

PROTOCOL

Title: Nurse-Managed Electrolyte Protocol	Effective Date	Date
Area/Department: Vanderbilt University Hospital (VUH) Intensive Care Units	Approval Date	Date
	Supersedes	NEW

The following protocol, once initiated by a provider's order for a specific patient, has been approved for implementation by RN LPN Other: [specify]

Protocol: Outlines the specific interventions that Registered Nursing staff are to follow for a patient admitted to the VUH intensive care unit (ICU) with electrolyte imbalance(s).

INCLUSION CRITERIA

Patient must meet ALL inclusion criteria below:

- Patient age 16 years or older;
- Patient currently admitted to VUH ICU;
- Patient does not have an active order for transfer out of the ICU;
- Active order for "Initiate Adult Electrolyte Replacement Protocol" with electrolyte(s) selection:
 - Calcium;
 - Magnesium;
 - Potassium; and/or
 - Phosphorous; and
- Patient does not currently have any known or documented contraindications below:
 - Hemodialysis/peritoneal dialysis;
 - Creatinine clearance (CrCl) less than 20 mL/min;
 - Chronic adrenal insufficiency;
 - New electrical burns;
 - Rhabdomyolysis;
 - Diabetic ketoacidosis;
 - New crush injury;
 - Hypothermic patients; and/or
 - Tumor lysis syndrome.

EXCLUSION CRITERIA

Patient meets any one of the following exclusion criteria:

- Patient age less than 16 years;
- Patient not currently admitted to VUH ICU intensive care unit;
- Patient has an active order for transfer out of the ICU; or
- No active order for "Initiate Adult Electrolyte Replacement Protocol" with appropriate electrolyte(s) selection:
 - Calcium;
 - Magnesium;
 - Potassium; and/or

- Phosphorous; or
- Patient has any known or documented contraindications below:
 - Hemodialysis/peritoneal dialysis;
 - CrCl less than 20 mL/min;
 - Chronic adrenal insufficiency;
 - New electrical burns;
 - Rhabdomyolysis;
 - Diabetic ketoacidosis;
 - New crush injury;
 - Hypothermic patients; and/or
 - Tumor lysis syndrome.

INTERVENTIONS

- Screen patient for inclusion and exclusion criteria;
- Enter order(s) for calcium, magnesium, potassium, and/or phosphorous doses with lab monitoring as indicated in the tables below:

Calcium Replacement

Ionized Calcium Level	Dose and Route	Enter Repeat Ionized Calcium Laboratory Order:
≥ 4.0 mg/dL	No repletion necessary	No repletion necessary
3.5-3.9 mg/dL	4 g calcium gluconate IV	With next AM labs
3-3.4 mg/dL	6 g calcium gluconate IV	4 hours after replacement
2.5-2.9 mg/dL	8 g calcium gluconate IV	4 hours after replacement
< 2.5 mg/dL	10 g calcium gluconate IV and notify provider immediately	4 hours after replacement

Magnesium Replacement

Magnesium Level	Dose and Route	Enter Repeat Magnesium Laboratory Order:
≥ 2.0 mg/dL	No repletion necessary	No repletion necessary
1.3-1.9 mg/dL	4 g magnesium sulfate IV	Not required
≤ 1.2 mg/dL	8 g magnesium sulfate IV	6 hours after replacement

Potassium Replacement

- Before entering every potassium replacement order for potassium ≤ 3.9 , review phosphorous level to determine which potassium product to administer:
 - If phosphorous level > 2.5 mg/dL, enter orders for potassium replacement using potassium chloride (KCl) with lab monitoring provided in potassium replacement table below;
 - If phosphorous level ≤ 2.5 mg/dL, enter orders for potassium replacement using potassium phosphate (KPhos) with lab monitoring provided in the phosphorus replacement table under “phosphorous replacement” section;
- Replacement of potassium by mouth (PO) or per tube (PT) is preferred if patient able to tolerate other enteral medications. If intravenous replacement is required, follow the instructions below:
 - If central line is present and continuous cardiac monitoring, administer ordered potassium dose at rate of 20 mEq/hr;
 - If peripheral access only, administer ordered potassium dose at rate of 10 mEq/hr;

Potassium Level	Dose and Route	Enter Repeat Potassium Laboratory Order:
≥ 4.0 mEq/L	No repletion necessary	No repletion necessary
3.3-3.9 mEq/L	KCl 40 mEq controlled-release tablet PO <u>or</u> KCl 40 mEq oral powder packet PT <u>or</u> KCl 40 mEq IV if enteral route not available	Not required
3-3.2 mEq/L	KCl 60 mEq controlled-release tablet PO <u>or</u> KCl 60 mEq oral powder packet PT <u>or</u> KCl 60 mEq IV if enteral route not available	With next AM labs
2.6-2.9 mEq/L	KCl 80 mEq IV and notify provider immediately	Immediately after replacement and with next morning labs
< 2.6 mEq/L	KCl 100 mEq IV and notify provider immediately	Immediately after replacement and with next AM labs

Phosphorous Replacement

- Before entering every phosphorous replacement order for phosphorous ≤ 2.5 mg/dL, review potassium level to determine which phosphorous product to administer:
 - If potassium ≥ 4 mEq/L, enter orders for phosphorous replacement using sodium phosphate (NaPhos) with lab monitoring as indicted in the phosphorous replacement table below;
 - If potassium level < 4 mEq/L, enter orders for phosphorous replacement using KPhos with lab monitoring provided in the phosphorous replacement table below;
- Replacement of phosphorous by mouth or per tube is preferred if patient able to tolerate other enteral medications.

Phosphorous Level	Dose and Route	Enter Repeat Phosphorous Laboratory Order:
> 2.5 mg/dL	No repletion necessary	No repletion necessary
2-2.5 mg/dL	KPhos Neutral tablet: 2 tabs PO/PT q4h x 3 doses <u>or</u> KPhos 15mmol IV <u>or</u> NaPhos 15mmol IV	With next AM labs

1.6-1.9 mg/dL	KPhos Neutral tablet: 2 tabs PO/PT q4h x 4 doses <u>or</u> KPhos 30mmol IV <u>or</u> NaPhos 30mmol IV	With next AM labs
< 1.6 mg/dL	KPhos 45 mmol IV <u>or</u> NaPhos 45mmol IV and notify provider immediately	6 hours after replacement

- **Circumstances of when to notify the provider for further instructions:**
 - Ionized calcium < 2.5 mg/dL;
 - Potassium level < 2.9 mEq/L;
 - Phosphorus level < 1.6 mg/dL;
 - If potassium does not increase to ≥ 4 mEq/L after 2 recommended replacement doses.

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REFERENCES

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