HEALTH HOLDING

HAFER ALBATIN HEALTH CLUSTER
MATERNITY AND CHILDREN HOSPITAL

Department:	Pediatrics		
Document:	Multidisciplinary Policy and Procedure		
Title:	Pediatric Patient with Diabetic Ketoacidosis		
Applies To:	All Pediatric Staff		
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1. PURPOSE:

1.1 To prevent circulatory collapse and other complications of diabetic ketoacidosis.
1.2 To restore fluid and electrolyte imbalance due to severe dehydration.

2. DEFINITIONS:

2.1 **Diabetic Ketoacidosis** – is a metabolic derangement caused by the absolute or relative deficiency of the anabolic hormone insulin. Diabetic ketoacidosis is characterized by a serum glucose level greater than 250 mg/ dl, a pH less than 7.3, a serum bicarbonate level less than < 15mmol/ L (18 mEq/L) an elevated serum ketone level and dehydration. Cerebral edema is the most common serious complication, requiring careful neurologic and vital sign monitoring and early intervention.

3. POLICY:

3.1 All patient admitted with Diabetic Ketoacidosis (DKA) should be managed as an emergency case. The staff nurse must be knowledgeable of the disease condition, pathophysiology and complication and must be familiar with the care and management to deal with potential problem when arise.
3.2 Laboratory investigations should be done as ordered immediately.
3.3 Two intravenous (IV) line must be available for the fluids replacement and insulin infusion and for essential of drug administration.
3.4 Insulin infusion must be started immediately as ordered. Blood glucose monitoring should be checked hourly and whenever needed, documented on the diabetic chart and Physician must be notified for any abnormal result.
3.5 Crash cart must be available at the patient's bedside in case resuscitation is needed. Standard precaution should be observed throughout the procedure.

4. PROCEDURE:

4.1 Identify patient correctly using two identifiers (4 names for Saudi/ complete name for Non – Saudi and the Medical Record Number).
4.2 Determine if there is family history of diabetes, and any precipitant factor that have triggered DKA:
  4.2.1 Infection.
  4.2.2 Missed injections/ insulin delivery is disrupted.
4.3 Assess patient for the following:
  4.3.1 **Degree of dehydration**:

Only just clinically detectable	Mild,3%
Dry mucous membranes, reduced skin turgor	Moderate, 5%
Above with sunken eyes, poor capillary return	Severe, 8%
May be severely ill with poor perfusion, thready rapid pulse (reduced blood pressure is not likely and is a very late sign)	Shock +

  4.3.2 Level of consciousness:

4.3.2.1 Utilized Glasgow Coma Scale measurement, pupillary response and patient's activity whether is drowsy upon admission.

4.3.2.2 Neurological observation to detect the warning signs of cerebral edema:

4.3.2.2.1 Headache

4.3.2.2.2 Recurrence of Vomiting

4.3.2.2.3 Change in Neurological Status

4.3.2.2.4 Pupillary Changes

4.3.2.2.5 Rising Blood Pressure

4.3.2.2.6 Decrease Oxygen Saturation

4.4 Ensure that the airway is patent. If level of consciousness deteriorating or patient has recurrent vomiting, insert nasogastric tube, aspirate and leave on open drainage.

4.5 Connect to cardio-respiratory monitor

4.5.1 Record hourly the temperature, pulse rate, respiratory rate, blood pressure, oxygen saturation.

4.5.1.1 Assess for kaussmaul's respirations, acetone breath characteristic of metabolic acidosis.

4.5.1.2 ECG monitoring in severe DKA to assess T – waves or evidence of hyperkalemia or hypokalemia.

4.5.1.3 Administer oxygen as ordered if the oxygen saturation is low.

4.6 Keep patient NPO and restrict oral intake as ordered. Patient will be on strict intake and output monitoring to evaluate and correct hydration status of the patient.

4.6.1 Oral fluids should only be offered after substantial clinical improvement and no signs of vomiting.

4.6.2 Oral fluid volume should be subtracted from the IV calculations.

4.6.3 Accurate fluid intake and output.

4.6.3.1 Insert urinary catheter for unconscious patient or weigh diaper to obtain exact measurement of patient's output.

4.6.3.2 Calculate urine output accurately in ml/kg/hour.

4.7 Check blood glucose hourly and PRN.

4.8 Test each urine specimen for glucose and ketones.

4.9 Weigh the patient for accurate rehydration calculation.

4.10 Secure a venous access for administration of intravenous fluid and insulin treatment.

4.11 Start the intravenous fluid as ordered.

4.11.1 Follow the pediatrics protocol:

4.11.1.1 Prepare normal saline bolus administration for patients with signs of shock, poor peripheral pulses or in coma as ordered.

4.11.1.2 Normal saline 10ml/ kg for 10 – 30 min. may be repeated after re – evaluation by the Physician.

4.11.1.3 Prepare for fluid replacement.

4.11.1.3.1 Ensure that fluid replacements are given on desired amount according to computed fluid replacement and maintenance rate.

4.11.1.3.2 Fluid repair usually extends over 48 hours to achieve a slower correction of serum hyper-osmolarity to avoid rapid shift of water from extracellular to intracellular compartments, which is implicated in development of cerebral edema.

4.11.1.3.3 Maintain blood glucose at 200 – 250mg/ dl (12 – 14mmol/L) for the initial 12-24 hours. When the blood glucose falls to 200 – 250 mg/dl, the IV fluid should be changed to D5W½ normal saline.

4.11.1.3.4 The intravenous fluid will be change depending on the patient's progress.

4.11.1.4 Potassium chloride 15 – 20 mEq is usually added to each 500 ml of fluid or as ordered.

4.11.1.4.1 Maximum peripheral IV solution concentration is 40 mEq/ L (20 mEq per 500ml).

4.11.1.4.2 Maximum concentration for central line administration is 15 – 20 mEq/L.

4.11.1.5 Prepare for Insulin regimen:

4.11.1.5.1 Two nurses should double check with each other for any dosage calculations and insulin preparations.

4.11.1.5.2 Prepare the insulin infusion, 50 units (0.5ml) of regular insulin in 50 ml normal saline.

4.11.1.5.3 Administer insulin as prescribed in a separate IV cannula. Prime IV tubing with insulin solution because insulin will bind to plastic tubing reducing concentration.

4.11.1.5.4 Do not start insulin until intravenous fluids have been running for at least an hour.

4.11.1.5.5 Start at running rate of 0.1units/kg/hour (0.1ml/kg/hour) depending on doctor's order but must be clearly written.

4.12 Monitor blood gas levels as ordered.

4.13 Send laboratory test for urea and electrolytes, complete blood count with differential count, blood sugar, HbA1c, urine analysis and culture, throat swab and blood culture.

4.13.1 Urea and electrolytes and blood gases should be repeated every 2-4 hours or as ordered until acidosis is reversed.

4.14 Shifting from IV insulin to subcutaneous insulin therapy:

4.14.1 The insulin infusion rate may be adjusted up or down, but should not be discontinued until the patient started on insulin subcutaneous therapy as ordered by the Physician.

4.14.2 Subcutaneous insulin therapy can be started as per protocol if:

4.14.2.1 The serum glucose is 190 – 235 mg/dl.

4.14.2.2 pH has returned to normal (i.e. pH >7.3 or bicarbonate is 18 mmol/L)

4.14.2.3 The first subcutaneous insulin injection should be given 30 minutes before stopping the insulin infusion.

4.14.2.4 Start diabetic meals if tolerated as ordered and begin subcutaneous regular insulin as ordered.

4.14.2.5 Monitor blood sugar level by finger prick method as ordered by the Physician.

4.15 Provide health education to the family and patient on the following:

4.15.1 Teach the patient and the parents about diabetic diet and nutritional requirement to reduce the episode attacks of DKA.

4.15.2 Teach the patient and the parents how to recognize signs of hypoglycemia and hyperglycemia.

4.15.3 Advise the patient and the parents to bring glucose – monitoring device and vials of insulin and to carry sources of simple sugar such as candy or juice when travelling.

4.15.4 Encourage to do exercises that include safe physical activity.

4.15.5 Make sure the patients/ parents can demonstrate drawing up and administering insulin in the proper dose by following medication administration rights, blood glucose monitoring, urine sugar and ketone testing.

4.16 Document in the nurse's note all nursing care rendered, all treatment given, patient's condition and health teaching given.

5. MATERIAL AND EQUIPMENT:

5.1 Cardio – Respiratory Monitor
5.2 Oxygen Supply
5.3 Resuscitation Equipment
5.4 Infusion/ Syringe Pump
5.5 IV Insertion Tray
5.6 Insulin Vials
5.7 Glucometer
5.8 Sterile Gloves

5.9 Heparinized Syringes
5.10 Capillary Tube
5.11 Laboratory Tube for Investigation
5.12 Blood Gas Machine
5.13 Strip Urine Test

6. RESPONSIBILITIES:

6.1 Physician
6.2 Nurses
6.3 Respiratory Therapist

7. APPENDICES:

N/A

8. REFERENCES:

8.1 Ministry of Health, General Directorate of Nursing, Manual of Nursing Policy and Procedure, 2013.
8.2 Janice L Hinkle, Kerry Cheever, Brunner and Siddhartha's Textbook of Medical Surgical Nursing, Lippincott Williams and Wilkins, Philadelphia, 13th edition, 2014.
8.3 Audrey Berman, Shirlee Snyder, Kozier and Erb's Fundamentals of Nursing Concept, Process and Practice, Pearson Education, 9th edition,2012.

9. APPROVALS:

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