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Critical Care Nursing Management Of Diabetic Ketoacidosis In A Critically Ill Adult

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Abstract
Diabetic ketoacidosis (DKA) is a serious and perhaps deadly short-term effect of diabetes mellitus that needs to be diagnosed and treated very away. Insulin deficiency, infections, or physiological stress can induce this syndrome, characterized by hyperglycemia, metabolic acidosis, and ketosis. This case-based discussion paper shows how important critical care nursing is for taking care of a critically ill patient with DKA. We focus on completing complete evaluations using the ABCDE framework, swiftly finding the most important concerns, establishing correct nursing diagnoses, and putting together a treatment plan based on evidence. Fluid resuscitation, insulin therapy for an indefinite period, monitoring of acid-base balance and electrolytes, patient-centered education, and prevention of complications were essential nursing interventions. Stabilizing hemodynamics, normalizing metabolism, and enhancing neurological state necessitated interdisciplinary collaboration and continuous evaluation. This case study shows how crucial nurses are in getting the best clinical results and stopping DKA from coming back by teaching patients and carefully organizing their departure.

Keywords : Diabetic Ketoacidosis, Critical Care Nursing, Fluid and Electrolyte Management, Insulin Therapy.

Introduction

Diabetic ketoacidosis is one of the most dangerous problems that can happen with diabetes mellitus. Diabetic ketoacidosis is when your blood sugar is too high, your metabolism is too low, and your body is in ketosis. The results could be deadly. Common causes are not making enough insulin, being sick, or other physical stressors. Our team has chosen to address this issue due to the significant insights it will provide concerning crisis management and collaboration with other professionals. The patient's condition changed quickly, showing how dynamic critical care nursing is (Lizzo et al., 2023).

Diabetic ketoacidosis (DKA) is a dangerous and possibly deadly acute complication of diabetes mellitus. It needs to be diagnosed and treated quickly. Hyperglycemia, metabolic acidosis, and the formation of ketone bodies are all signs of either complete or partial insulin deficiency. Diabetic ketoacidosis (DKA) is still a common reason for people to be admitted to the intensive care unit (ICU), especially people who have just been diagnosed with diabetes, have poorly controlled diabetes, or are under a lot of stress, such as from an infection, a heart attack, or other physiological stresses. If DKA isn't treated quickly enough, it can lead to death, brain swelling, and circulatory collapse (Umpierrez et al., 2024).

Critical care nurses are very important in managing DKA because it is always changing and moving. Effective nursing care includes a full assessment, regular monitoring, quick delivery of fluids and insulin, early problem detection, and avoiding electrolyte imbalances. For patients who are very sick, organized evaluation frameworks like the ABCDE method help doctors make quick decisions about care and prioritize it (El-Remessy, 2022).

Acute physiological treatment is one part of critical care nursing. Other parts include patient education, interdisciplinary teamwork, and planning for discharge to prevent recurrence. It is essential to instruct patients and their families on the management of sick days, the monitoring of glucose and ketone levels, and the administration of insulin for sustained diabetes control. Dailah (2024) looks at how critical care nurses manage diabetic ketoacidosis in an adult who is very sick. The nurse's primary role in enhancing patient outcomes is underscored, alongside evidence-based nursing interventions and clinical reasoning.

Pathophysiology

Diabetic ketoacidosis (DKA) happens when there is no insulin or not enough insulin. When glucose is turned into ketone bodies (β-hydroxybutyrate and acetoacetate), it causes metabolic acidosis (HCO_3 <18 mmol/L, pH <7.3). This process breaks down fat cells and raises blood sugar levels (>250 mg/dL). Osmotic diuresis causes the body to lose salt, potassium, and chloride, which makes it dehydrated. Polyuria, dehydration, tachycardia, and Kussmaul breathing are some of the clinical signs that these metabolic problems cause. Gosmanov and Kitabchi (2018) assert that coma or alterations in mental status may result from acidosis and hypovolemia in severe cases.

Diabetic ketoacidosis (DKA) happens when there are too many counterregulatory hormones like glucagon, cortisol, catecholamines, and growth hormone, along with not enough insulin. Hyperglycemia continues because peripheral tissues can't take in glucose because the insulin response isn't strong enough. When this happens, the body starts breaking down fat instead of glucose for energy. This is called lipolysis. When these free fatty acids are sent to the liver and turned into ketone bodies, mostly β-hydroxybutyrate and acetoacetate, metabolic acidosis happens (Kitabchi et al, 2009).

Osmotic diuresis happens when the level of glucose in the blood goes up higher than the kidneys can handle. The process makes the volume of blood vessels smaller and causes severe dehydration because too much water and electrolytes, especially sodium, potassium, and chloride, are lost through the urinary tract. Because of acidosis, potassium levels in the blood may seem normal or even higher at first, but the body as a whole is very low in potassium. People who are getting insulin and fluids to help them recover from hypokalemia are at risk of getting it again (Kamel and Halperin, 2020).

When metabolic acidosis happens, the respiratory system goes into compensatory mode, which means it breathes quickly and shallowly, which is also called Kussmaul respirations. This helps bring the acid-base balance back to normal and lower the amount of carbon dioxide in the body. In very bad cases, acidosis, dehydration, and less blood flow to the brain can cause the mental state to change from mild disorientation to coma. If you don't treat hypovolemia, electrolyte imbalance, or acidosis, you could go into shock, have heart problems, or have multiple organ failure. To effectively and promptly direct critical care nursing interventions for patients with diabetic ketoacidosis, it is essential to comprehend these pathophysiological mechanisms (Kraut and Madias, 2010).

Nursing Assessment

The ABCDE test showed that the patient's airway was open and not blocked. When the doctor listened to the patient's lungs, they heard clear breath sounds on both sides. The patient was breathing quickly and deeply, like in Kussmaul breathing. The patient's circulation was checked and found to be bad because of a weak and fast pulse, low blood pressure, and a slow capillary refill. During the neurological evaluation, the Glasgow Coma Scale showed a score of 13 out of 15, which means that the person was only mildly disoriented. During the exposure evaluation, the patient showed signs of severe dehydration, such as sunken eyes, low skin turgor, and dry skin (Thim et al., 2012).

Nursing Diagnosis (NANDA-I)

The NANDA-I classification says that this patient has several nursing diagnoses, such as imbalanced nutrition because their metabolic state has changed, a lack of knowledge about managing diabetes and taking insulin, dehydration and osmotic diuresis, and a risk of electrolyte imbalance from insulin therapy and fluid resuscitation. Ernstmeyer et al. (2021) say that the following things should be done

first: restoring fluid volume, restoring electrolyte balance, making sure the patient is eating enough, and teaching them how to take care of themselves.

Nursing Care Plan

The main goal of restoring hemodynamic stability, which means having a blood pressure of more than 100/60 mmHg, a heart rate of less than 100 beats per minute, and a normal urine output, was to restore the right amount of fluid volume, which was the main nursing diagnosis. The patient received isotonic saline (0.9% sodium chloride) as part of their nursing care, and their vital signs and urine output were checked every hour. Their skin turgor and mucosal membranes were also checked on a regular basis. Fluid replacement prevents hypovolemic shock and restores blood circulating volume, which is why these treatments are so important. The evaluation results indicated that the patient's vital signs—blood pressure, heart rate, urine output, and mucous membrane moisture—were all stabilized (Ghimire et al., 2023).

The goal of addressing a second nursing diagnosis of risk for electrolyte imbalance was to keep serum potassium levels between 3.5 and 5.0 mmol/L. The intervention included continuous cardiac monitoring, potassium supplementation as prescribed, and serum electrolyte testing every two to four hours. This plan was necessary because insulin treatment and aggressive fluid resuscitation can quickly change potassium levels, which raises the risk of arrhythmias that could be fatal. Ernstmeyer et al. (2021) reported that the evaluation showed that the potassium levels were always in the target range and that no heart arrhythmias were found.

An unbalanced diet means eating fewer calories than the body needs to keep blood sugar levels stable. The nursing care plan included checking the patient's blood glucose levels every hour, slowly letting them eat again after they had reached clinical stability, and working with a dietician to make sure they got the right nutritional support. These treatments helped both prevent hypoglycemia and speed up metabolic recovery. Valente et al. (2012) say that the patient's appetite got better and their blood glucose levels stayed between 100 and 180 mg/dL.

The patient and their family learned enough about sick-day care and diabetes management to be able to explain and show that they understood the insulin schedule and how to avoid problems. The patient was taught how to give insulin, how to check their blood glucose and ketone levels, how to write about sick days, and how to make an appointment with a diabetes educator for follow-up care. Education can help stop diabetic ketoacidosis from coming back. The evaluation results showed that the patient was able to give insulin and recognize when they needed medical help (Dailah., 2021).

Key Medical Treatments & Interventions

To treat the patient's hypovolemia and dehydration, they were given intravenous fluids, starting with isotonic saline. When the blood sugar level dropped below 250 mg/dL, Delcroix was added to the mix of fluids. To treat high blood sugar and stop ketogenesis, intravenous insulin was given at a rate of 0.1 U/kg/hr. After the acidosis went away, the insulin was switched to subcutaneous. Regular tests of the serum determined how much potassium was needed. If potassium levels dropped below 3.3 mmol/L, insulin was not given to avoid hypokalemia, which can be deadly. Antibiotics were given when there was a suspicion of an infection. When DKA was brought on by a heart attack, heart treatments were used. These cases show how to properly deal with precipitating variables. So that problems can be found and fixed quickly. During the treatment, the patient's electrolytes, heart rate, blood glucose, acid-base status, and vital signs were all closely watched (Evans, 2019).

Nurse's Role

The nurse is an important part of the patient's care because she checks the IV site for infection, makes sure the doctor's orders are correct, and makes sure that fluids and medications are given correctly. Monitoring vital signs, test results, fluid balance, and problem signals regularly, usually every hour, makes it easier to notice changes quickly. The nurse also carefully records the patient's responses and activities, tells the rest of the healthcare team about the patient's condition, and makes changes to treatments as needed based on established guidelines. The nurse is still responsible for the patient's safety after they leave the hospital. One of these steps is helping the patient and their family switch from getting insulin through an IV to getting it through the skin, so the patient never has to get insulin shots again (Ernstmeyer et al., 2021).

Patient and Family Education

Educational Needs

Anyone who takes care of a diabetic person should know about diabetic ketoacidosis (DKA), its symptoms, risks, and warning signs that keep coming back. They need to learn how to give insulin correctly and keep an eye on their blood sugar and ketone levels. It's important to know how to handle sick days, recognize symptoms, and know when to get medical help. Education should also cover the nutritional and hydration needs for recovery and to stop new episodes from happening (Lizzo et al., 2023).

Communication & Support Strategies

Using simple language and the teach-back method are two ways to communicate and help that work well. The nurse's written instructions and hands-on demonstrations should cover giving insulin, checking blood sugar levels, and taking sick days. Having family members help with patient education and care at the bedside makes it more likely that patients will follow their treatment plans. Yen and Leasure (2019) discovered that patients exhibit increased confidence in managing their illness at home when provided with counseling, emotional support, and reassurance.

Evaluation of Care

Nursing care helped the patient get better mentally, stabilize their vital signs, treat acidosis, and restore their fluid and electrolyte balance. The patient appeared to have a solid understanding of self-care, as issues were averted through hourly check-ins and the administration of fluids, insulin, and electrolytes as necessary. To make the length of treatment more consistent. Peters and Orinate (2025) say that we need to put more emphasis on teaching people how to handle sick days, how to spot the signs of diabetic ketoacidosis more quickly, and how to keep detailed records of family education.

Reflection

This case has greatly improved my understanding of diabetic ketoacidosis (DKA) and how it happens, as well as the importance of careful monitoring, managing insulin administration, and quickly fixing fluid and electrolyte imbalances. Elendu et al. (2023) said that it made me a better critical care nurse, which helped me move up in my career. I can now teach patients and their families better, work well with coworkers from different backgrounds, and make clinical decisions based on evidence in high-acuity settings.

Conclusion

Patients with diabetic ketoacidosis need quick, coordinated, and expert nursing care, especially in intensive care units, because the condition is so serious. To restore fluid balance, correct metabolic derangements, and stabilize essential processes, this case underscores the fundamental significance of prompt nurse assessment, meticulous monitoring, and timely interventions. A nurse's job description goes beyond just technical management. It also includes patient advocacy, communication between different disciplines, and making sure that patients and their families understand everything. To stop diabetic ketoacidosis (DKA) from happening again, it is very important to teach people how to give insulin, check their blood sugar, and handle sick days. When nurses use evidence-based practice along with ongoing evaluation and patient-centered education, patients with diabetes mellitus have much better outcomes, fewer complications, and better self-management. This example shows how important critical care nurses are for both preventing and treating diabetic ketoacidosis in the short and long term.

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