Nursing management of a patient with diabetic ketoacidosis nursing essay

David (18 years, male) is suffering from a condition known as ‘ diabetic ketoacidosis’. This is a very serious condition that occurs in diabetes where the body is unable to use the blood glucose to meet the energy needs due to the lack of insulin in the body. Therefore the body utilizes fat and the breakdown of fats results in the formation of ketones which slowly build up in the body could be toxic. Usually, Insulin plays a major role in the manner in which glucose is utilized as an energy source (Mayo 2010). With a lack of insulin, glucose does not enter the blood cells and hence fat is utilized as an alternative energy source. Any type of diabetes is at the risk of developing diabetic ketoacidosis (especially type 1, & rare case in type 2), and this condition often requires emergency and critical care.

Diabetic ketoacidosis is associated with certain risk factors such as illness, problems with insulin therapy, excessive stress, emotional or physical trauma, recent surgery, tremors, heart attack, listlessness, stroke, drug or alcohol abuse (Margaret, 2006). Type 2 diabetics can develop diabetic ketoacidosis following a bout of serious infection. Individuals who are Hispanic or African-American in origin are at a higher risk of developing diabetic ketoacidosis following type 2 diabetes. David is 18 years old and has developed diabetes ketoacidosis as a complication of type 1 diabetes (more likely) or type 2 diabetes (very rare), and this complication is common in this age/disease group (Margaret, 2006).

Key Findings

David has developed a range of symptoms following diabetes ketoacidosis. These include rapid and deep breathing, dry mouth and cracked skin, flushing of the face, fruity odor, nausea, vomiting, severe abdominal pain,

loss of body weight, increased heart rate, drop in blood pressure, polyuria, polyphagia, polydipsia, tiredness, frequent urination, mental stupor, muscle cramps and headache (Watkins, 2003).

Blood tests demonstrate a high level of glucose and potassium in the blood, along with electrolyte imbalances. Urine analysis demonstrates ketonuria and glycosuria (Watkins, 2003). The ECG demonstrates irregularities and the respiratory rate are raised to 38 breathes per minute with Kussmaul's respiration. The patient may require certain other tests in addition including amylase blood test, CSF fluid analysis, potassium and sodium urine test, blood levels of sodium, potassium and magnesium, urine pH, arterial blood gas analysis, chest X-ray and blood pH (Eckman 2010).

Nursing Diagnosis

An important part of the plan is the nursing diagnosis. It is made based on the assessment of the medical history, symptoms, drugs administered and clinical assessment (Benaga, 2010). In this case, the condition due to diabetic ketoacidosis is a fluid volume deficit, metabolic acidosis, excessive blood glucose levels, high potassium levels, dehydration, along with imbalances in nutrition, infection related to the influenza and fatigue (Scribd, 2010). The key nursing diagnosis are

High blood glucose related to insulin deficiency as manifest by diabetic ketoacodosis.

Dehydration related to hyperglycemia as manifest by frequent urination, weakness and dry skin.

Potassium imbalance related to osmotic diuresis as manifest by unstable vital signs, cramps and muscle weakness.

Metabolic acidosis related to ketones presence in blood as manifest by kussmul’s breathing, nausea, confusion and drowsiness.

The assessment would include the airway, breathing, circulation (dehydration) and the neurological state (MCG, 2004). There is an osmotic diuresis related to hyperglycemia causing excessive gastric losses in the form of vomiting, abdominal pain and diarrhea, and lowered intake of food (nausea and sub-consciousness). The sensory perception of the patient is also altered due endogenous chemical alterations (Scribd 2010). Evidence for making the nursing diagnosis is done based on the presence of the following symptoms/features:-

Great output of urine

Diluted urine

Excessive thirst

Sudden loss of body weight

Poor food intake

Diarrhea and vomiting

Altered neurological state

Rise in the ketone levels in the blood and the urine

Lowered blood pressure and increased heart rate

Kussmaul’s respiration (deep and rapid breathing)

Dry and cracked skin with poor turgor

Most Acute Problems and their nursing needs

The nurse should ensure that all the parameters of the patient including respiration, blood pressure, heart beat, Input/ Output, body weight, fluid intake, temperature, skin changes, urine parameters, blood parameters and arterial blood gas analysis are adequately monitored round the clock. The fluid intake should be maintained for 2500 mL per day, till oral intake is resumed. Patient’s most acute six problems and their interventions are prioritized and listed below.

High blood glucose levels – This is related to the insulin deficiency, infection process and the effect of the stress hormones, which elevates the glucose level in the blood (Brooker, 2003). The symptoms include diluted urine, increased urination, loss of body weight, tiredness, and ketone formation. The patient’s recent dietary history needs to be studied further and the weight recorded daily. Insulin should be administered intravenously at 5-10Units per hour. Glucose solution can be administered in order to ensure that it is within the normal level in the blood. Besides, oral diabetic drugs need to be administered as suggested. Evaluation is done through checking body weight, blood glucose, urine sugar, etc (Pearson Prentice Hall, 2010).

Fluid volume deficit (dehydration) – This may be related to the hyperglycemia, loss of water through diarrhea, increased urination or

vomiting, or reduced intake related to nausea. This may be demonstrated through the symptoms increased urination, diluted urine, weakness, sudden weight loss, dry skin, dry mucous membrane, loss of skin turgor, hypotension and tachycardia (Pearson Prentice Hall, 2010). Fluids need to be administered in the form of isotonic (0. 9%) or lactated Ringer's solution, and also administration of dextran and albumin. A urinary catheter needs to be utilized. Evaluation of the same may be through stable vitals, good skin turgor, palpable pulses, adequate urinary output, and normal electrolyte levels (Scribd, 2010).

Potassium imbalances – This may be related to osmotic dieresis, fluid losses, or reduced intake. Due to potassium imbalances, vital signs are unstable, pulses not palpable, cramping, muscle weakness and respiratory problems occur, and skin turgor is lost. A urinary catheter should also be maintained. Sodium and potassium levels are usually depleted with diuresis, but correction of the insulin levels would help to restore these electrolytes. Potassium and sodium should be administered intravenously, along with bicarbonate (in case the pH of the blood is below 7. 1). The evaluation is done through checking the vital signs, skin turgor, pulses and urine output & checking for the signs of potassium imbalances (Scribd 2010).

Metabolic Acidosis – This develops due to the build up of ketones in the blood. Some of the signs include kussmaul's breathing, nausea, confusion, fruity odor, and drowsiness (Holcomb, 1999). Serum ketones levels are increased, pH of the blood is lowered and the bicarbonate levels are reduced to below 15mEq/L. Besides insulin, Sodium bicarbonate solution should also be administered to lower the acidosis. Evaluation is made based on pH of the

blood, bicarbonate levels and serum ketone levels (Pearson Prentice Hall, 2010).

The patient's vital signs should be maintained and closely monitored. The patient should be reoriented to place, time and person so as to ensure a reality-check (Brooker, 2003). The nurse should speak to the patient slowly, clearly and explaining issues. Uninterrupted rest periods should be given to the patient. Slowly the patient should be permitted to perform daily activities. Patient should be protected from further injuries (Gulianick, 2003). Hands and feet should be kept warm and assistance should be provided during ambulation. All activities that can result in fatigue should be identified and alternative activities should be suggested. The patient should be given an uninterrupted sleep and rest plan to follow (Scribd 2010).

The following issues have to be closely evaluated by the concerned nurse:-

History of diabetes and symptoms (During admission)

Vital signs monitoring (continuously)

Respiratory signs (continuously)

Temperature (Continuously)

Skin changes (Continuously)

Arterial Blood gas analysis (frequently)

I&O (daily)

Weight body (daily)

Environment changes (Frequently)

Sensorium (Continuously)

Blood parameters (continuously)

Urine parameters (Frequently)

IV line (continuously)

Laboratory studies (frequently)

Sodium and potassium levels (continuously)

Blood pH (continuously)

Condition of the bowels and the stomach (Frequently)

Diet program (continuously)

Hypoglycemia or hyperglycemia signs (continuously)

Insulin and glucose levels (continuously)

Infection parameters (continuously)

Clean IV line, catheters, infection control measures, etc (continuously)

Auscultation of respiratory sounds (continuously)

Oral Hygiene (frequently)

Culture and sensitivity tests (as needed)

Antibiotic administration (as needed)

Rest and sleep (continuously)

Promote daily activities (later)

Protection from injuries, removing restrain (frequently)

Evaluation of visual acuity (Frequently)

Sensory and motor functions (frequently)

Assistance in ambulation and changing position (Frequently) (MCG 2004).

Nursing plan

Basically, the nursing plan should address the nursing diagnosis. There are certain nursing priorities which need to be fulfilled in this patient, which include:-

Managing the high blood glucose levels, and bringing it to normal within 24 hours

Ensuring the fluid and electrolyte balance is corrected

Maintaining a acid-base balance (correct the metabolic acidosis) (Margaret, 2006)

Correcting the metabolic imbalances (Banaga, 2010)

Treat or manage the underlying cause

Treat or manage any related condition

Preventing further complications – the patient should be taught how to identify the cause and the symptoms of ketoacidosis and prevent the condition from worsening

Ensuring that the patient is sufficiently educated about the disease process, outcomes and self-care measures required

Involving the patient in a local support group (Scribd, 2010)

Ensure that the patient knows about what has to be done during follow-up (LSU Health Services, 2004)

The nursing plan should include the following steps:-

Assessment of the problems and resuscitation

Correction of the acidosis and identification of the problem

Further management of the patient

Ensuring issues are sorted out before discharge (Medical Colleges of Georgia, 2004).

Goals

The patient has severe diabetic ketoacidosis and hence has to be managed in the critical care unit. The concerned nurse can discharge the patient only on achievement of certain goals:-

Achieving a homeostasis

Stabilizing of the patient’s condition

Correction of the patient’s causative or precipitating condition (in this case influenza and type 1 diabetes)

Preventing any further complications

Ensuring that the disease process is stopped – using multiple options

Improving the access to healthcare – so that the patient’s treatment needs can be attended

Ensuring that the patient knows the self-care needs and the means by which the same can be fulfilled (Scribd, 2010)

Having a post-discharge management plan for the patient

Education process should be initiated based on need assessment and using the services of a diabetic education nurse

Ensuring that the patient understands the therapeutic regimen (LSU Health Services, 2004).

Expected outcomes

Client will achieve normal blood glucose level.

Client will have good understanding of diabetes ketoacidosis before discharge.

Client will have normal fluid and electrolyte balance.

Client will be visiting diabetic clinic for better ongoing diabetes management.

Client will report less physical discomfort.

Evaluation

Client achieves normal blood glucose level within 24 hours.

Client achieves normal vital signs within 24 hours.

Client reports no vomiting, dry mouth, flushing of the face and nausea within 24 hours in the absence of dehydration.

Client reports better skin condition, weigh gain and more energetic within a week.

Client will have improved respiratory conditions within 72 hours.

Client reports reduced thirst, no frequent urination and muscle cramps within 48 hours.

Client's blood test will demonstrate the normal electrolyte- fluid balance within 48 hours.

Conclusion

The nursing plan should not only aim at emergency management of the patient and control of the vital signs, blood glucose level and other complications of diabetes on a short-term basis, but also ensuring that the patient has enough knowledge to ensure self-care of diabetes and prevention of further complications. The nurse can play an active role in the management of the patient with type 1 diabetes, not only in the intensive

care management of the patient but also educating the patient and ensuring that the patient is better informed. Also, the accessibility issues to healthcare facilities to seek diabetes care should be discussed by the nurse in order to address these complications.