

TITLE: HRMC Electrolyte Management Reference



EFFECTIVE DATE: 1/10	POLICY#: PN.09c	Page 1 of 3
REVIEW: REVISION:	Created by: J.Coleman, PharmD Revised by: Ryan Thelin, PharmD	DISTRIBUTION: Nursing; Pharmacy

ELECTROLYTE DISORDER	TREATMENT	DOSING	NOTES
HYPERCALCEMIA [Corrected Ca ²⁺] >10.5 mg/dL	Normal Saline followed by furosemide.	NS at 200-300 mL/h, then add furosemide 40 – 100 mg IV Q1-4H.	Add furosemide to avoid fluid overload and enhance calcium elimination.
HYPOCALCEMIA [Corrected Ca ²⁺] ≤ 8 mg/dL	Calcium gluconate	[Corrected Ca²⁺] 7.5-8 mg/dL: 1 G IV over 30 minutes. [Corrected Ca²⁺] < 7.5 mg/dL: 2 G IV over 30 minutes. Consider continuous replacement.	[Corrected calcium] = [serum calcium] + (0.8 X (4 - [serum albumin]))
ELECTROLYTE DISORDER	TREATMENT	DOSING	NOTES
HYPERKALEMIA [K ⁺] Mild: 5.1-5.9 mEq/L Moderate: 6-7 mEq/L Severe: >7 mEq/L	Furosemide	Mild: 40 – 80 mg IV	To eliminate potassium. Caution if patient is hyponatremic.
	Sodium polystyrene sulfonate (Kayexalate®)	Mild: 15 g PO or rectal 1-4 times daily.	Do not mix in orange juice or other potassium containing solutions.
	Insulin plus dextrose	Moderate/Severe: 25 g of dextrose IV with 10 units of regular insulin IV	Adjunct therapy only- shifts potassium intracellular.
	Sodium bicarbonate	Moderate/Severe: 50 mEq IV over 5 minutes	Adjunct therapy only- shifts potassium intracellular.
	Albuterol	Moderate/Severe: 2.5-5 mg nebulized over 15 minutes	Adjunct therapy only- shifts potassium intracellular.
	Calcium Gluconate	Arrhythmia: 1-2 g IV over 5-10 minutes	Repeat dose if abnormal EKG persists after 5 minutes.
HYPOKALEMIA [K ⁺] <3.6 mEq/L	Potassium Chloride PO	[K⁺] 3.2-3.5 mEq/L: 20 mEq [K⁺] 2.8-3.1 mEq/L: 20 mEq, repeat in 1 hour.	ADE: GI upset If losses are ongoing or severe- consider IV.
	Potassium Chloride IV	[K⁺] 3.2-3.5 mEq/L: 20 mEq [K⁺] 2.8-3.1 mEq/L: 40 mEq [K⁺] ≤ 2.7 mEq/L: 60 mEq	<ul style="list-style-type: none"> • Central line and EKG monitoring for infusions administered at >10 mEq/hour. • Max concentration for central line: 20 mEq/100mL • Max concentration for peripheral line: 10mEq/100 mL Administer 50% of dose to patients with renal impairment.

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ELECTROLYTE DISORDER	TREATMENT	DOSING	NOTES	
HYPERMAGNESEMIA [Mg ²⁺] ≥ 4 mg/dL [Mg ²⁺] > 8 [OB patient on Mg]	Calcium IV	200-300 mg elemental calcium	Calcium chloride- administer via central line due to extravasation.	
	Normal Saline	200-300 mL/h	Add furosemide to avoid fluid overload.	
	Furosemide	40 – 100 mg IV Q1-4H		
HYPOMAGNESEMIA [Mg ²⁺] <1.8 mg/dL	Magnesium oxide	400 – 800 mg PO BID-TID	ADE: diarrhea	
	Magnesium chloride	64-128 mg PO BID		
	Magnesium sulfate IV	[Mg ²⁺] 1.4-1.7 mg/dL : 2 g over 2 hours [Mg ²⁺] ≤ 1.3 mg/dL : 4 g over 4 hours	If [Mg ²⁺] is ≤ 0.9 mg/dL- place on telemetry monitor.	
ELECTROLYTE DISORDER	TREATMENT	DOSING	NOTES	
HYPERPHOSPHATEMIA [PO ₄ ⁻] ≥ 5 mg/dL	Calcium acetate	2-4 tablets PO TID with meals	1 tab = 667 mg	
	Calcium carbonate	1-2 g PO TID with meals		
	Aluminum hydroxide	300-600 mg PO TID with meals	ADE: constipation	
	Fosrenol®(lanthanum carbonate)	500-1000 mg PO TID with meals		
	Sevelamer	800 – 1600 mg PO TID with meals.	Reserve for severe refractory cases and those which are accompanied by hypercalcemia.	
HYPOPHOSPHATEMIA [PO ₄ ⁻] < 2.5 mg/dL	Solution dependent on serum potassium level.			
[PO ₄ ⁻] ≤ 1.4mg/dL	K ⁺ ≤ 4 mEq	Potassium phosphate	30mmol IV over 6 hours.	Phosphorous levels should be rechecked 2 to 4 hours after dose. Max phosphate infusion rate = 7 mmol/h Alternative Oral Therapy: K-Phos Neutral provides 250 mg of phosphorous, 13 mEq of sodium, and 1.1 mEq of potassium per tablet. K-Phos Original provides 150 mg of phosphorus and 3.7 mEq of potassium per capsule.
	K ⁺ > 4 mEq	Sodium phosphate	30 mmol IV over 6 hours.	
[PO ₄ ⁻] 1.5-1.9 mg/dL		Neutraphos	16 mmol (2 packets) PO Q8H for 3 doses.	
	K ⁺ ≤ 4.2 mEq	Potassium phosphate	22.5 mmol IV over 4 hours.	
	K ⁺ > 4.2 mEq	Sodium phosphate	22.5 mmol IV over 4 hours.	
	[PO ₄ ⁻] 2-2.4 mg/dL		Neutraphos	
K ⁺ ≤ 4.5 mEq		Potassium phosphate	15 mmol IV over 4 hours.	
K ⁺ > 4.5 mEq	Sodium phosphate	15 mmol IV over 4 hours.		

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ELECTROLYTE DISORDER	TYPE	TREATMENT
HYPERNATREMIA [Na+] >145 mEq/L	Hypovolemic	1. Free Water Deficit(L)= (Total Body Water [TBW]) X ([Serum Sodium/140] – 1) $TBW = [Body\ Weight(kg) \times \% \text{ of Total Body Water}]$ $\% \text{ Total Body Water: Young men} = 0.6; \text{ young women/elderly men} = 0.5; \text{ elderly women} = 0.4$ ➤ May correct hemodynamic instability with Normal Saline or Lactated Ringers initially.
		2. Calculate anticipated serum sodium changes based on 1 L of fluid:
		5% Dextrose $\Delta [serum\ sodium] = (0\ mEq/L - [serum\ sodium]) / (TBW + 1)$
		0.9% NaCl (NS) $\Delta [serum\ sodium] = (154\ mEq/L - [serum\ sodium]) / (TBW + 1)$
		0.45% NaCl $\Delta [serum\ sodium] = (77\ mEq/L - [serum\ sodium]) / (TBW + 1)$
		D5/0.3% NaCl $\Delta [serum\ sodium] = (51\ mEq/L - [serum\ sodium]) / (TBW + 1)$
		D5/0.225% NaCl $\Delta [serum\ sodium] = (38.5\ mEq/L - [serum\ sodium]) / (TBW + 1)$
		3. Correct half the free water deficit within the first 24 hours and remainder over the next 24-72 hours. ➤ Administer at a maximum sodium correction rate of 1-2mEq/L/h for acute (no more than 3 hours) and 0.5 mEq/L/h for chronic. <ul style="list-style-type: none"> ▪ Max total of 10-12 mEq/L/day
	Isovolemic	➤ May result from a water deficit or sodium excess. Evaluate and treat accordingly. ➤ Most common in diabetes insipidus(DI) patients.
	Hypervolemic	➤ Sodium restriction ➤ Administer diuretics (Loop/Thiazide) to facilitate sodium excretion. <ul style="list-style-type: none"> ○ Consider hypotonic saline or 5% dextrose injections in addition to prevent additional complications.
HYPONATREMIA [Na+] <136 mEq/L		$Sodium\ deficit(mEq) = (Total\ Body\ Water\ [TBW]) \times (140 - [serum\ sodium])$ $TBW = [Body\ Weight(kg) \times \% \text{ of Total Body Water}]$ (see above for % number) ➤ Maximum sodium correction rate of 1-2mEq/L/h for acute and 0.5 mEq/L/h for chronic. Max total of 10-12 mEq/L/day
	Hypovolemic	➤ Administer normal saline or hypertonic saline based on deficit and max sodium correction rate. <ul style="list-style-type: none"> ○ 1 L of normal saline <ul style="list-style-type: none"> ▪ $\Delta [serum\ sodium] = (154\ mEq/L - [serum\ sodium]) / (TBW + 1)$ ○ 1 L of 3% sodium chloride (reserved for severe cases) <ul style="list-style-type: none"> ▪ $\Delta [serum\ sodium] = (512\ mEq/L - [serum\ sodium]) / (TBW + 1)$
	Isovolemic	➤ Water restriction <ul style="list-style-type: none"> ○ May diurese with furosemide 20-40 mg IV Q6-12H ➤ Assess for SIADH
	Hypervolemic	➤ Restrict sodium and free water <ul style="list-style-type: none"> ○ May add furosemide 20-40 mg IV Q6-12H

Reference: Kraft MD, Btaiche IF, Sacks GS, Kudsk KA. Treatment of Electrolyte Disorders in Adult Patients in the Intensive Care Unit. *Am J Health-Syst Pharm.* 2005. 62:1663-1682.