

Common fluid and Electrolyte Disturbances in Acute Renal Injury and Chronic Renal Failure

Disturbance	Manifestation	General Management Strategies
Fluid volume excess	<ul style="list-style-type: none">▪ Distended neck veins and hand veins▪ Bounding pulses, hypertension▪ Dyspnea, crackles, pulmonary edema, S3▪ Weight gain (1 kg wt gain for each 1 liter of excess fluid) ▪ Peripheral edema	<ul style="list-style-type: none">• Fluid restriction• Diuretics• Sodium restricted diet• HOB elevated• Monitor :<ul style="list-style-type: none">• Intake and output• Vital signs (hypertension, tachypnea)• Lung sounds• Skin (Peripheral edema)• Daily weights (trends)• Electrolytes

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Hyperphosphatemia (PO_4^{3-} greater than 4.4 mg/dL)	<ul style="list-style-type: none">• Signs and symptoms of hypocalcemia:<ul style="list-style-type: none">• Numbness around lips• Tetany• Calcium-phosphate precipitates in skin, soft tissue and blood vessels with prolonged hyperphosphatemia	<ul style="list-style-type: none">• Monitor serum phosphorus levels• Treat hyperphosphatemia (>4.4 mg/dL) with:<ul style="list-style-type: none">• Dietary phosphorous restriction• Phosphate binder medications that contain no calcium:<ul style="list-style-type: none">• Sevelamer (Renagel)• Taken with meals• Calcium-containing binders like calcium acetate (PhosLo) Not recommended

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<p>Hypocalcemia</p> <p>Total: $\text{Ca}^{2+} < 8.6 \text{ mg/dL}$</p> <p>Ionized: $\text{Ca}^{2+} < 4.4 \text{ mg/dL}$</p>	<p><u>Acute hypocalcemia:</u></p> <ul style="list-style-type: none"> • Numbness & tingling of extremities, lips and mouth • Hyperactive reflexes • Tetany: Muscle cramps, +Chvostek's sign, +Trousseau's sign • Laryngeal spasms (stridor) • Cardiac dysrhythmias • Seizures <p><u>Prolonged hypocalcemia:</u></p> <ul style="list-style-type: none"> • Bone pain and osteoporosis 	<ul style="list-style-type: none"> • Treat underlying cause (hyperphosphatemia) • Increase dietary intake of calcium and vitamin D. • Oral calcium and/or vitamin D supplements: <ul style="list-style-type: none"> • Calcitriol (Rocaltrol) • Calcium supplements not recommended unless dietary calcium intake is less than 1,000 mg/day. • <u>Treat severe hypocalcemia with IV calcium gluconate or calcium chloride.</u>

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Metabolic Acidosis pH < 7.35 CO ₂ 35-45 mm Hg HCO ₃ < 22 mEq/L	<ul style="list-style-type: none">• Kussmaul breathing• Restlessness and confusion• Hyperkalemia	<ul style="list-style-type: none">• Monitor respiratory rate and rhythm• Monitor ABGs • Administer sodium bicarbonate supplement: Oral or IV • Dialysis

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Hyperkalemia (K ⁺ > 5.0 mEq/L)	<ul style="list-style-type: none">• Neuromuscular<ul style="list-style-type: none">• Weakness• Paresthesia• Gastrointestinal<ul style="list-style-type: none">• Abdominal cramps• Diarrhea• Cardiovascular<ul style="list-style-type: none">• K⁺ > 6.0 mEq/L• Cardiac dysrhythmias• Cardiac arrest	<ul style="list-style-type: none">• Eliminate oral and parenteral potassium intake.• Administer Loop diuretics.• Administer Sodium Polystyrene Sulfonate (Kayexalate): Given oral or rectal.• Emergency measures to temporarily treat severe hyperkalemia:<ul style="list-style-type: none">• Place patient on a cardiac monitor• Administer IV Sodium Bicarbonate• Administer a continuous infusion of D₁₀W and Insulin.• Administer calcium gluconate IV• Dialysis

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Hypermagnesaemia (Mg ²⁺ >2.4 mEq/L)	<ul style="list-style-type: none">• Neuromuscular<ul style="list-style-type: none">• Depressed deep tendon reflexes• Muscle weakness• Cardiovascular<ul style="list-style-type: none">• Hypotension• Bradycardia• Cardiac arrest• Gastrointestinal<ul style="list-style-type: none">• Nausea and vomiting	<ul style="list-style-type: none">• Eliminate magnesium-containing medications (eg, antacids, laxatives)• Administer loop diuretics• Dialysis

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Anemia (Hgb < 10 g/dL)	<ul style="list-style-type: none">• Generalized weakness• Orthostatic symptoms (eg, lightheadedness or dizziness)• Decreased exercise tolerance• Chest discomfort or heart palpitations• Cold intolerance• Inability to concentrate	<ul style="list-style-type: none">• Treated with an Erythropoiesis-Stimulating Agent:<ul style="list-style-type: none">• epoetin alfa (Epogen) - or -• darbepoetin alfa (Aranesp)• Target hemoglobin in the range of 11 to 12 g/dL• May also need an iron and folic acid supplement