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| **Institute / Department Protocol** |

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| **Target Group:**  Physicians, Nurses, and Pharmacists at CCAD | **Protocol Number:**  RCCI\_PTL\_104  **Version**: 2 | **Date of Issue:**  25 October 2015 (v.1)  06 January 2016 (v.2) | **Date of Review:**  04 January 2016 |
| **Approved by:**  Jeffrey Chapman, MD  Chief of RCCI | **Date Approved:**  19 October 2015 (v.1)  06 January 2016 (v.2) | **Prepared by:**  Janise Phillips, Dept.  of Pharmacy Services | **Date of Revision:**  04 January 2016 |

**Printed copies are for reference only. Please refer to the electronic copy for the latest version in CCAD’s Policy & Procedure Manual on SharePoint.**

**Purpose**

To provide guidance for the treatment of electrolyte depletion in critically ill adults

**Protocol**

1. Exclusion criteria:
2. Renal impairment (SCr >250 umol/L or urine output < 30 mL/hr)
3. Renal replacement therapy (intermittent hemodialysis, continuous renal replacement therapy, or peritoneal dialysis)
4. Diabetic ketoacidosis (DKA) or hyperosmolar hyperglycemic state (HHS)
5. Rhabdomyolysis
6. Parenteral nutrition
7. Weight < 40 kg
8. The physician will order the ICU Electrolyte Replacement Orderset in Epic.
   1. The RN will request the medication from pharmacy as needed per protocol.
      1. IV replacement is preferred. Enteral replacement is optional if the patient is tolerating an oral diet or tube feedings without nausea/vomiting.
   2. The RN will request follow up labs as needed per protocol
9. Potassium Replacement (Reference Range: 3.6 – 4.8 mmol/L)

**Central Line IV Replacement**

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| **Serum Potassium** | **Potassium Chloride Dose** | **Monitoring** |
| 3.6 – 3.9 mmol/L | 20 mmol Potassium Chloride in 100 mL NS Infuse over 1 hour | Recheck potassium level 1 hr after infusion complete |
| 3.2 – 3.5 mmol/L | 40 mmol Potassium Chloride in 100 mL NS Infuse over 2 hours | Recheck potassium level 1 hr after infusion complete |
| 2.9 – 3.1 mmol/L | 20 mmol Potassium Chloride in 100 mL NS Infuse over 1 hour x 3 doses | Recheck potassium level 1 hr after infusion of last dose complete |
| < 2.9 mmol/L | 40 mmol Potassium Chloride in 100 mL NS Infuse over 2 hours every 2 hrs x 2 doses  **Notify physician** | Recheck potassium level 1 hr after infusion of last dose complete |

\*Potassium phosphate may be given if concurrent hypokalemia and hypophosphatemia. Contact physician for order. (3 mmol potassium phosphate = 4.4 mmol potassium)

**Peripheral Line IV Replacement**

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| **Serum Potassium** | **Potassium Chloride Dose** | **Monitoring** |
| 3.6 – 3.9 mmol/L | 20 mmol Potassium Chloride in 250 mL NS Infuse over 2 hours | Recheck potassium level 1 hr after infusion |
| 3.2 – 3.5 mmol/L | 20 mmol Potassium Chloride in 250 mL NS Infuse over 2 hours every 2 hrs x 2 doses | Recheck potassium level 1 hr after infusion of last dose complete |
| 2.9 – 3.1 mmol/L | 20 mmol Potassium Chloride in 250 mL NS Infuse over 2 hours every 2 hrs x 3 doses | Recheck potassium level 1 hr after infusion of last dose complete |
| < 2.9 mmol/L | 20 mmol Potassium Chloride in 250 mL NS Infuse over 2 hours every 2 hrs x 4 doses  **Notify Physician** | Recheck potassium level 1 hr after infusion of last dose complete |

\*Potassium phosphate may be given if concurrent hypokalemia and hypophosphatemia. Contact physician for order. (3 mmol potassium phosphate = 4.4 mmol potassium)

**Oral or Enteral Replacement**

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| **Serum Potassium** | **Potassium Chloride Dose** | **Monitoring** |
| 3.6 – 3.9 mmol/L | 20 mmol Potassium Chloride oral syrup PO/tube | Recheck potassium level in 4 hrs |
| 3.2 – 3.5 mmol/L | 20 mmol Potassium Chloride oral syrup PO/tube every 2 hrs x 2 doses | Recheck potassium level 4 hrs after last dose |

\*Only if patient can tolerate enteral replacement. If K <3.2 mmol/L give IV replacement.

1. Magnesium Replacement (Reference Range: 0.66 – 1.07 mmol/L)

**IV Replacement**

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| **Serum Magnesium** | **Magnesium Sulfate Dose** | **Monitoring** |
| 0.66 – 0.8 mmol/L | 8 mmol Magnesium Sulfate in 100 mL NS  Infuse over 1 hour | Recheck magnesium level next AM |
| 0.5 – 0.65 mmol/L | 16 mmol Magnesium Sulfate in 250 mL NS  Infuse over 2 hours | Recheck magnesium level 4 hours after infusion complete |
| < 0.5 mmol/L | 16 mmol Magnesium Sulfate in 250 mL NS  Infuse over 2 hours  **Notify Physician** | Recheck magnesium level 4 hours after infusion complete |

\*Serum magnesium levels could appear artificially high if measured too soon after dose is given due to slow equilibration of magnesium between serum and intracellular spaces and tissues.

**Oral or Enteral Replacement**

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| **Serum Magnesium** | **Magnesium Oxide Dose** | **Monitoring** |
| 0.66 – 0.8 mmol/L | 400mg Magnesium Oxide tablet PO/tube twice daily | Recheck magnesium level next AM |

\*Magnesium oxide 400mg = 10 mmol magnesium.

Give only if patient can tolerate enteral replacement. If Mg <0.66 mmol/L give IV replacement.

1. Phosphorus Replacement (Reference Range: 0.81 – 1.45 mmol/L)

**IV Replacement**

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| **Serum Phosphorus** | **Sodium Phosphate Dose** | **Monitoring** |
| 0.65 – 0.8 mmol/L | 15 mmol Sodium Phosphate in 100 mL D5W  Infuse over 2 hours | Recheck phosphorus level next AM |
| < 0.65 mmol/L | 30 mmol Sodium Phosphate in 250 mL D5W  Infuse over 4 hours  **Notify Physician** | Recheck phosphorus level 2 hrs after infusion |

**\***Potassium phosphate can be used if potassium < 4 mmol/L. Contact physician for order. (3 mmol sodium phosphate = 4 mmol sodium)

**Oral or Enteral Replacement**

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| **Serum Phosphorus** | **Phosphorus Dose** | **Monitoring** |
| 0.65 – 0.8 mmol/L | 500mg Phosphorus tablet PO/tube twice daily | Recheck phosphorus level next AM |

\*Phosphorus 500mg tablet = 16 mmol phosphorus (also contains 3 mmol potassium and 20 mmol sodium).

Give only if patient can tolerate enteral replacement. If Phos <0.65 mmol/L give IV replacement.

**Oversight and Responsibility**

1. Department of Pharmacy Services
2. Respiratory and Critical Care Institute
3. Department of Nursing

**Definitions**

1. None

**References:**

1. Kraft MD, Btaiche IF, Sacks GS, Kudsk K. Treatment of electrolyte disorders in adult patients in the intensive care unit. Am J Health-Syst Pharm. 2005;62:1663-82.
2. Todd SR, Sucher JF, Moore LJ, Turner KL et al. A multidisciplinary protocol improves electrolyte replacement and its effectiveness. Am J of Surg 2009;198:911-15.

**Institute / Department / Committee Involved in SOP Development / Revision**

1. Department of Pharmacy Services
2. Respiratory and Critical Care Institute
3. Department of Nursing

**Contact for Questions / Clarifications**

1. Janise Phillips, PharmD, BCPS, BCCCP | Pharmacotherapy Specialist

**Related or Supporting Documents**

1. None