | | 35-45 mmHg | | | |
| ABG HC03 | | | | 32 | | | 22-26 mEq/L | | | |
| Creatine (Serum) | | | | 1.9 | | | 0.9 to 1.4 mg/dL | | | |
| Glucose random | | | | 435 | | | 70- 140 mg/dL | | | |
| Other (urine) | | | | Positive ketones | | | negative | | | |
| Potassium(serum) | | | | 3.4 | | | * 1. to 5 mEq/L | | | |
| **Orders** | | | | |
| * Admit to ICU with diagnosis of ketoacidosis * Give 1000ml IV 0.9 NS fluid bolus over 30 minutes * The start .9NS with 20mEQ KCL/100 mL at 125mL/hr * Start regular insulin infusion at 0.1 Units/kg/h after fluid bolus * Finger stick blood glucose hourly ; titrate insulin infusion-based on ICU protocol * Obtain electrolytes every 2 hours * Continuous cardiac monitoring | | | | | | | | | | |
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The nurse reviews orders the orders.

What actions should the nurse take while implementing the treatment plan? Select all that apply

* Begin insulin after bolus at 0.9 Units/hr
* Anticipate holding insulin for low potassium levels
* Request IV fluids with dextrose when glucose levels start to normalize
* Allow client to client to eat when status stabilizes
* Monitor for symptoms of fluid overload

**Case Study Question 6 of 6**

73-year-old male with a history of type II diabetes presented to the emergency department due to a change in mental status.

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| **Nurses' Notes** |
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| **Vital Signs** | |
| Time | | 1200 | | | | 1215 | | 1330 | | 1330 | | |
| Temp | | 99.5° F (37.5 °C) | | | | 99.5° F (37.5 °C) | | 98.9°F (37.1 °C) | | 98.9°F (37.1 °C) | | |
| P | | 118 | | | | 115 | | 105 | | 100 | | |
| RR | | 32 | | | | 30 | | 30 | | 24 | | |
| B/P | | 97/66 | | | | 98/70 | | 100/70 | | 109/70 | | |
| Pulse oximeter | | 89% on RA | | | | 92% on 2L NC | | 94% on 2L NC | | 95% on 2L NC | | |
| **Medications** | | |
| Empagliflozin 10 mg PO daily | | | | | | | | |
| Sitagliptin / metformin 50-1000 mg PO daily | | | | | | | | |
| Valsartan 160 mg PO daily | | | | | | | | |
| **Laboratory Report** | | |
| Lab | | | | Results | | | Reference range | | | | |
| ABG pH | | | | 7.20 | | | 7.35-7.45 | | | | |
| ABG PC02 | | | | 45 | | | 35-45 mmHg | | | | |
| ABG HC03 | | | | 32 | | | 22-26 mEq/L | | | | |
| Creatine (Serum) | | | | 1.9 | | | 0.9 to 1.4 mg/dL | | | | |
| Glucose random | | | | 435 | | | 70- 140 mg/dL | | | | |
| Other (urine) | | | | Positive ketones | | | negative | | | | |
| Potassium(serum) | | | | 3.4 | | | * 1. to 5 mEq/L | | | | |
| **Orders** | | | | |
| * Admit to ICU with diagnosis of ketoacidosis * Give 1000ml IV 0.9 NS fluid bolus over 30 minutes * The start .9NS with 20mEQ KCL/100 mL at 125mL/hr. * Start regular insulin infusion at 0.1 Units/kg/h after fluid bolus * Finger stick blood glucose hourly and titrate insulin infusion-based on ICU protocol * Obtain electrolytes every 2 hours * Continuous cardiac monitoring | | | | | | | | | | | |
|  | | | | | | | | | | | |

The nurse reassesses the client after giving a fluid bolus and starting the insulin infusion.

* Which findings indicate the treatment plan has been effective? Select all that apply.
* Blood pressure
* Mental status
* Breath sounds
* Pulse 100 bpm
* Capillary glucose
* Pain levels

**Bowtie**

A 73-year-old male client with a history of type II diabetes presented to the emergency department due to a change in mental status.

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| **Nurses' Notes** |
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| **Vital Signs** | |
| Time | | 1200 | | | | 1215 | |
| Temp | | 99.5° F (37.5 °C) | | | | 99.5° F (37.5 °C) | |
| P | | 118 | | | | 115 | |
| RR | | 32 | | | | 30 | |
| B/P | | 97/66 | | | | 98/70 | |
| Pulse oximeter | | 89% on RA | | | | 92% on 2L NC | |
| **Medications** | | |
| Empagliflozin 10 mg PO daily | | | | | | | | |
| Sitagliptin / metformin 50-1000 mg PO daily | | | | | | | | |
| Valsartan 160 mg PO daily | | | | | | | | |
| **Laboratory Report** | | | | |
| Lab | | | | Results | | | Reference range | | | |
| ABG pH | | | | 7.20 | | | 7.35-7.45 | | | |
| ABG P02 | | | | 60 | | | 75-100 mm Hg | | | |
| ABG PC02 | | | | 45 | | | 35-45 mmHg | | | |
| ABG HC03 | | | | 32 | | | 22-26 mEq/L | | | |
| BUN | | | | 34 | | | 10-20 mg/dL | | | |
| Creatine (Serum) | | | | 1.9 | | | 0.9 to 1.4 mg/dL | | | |
| Hematocrit | | | | 37 | | | Males: 42-52%; Females: 35-47% | | | |
| Hemoglobin | | | | 14 | | | Males: 13-18 g/dL; Females:12-16 g/dL | | | |
| WBC | | | | 4.7 | | | 4.5 – 10.5 x 103 cells/mm3 | | | |
| Platelets | | | | 140,000 | | | 140,000 to 450,000/ mm3 | | | |
| Potassium(serum) | | | | 3.4 | | | 3.5 to 5 mEq/L | | | |
| Sodium (serum) | | | | 140 | | | 135 to 145 mEq/L | | | |
| Other (urine) | | | | Positive ketones | | |  | | | |

* Complete the diagram by entering 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 IV insulin | Cardiogenic shock | Capillary glucose monitoring |
| Give nitroglycerin | Diabetic ketoacidosis | Serial electrocardiogram |
| Assist with intubation | Hyperglycemic hyperosmolar syndrome | Arterial blood gases |
| Administer antibiotics | Urinary tract infection with delirium | Urinalysis |
| Infuse normal saline fluid bolus |  | Level of consciousness |