THE ROLE OF A NURSE IN MANAGEMENT OF ELECTROLYTE IMBALANCES.

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Objectives:

- Definition of Electrolyte, Electrolyte Imbalance.
- The Role of a Nurse in Management of Electrolyte Imbalances.

Definition;

Electrolytes; Refers to electrically charged atoms and ions when dissolved into a solution. Examples: Sodium, chloride, potassium, magnesium, phosphorus, calcium.

An Imbalance; Is the state of being out of equilibrium or out of proportion.

Electrolyte Imbalance is an abnormality in the concentration of electrolytes in the body. Electrolytes play a vital role in maintaining homeostasis in the body. They help to regulate heart and neurological function, Fluid balance, oxygen delivery, acid–base balance and much more. (Silvestri, 2017)

NURSE`S ROLE IN MANAGEMENT OF ELECTROLYTE IMBALANCE:

APPLYING NURSING PROCESS:

The nursing process is used continuously for individuals who have electrolyte, or acid-base imbalances, or at risk for developing them, because their condition can change rapidly.

- Appropriate interventions are implemented according to the patient's current condition.

Assessment;

- Performing a chart review or focused health history is a good place to start collecting data.
- with any identified gaps or discrepancies verified during the physical assessment.
- It is also important to consider pertinent life span or cultural considerations that impact a patient's fluid and electrolyte status.

APPLYING NURSING PROCESS Cont.…

Subjective Assessment; (Scenario).

- Assessment is the first step and involves critical thinking skills and data collection.

- HPC - NJ 65y/F, Known DM/HTN/CKD for the past 2yrs, Readmission after 1/52, with a h/o GBW for 3/7, Easy fatigability 2/7, facial puffiness & lower limb swelling.

- Patient was found semi-conscious in her home prior to admission, following complaints of GBW, easy fatigability and chest pain.

APPLYING NURSING PROCESS Cont.….

Objective Assessment;

- ***We shall use the ABCDE approach to do Rapid Assessment of the patient.***
- Very sick looking, in severe distress, semiconscious, some DeH2O, mild pallor, no jaundice, no cyanosis, had bilateral pitting edema and no lymphadenopathy, slurred speech with facial puffiness.
- Semiconscious, GCS=9/15, PEARL, normal tone but reduced reflexes
- Resp; Abnormal forced Breathing, Coarse crackles bilaterally.
- MSK – wasted with reduced muscle bulk.

Investigations;

- RBS, CBC, Serum Electrolytes, RFTS, LFTS.
- Echo: Hypertensive cardiomyopathy with left ventricular dysfunction

HYPERKALEMIA:

Clinical Manifestations;

- Drowsiness
- Decreased BP.
- Muscle Cramps leading to weakness and then paralysis.
- Dysrhythmias: Ventricular Fibrillation or Cardiac standstill.
- Abdominal cramping (Intestinal Colic).
- Diarrhea
- Oliguria.
- Flaccid paralysis.
- EKG Changes; Tall Peaked T- waves, depressed ST segment, Widened QRS Complex, Wide flat P-wave, Prolonged PR Interval.

ECG Changes in Hyperkalemia;

Serum Potassium	Typical ECG Appearance	Possible ECG Abnormalities
Mild (5.5-6.5 mEq/L)		Peaked T waves Prolonged PR segment
Moderate (6.5-8.0 mEq/L)		Loss of P wave Prolonged QRS complex ST-segment elevation Ectopic beats and escape rhythms
Severe (> 8.0 mEq/L)		Progressive widening of QRS complex Sine wave Ventricular fibrillation Asystole Axis deviations Bundle branch blocks Fascicular blocks

Nursing Process Cont……

Nursing Concerns;

1. Reduced Level of consciousness
2. Respiratory distress
3. Electrolyte Imbalance
4. Convulsions
5. Aspiration Pneumonia
6. Hypertensive emergency
7. Generalized body swelling

Nursing Dx;

1. Ineffective airway clearance related to altered LOC…
2. Risk for Injury……
3. Risk for Electrolyte Imbalance……

Potential Complication: Dysrhythmias.

NOTE: Prioritization is a key component in planning for Interventions.

Nursing Process Cont.…

GOALS OF CARE:

1. "The client will maintain serum sodium, potassium, calcium, phosphorus, magnesium, and/or pH levels within normal range."
2. "The client will maintain a normal sinus heart rhythm with regular rate".

PLANNING:

✔ **Short term Goals (4-12hrs);**

The client will maintain serum sodium, potassium, calcium, phosphorus, magnesium, and/or pH levels within normal range.

✔ **Long Term Goals (Time – Dependent upon set target and condition);**

The client will maintain a normal sinus heart rhythm with regular rate

Hyperkalemia, Nursing Mgt:

- ✔ Eliminate Oral and Parenteral Potassium Intake.
- ✔ Increase Elimination of K+ (Loop diuretics, Cation Exchange Resin-Kayexalate).
- ✔ Force K+ from ECF to ICF by IV 50% Dextrose with regular Insulin or NaHCO3 preferably by use of Infusion Devices.
- ✔ Reverse membrane effects of elevated ECF K+ with IV Calcium gluconate or Chloride. To avert myocardial excitability.
- ✔ Monitor ECG with a comprehensive cardiac Assessment & monitoring. Involve a Cardiologist in cases of symptomatic or Refractory hyperkalemia
- ✔ Health Education;
  - I. Encourage a low potassium diet. Restrict Foods like Oranges, Green leafy vegetables, root vegetables- such; as carrots, potatoes and sweet potatoes, vine fruits- such; as tomatoes, cucumbers.
  - II. Educate patient on hyperkalemia, collaboratively, involve the Nephrologist in care.

Hyperkalemia, Nursing Mgt Cont.....

- ✔ If the patient is to receive blood transfusion, the Nurse should preferably request for freshly donated blood.
- ✔ In cases of Impaired Renal Function, administration of sodium polystyrene sulfonate (Oral or Rectal), a cation exchange Resin that promotes GIT potassium excretion and sodium absorption.
- ✔ Nebulized salbutamol 5mg/3mls Ns 3 divided doses over 2hrs.
- ✔ Prepare the Patient for Dialysis if hyperkalemia is refractory to conventional treatment.
- ✔ Do 12lead ECG for diagnosis and monitoring of the treatment interventions.
- ✔ Four to Six hourly electrolyte monitoring for evaluation of treatment interventions. Caution sample quality and proper technique of taking off the sample.
- ✔ Considering the patient before us, we have to also monitor renal function (BUN & Creatinine), ABG, urinalysis, and Osmolality.
- ✔ Strict Fluid balance chart with possible input/output targets.

Non Specific Nursing Care in Electrolyte Imbalance:

1. Ensure to continue with routine care bundles like FASTHUGS BID, NEURO-Critical Care, VAP, and other house keeping routines in case there is escalation of care.

2. Weigh the patient daily.

Regular monitoring of the patient's weight will indicate if there is fluid volume excess, which could cause more changes in electrolyte levels.

3. Administer pain medication as appropriate.

Electrolyte abnormalities may cause discomfort, and patients may need treatment for pain.

4. Half hourly – Hourly Vitals monitoring as per ICU Protocol.

5. Provide intravenous or oral hydration as needed.

Patients are more prone to electrolyte imbalances when experiencing vomiting and/or diarrhea. It is important that the nurse ensures the patient is maintaining appropriate hydration status.

Non Specific Nursing Care in Electrolyte Imbalance:

4. Supplement electrolyte levels as appropriate as ordered by the healthcare provider.

If patients' electrolyte levels are low, additional supplements may be needed orally or intravenously to maintain appropriate levels. The nurse will administer these as ordered by the healthcare provider.

5. Administer oxygen as needed.

Electrolyte imbalances can cause respiratory distress/failure. The nurse should monitor closely and if needed, supply supplemental oxygen therapy.

6. Educate patient and family on signs and symptoms of electrolyte abnormalities.

This will help to provide the patient with more independence at home in managing their care and preventing further complications or episodes of electrolyte abnormalities.

7. Educate the patient and family members on the importance of a balanced diet and the importance of hydration.

This will help patients to understand how their nutritional status affects their electrolyte levels.

Applying Nursing Process Cont.…

Evaluation;

- The effectiveness of interventions implemented to maintain electrolyte balance must be continuously evaluated.

- Evaluation helps the nurse determine whether goals and outcomes are met and if interventions are still appropriate for the patient.

- If outcomes and goals are not met, they need to be revised.

OTHER ELECTROLYTE IMBALANCES:

Hypokalemia; <3.5mEq/l

- . Deficit is life threatening, Assess for the cause.
- Lab work (for Dx & Rx Monitoring). (Digoxin levels)
- Administer the prescribed formulation of K+ (oral or IV), based on the level.
- K+ is never given by intravenous (IV) push or by the intramuscular or subcutaneous route. (RED ALERT)
- A dilution of no more than 1 mEq/10mL of solution is recommended.
- Ensure that the IV bag/Syringe/bottle containing potassium is properly labeled.
- Unpleasant test with oral liquid K+ administer with juice.

Hypokalemia

- The maximum recommended infusion rate is 5 to 10 mEq/hr never to exceed 20 mEq/hr under any circumstances.
- A client receiving IV K+ should be placed on a cardiac monitor and monitored for any changes.
- K+ infusion can cause phlebitis or Infiltration; if using a peripheral line the nurse should assess the site frequently for signs.
- Oral K+ should not be taken on an empty stomach & if a client develops abdominal pain, distention, nausea, vomiting, diarrhea, or gastrointestinal bleeding, STOP Rx.

ient/Care taker about foods rich in K+

OTHER ELECTROLYTE IMBALANCES:

Hypernatremia; >145 mEq/L

- Assess for the cause. Lab work (for Dx & Rx Monitoring).
- If the cause is fluid loss, prepare to administer IV infusions. Monitor daily weight.
- If the cause is inadequate renal excretion of sodium, prepare to administer diuretics that promote sodium loss.
- Restrict sodium and fluid intake as prescribed.
- Watch out for signs (Increased thirst, spontaneous muscle twitches or irregular muscle contractions in early stages).

Hypernatremia

- Implement Seizure precautions, due to altered cerebral function, agitation, confusion & seizures with/without LOC, stupor or coma.
- Lately, skeletal muscle weakness with diminished or absent deep tendon reflexes.
- Position change/turning to prevent sores, ROM exercises, Collaborate with physio team.
- Restrict oral salt intake, strict FBC, RFTs.
- Prepare for contingency in case of refractory/worsening hypernatremia.

OTHER ELECTROLYTE IMBALANCES:

Hyponatremia

- Assess for the cause. Lab work (for Dx & Rx Monitoring).
- Administer prescribed hypertonic saline (3%) or oral supplement. As a slow infusion & if possible an infusion device is preferred.
- Take note for clients taking Lithium Carbonate, hyponatremia precipitates lithium toxicity through diminished lithium excretion.
- If hyponatremia is caused by hypervolemia, osmotic diuretics may be prescribed to promote the excretion of water rather than sodium, Institute an strict FBC.
- Preferred is a CVC but your using a PL, there`s risk of infiltration and extravasation due to administration of a vesicant.
- Instruct the client to increase oral sodium intake as prescribed and inform the client about the foods to include in the diet e.g. Bacon, Butter, Canned food, Cheese, Cured pork, Hot dogs, Ketchup, or Table salt.
- Monitor vitals including the LOC and look out for signs of either overload/dehydration.

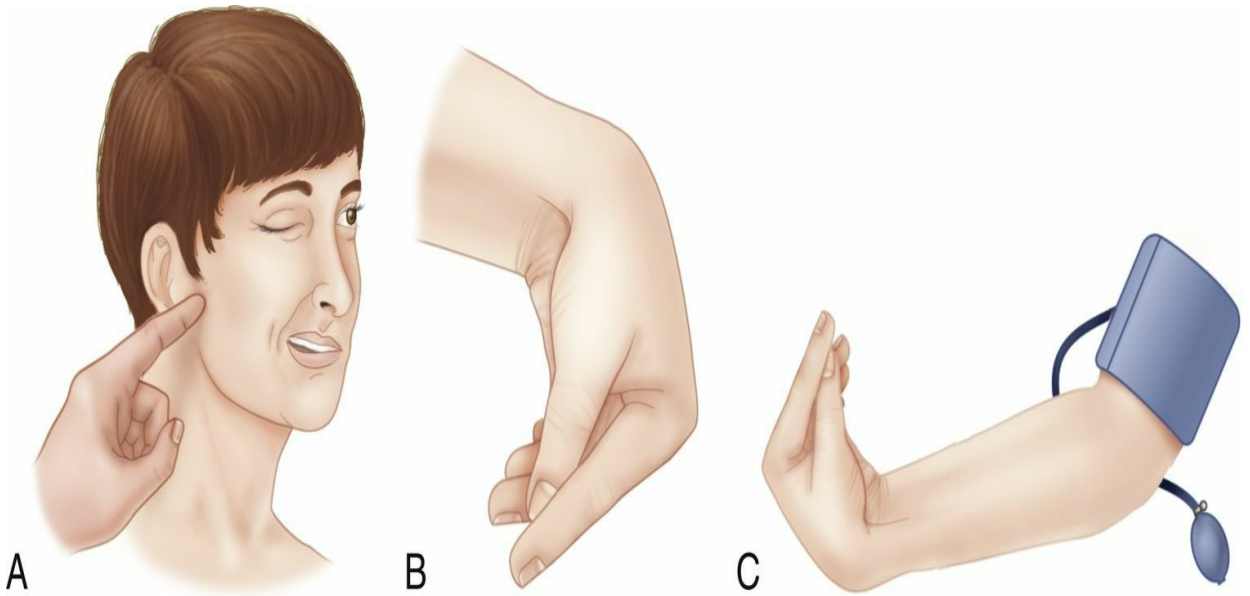
OTHER ELECTROLYTE IMBALANCES:

Hypocalcemia <9.0mg/dl (2.25mmol/l)

- Assess for the cause. Lab work (for Dx & Rx Monitoring).
- Administer prescribed calcium supplements orally or calcium intravenously.
- When administering calcium gluconate/Chloride intravenously, the line should be appropriate and administer slowly.
- Monitor for electrocardiographic changes.
- Observe for infiltration, and monitor for hypercalcemia.

Classical Picture of Hypocalcaemia;

- A, Chvostek's sign.
- B, Trousseau's sign,



OTHER ELECTROLYTE IMBALANCES:

Hypocalcemia <9.0mg/dl (2.25mmol/l)

- Administer prescribed medications that increase calcium absorption, e.g. Aluminum hydroxide reduces phosphorus levels, Vitamin D.
- Provide a quiet environment to reduce environmental stimuli & Initiate seizure precautions.
- Move the client carefully, and monitor for signs of a pathological fracture.
- Educate/instruct the client to consume foods high in calcium, e.g. Cheese, Collard greens, Milk and soy milk, Rhubarb, Sardines, Tofu, or Yogurt.

OTHER ELECTROLYTE IMBALANCES:

Hypercalcemia >10.5mg/dl (2.75 mmol/L).

- Assess for the cause. Lab work (for Dx & Rx Monitoring).
- Thiazide diuretics may be replaced with loop diuretics that enhance the excretion of calcium.
- Administer medications as prescribed that inhibit calcium resorption from the bone, such as phosphorus, calcitonin, bisphosphonates, and prostaglandin synthesis inhibitors
- Instruct the client to avoid foods high in calcium.
- Prepare the client with severe hypercalcemia for
- dialysis if medications fail to reduce the serum calcium level.
- Move the client carefully and monitor for signs of a pathological fracture.
- Monitor for flank or abdominal pain, and strain the urine to check for the presence of urinary stones.

OTHER ELECTROLYTE IMBALANCES:

Hypomagnesemia <1.8mEq/l

- Assess for the cause. Lab work (for Dx & Rx Monitoring).
- Hypomagnesemia frequently accompanies hypocalcemia, interventions also aim to restore normal serum calcium levels.
- Oral preparations of magnesium may cause diarrhea and increase magnesium loss, monitor treatment.
- IV Magnesium sulfate may be prescribed in ill clients when the magnesium level is low (intramuscular injections cause pain and tissue damage).
- initiate seizure precautions, monitor serum magnesium levels frequently, and monitor for diminished deep tendon reflexes, suggesting Hypermagnesemia, during the administration of magnesium.
- Instruct the client to increase the intake of foods that contain magnesium.
- Monitor for signs of MgS04 toxicity.

OTHER ELECTROLYTE IMBALANCES:

Hypermagnesemia >2.6 mEq

- Assess for the cause. Lab work (for Dx & Rx Monitoring).
- Instruct the client to avoid the use of laxatives and antacids containing magnesium.
- Intravenously administered calcium chloride or calcium gluconate may be prescribed to reverse the effects of magnesium on cardiac muscle.
- Calcium gluconate is the antidote for magnesium overdose

Hypophosphatemia <3.0mg/dl

- Discontinue medications that contribute to hypophosphatemia.
- Administer phosphorus orally along with a vitamin D supplement.
- Administer prescribed intravenously phosphorus serum levels fall below 1 mg/dL and when the client experiences critical clinical manifestations.
- Administer IV phosphorus slowly because of the risks associated with hyperphosphatemia.

OTHER ELECTROLYTE IMBALANCES:

Hyperphosphatemia >4.5 mg/dL

- Assess for the cause. Lab work (for Dx & Rx Monitoring).
- Recall the Reciprocal Relationship with Calcium.
- Administer phosphate-binding medications that increase fecal excretion of phosphorus by binding phosphorus from food in the GIT.
- Instruct the client to avoid phosphate containing medications, including; laxatives & enemas.
- Instruct the client to decrease the intake of food that is high in phosphorus e.g. Dairy products Fish, Nuts, Pumpkin, Organ meats, Pork, beef, chicken, Squash, Whole-grain breads, and cereals.
- Instruct the client to take phosphate-binding medications with meals or immediately after meals.

References;

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THE END

THANK YOU