Department of Pharmacy

Medication Distribution – Intravenous Potassium Administration (N 11-07A)

Intent:

This protocol has been developed based upon the need for providing safe and effective guidelines for the infusion of intravenous potassium salts and to reduce the occurrence or potential occurrence of medication errors or adverse effects.

Concentrated potassium vials will not be stored on patient care units and will not be available after pharmacy hours.

Protocol:

Concentration of potassium solutions and rate of administration should be in accordance with the following:

1. Potassium Chloride

<table>
<thead>
<tr>
<th>AREA</th>
<th>PUMP REQUIRED</th>
<th>MAXIMUM RATE OF INFUSION</th>
<th>SITE OF INFUSION</th>
<th>POTASSIUM CONCENTRATION (Commercially Available Product)</th>
<th>POTASSIUM MAXIMUM CONCENTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive Care Unit/Emergency Department</td>
<td>YES</td>
<td>20 mEq/hour</td>
<td>CENTRAL</td>
<td>10 mEq/100 mL</td>
<td>0.2 mEq/mL</td>
</tr>
<tr>
<td>(Monitored Beds)</td>
<td></td>
<td>(Unless life threatening arrhythmia present, then 40 mEq/hour.)</td>
<td></td>
<td>20 mEq/50 mL</td>
<td>(20 mEq/100 mL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mEq/hour</td>
<td>PERIPHERAL</td>
<td>10 mEq/100 mL</td>
<td>0.1 mEq/mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(10 mEq/100 mL)</td>
<td>(10 mEq/100 mL)</td>
</tr>
<tr>
<td>Telemetry Unit (Monitored Beds)</td>
<td>YES</td>
<td>20 mEq/hour</td>
<td>CENTRAL</td>
<td>10 mEq/100 mL</td>
<td>0.1 mEq/mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(10 mEq/100 mL)</td>
<td>(10 mEq/100 mL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mEq/hour</td>
<td>PERIPHERAL</td>
<td>10 mEq/100 mL</td>
<td>0.1 mEq/mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(10 mEq/100 mL)</td>
<td>(10 mEq/100 mL)</td>
</tr>
<tr>
<td>General Nursing Unit (Non-Monitored Beds)</td>
<td>YES</td>
<td>10 mEq/hour</td>
<td>CENTRAL</td>
<td>10 mEq/100 mL</td>
<td>0.1 mEq/mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(10 mEq/100 mL)</td>
<td>(10 mEq/100 mL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PERIPHERAL</td>
<td>10 mEq/100 mL</td>
<td>0.1 mEq/mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(10 mEq/100 mL)</td>
<td>(10 mEq/100 mL)</td>
</tr>
<tr>
<td>All Nursing Units</td>
<td>YES</td>
<td>10 mEq/hour*</td>
<td>CENTRAL or PERIPHERAL</td>
<td>(Recommend use of commercially available pre-mixed solutions, when available.)</td>
<td>40 mEq/1000 mL**</td>
</tr>
</tbody>
</table>

*Includes rate of potassium being infused through Total Parenteral Nutrition (TPN) therapy if appropriate.

**Although the use of commercially-available, pre-mixed large-volume solutions are recommended (maximum potassium content 40 mEq/1000 mL), concentrations of up to 80 mEq/1000 mL may be used via central line in some instances.
2. Potassium Phosphate

<table>
<thead>
<tr>
<th>AREA</th>
<th>PUMP REQUIRED</th>
<th>MAXIMUM RATE OF INFUSION</th>
<th>SITE OF INFUSION</th>
<th>POTASSIUM CONCENTRATION</th>
<th>POTASSIUM MAXIMUM CONCENTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive Care Unit/Emergency Department (Monitored Beds)</td>
<td>YES</td>
<td>7.5 mMol/hour (11 mEq/hour)</td>
<td>CENTRAL</td>
<td>5 mMol/100 mL (7 mEq/100 mL)</td>
<td>0.075 mMol/mL (0.1 mEq/mL) OR 7.5 mMol/100 mL (11 mEq/100 mL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PERIPHERAL</td>
<td>5 mMol/100 mL (7 mEq/100 mL)</td>
<td>0.05 mMol/mL (0.07 mEq/mL) OR 5 mMol/100 mL (7 mEq/100 mL)</td>
</tr>
<tr>
<td>Telemetry Unit (Monitored Beds)</td>
<td>YES</td>
<td>7.5 mMol/hour (11 mEq/hour)</td>
<td>CENTRAL</td>
<td>5 mMol/100 mL (7 mEq/100 mL)</td>
<td>0.05 mMol/mL (0.07 mEq/mL) OR 5 mMol/100 mL (7 mEq/100 mL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PERIPHERAL</td>
<td>5 mMol/100 mL (7 mEq/100 mL)</td>
<td>0.05 mMol/mL (0.07 mEq/mL) OR 5 mMol/100 mL (7 mEq/100 mL)</td>
</tr>
<tr>
<td>General Nursing Unit (Non-Monitored Beds)</td>
<td>YES</td>
<td>3 mMol/hour (4.4 mEq/hour)</td>
<td>CENTRAL</td>
<td>5 mMol/100 mL (7 mEq/100 mL)</td>
<td>0.05 mMol/mL (0.07 mEq/mL) OR 5 mMol/100 mL (7 mEq/100 mL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PERIPHERAL</td>
<td>5 mMol/100 mL (7 mEq/100 mL)</td>
<td>0.05 mMol/mL (0.07 mEq/mL) OR 5 mMol/100 mL (7 mEq/100 mL)</td>
</tr>
</tbody>
</table>

3. Potassium Acetate

a. The use of potassium acetate injection is generally reserved for patients receiving total parenteral nutrition (TPN) or peripheral parenteral nutrition (PPN) therapy. This product should only be stocked in the pharmacy department.

4. General Information

a. An infusion pump is required for all administration of potassium salts.
b. The typical rate of infusion is 10 mEq per hour for potassium chloride and 3 mMol per hour for potassium phosphate.
c. As a general rule, a drop of 1 mEq/L in the serum potassium level correlates to a loss of 200 to 500 mEq of total body potassium.
d. Replacement Recommendations – Potassium Chloride:
   - **Oral:**
     - The oral route is the preferred method of potassium administration, primarily because of safety.
     - Oral potassium is almost completely absorbed from the gastrointestinal tract and rarely causes hyperkalemia in patients with normal renal function.
   - **Intravenous:**
     - Potassium chloride is recommended to be ordered in milliequivalents (mEq).
If serum potassium is greater than or equal to 2.5 mEq/L: infuse up to 200 mEq potassium per day at a rate not to exceed 10 mEq/hour.

If serum potassium is greater than or equal to 2 mEq/L but less than 2.5 mEq/L: infuse up to 200 mEq potassium per day at a rate not to exceed 20 mEq/hour.

If serum potassium is less than 2 mEq/L with ECG changes or paralysis (Urgent Treatment): infuse up to 400 mEq potassium per day at a rate not to exceed 40 mEq/hour.

Patient response, as determined by measurement of serum potassium concentration and/or ECG following the initial 40 to 60 mEq of potassium infused, should indicate the subsequent infusion rate required. Total daily dosage of phosphate should not exceed 0.24 mMol/kg/day.

Rates faster or slower than those suggested may be indicated in specific patient situations, under the direct supervision of a physician.

e. Potassium phosphate is recommended to be ordered in terms of millimoles (mMol). Each mL of potassium phosphates contains 3 mMol phosphate and 4.4 mEq potassium.

f. Replacement Recommendations – Potassium Phosphate:
   - Asymptomatic hypophosphatemia (Serum phosphate level less than 2 mg/dL): 15 mMol of potassium phosphate administered at a rate of 3 mMol/hour. May repeat times two within 24 hours if phosphate level remains less than 2 mg/dL.
   - Symptomatic hypophosphatemia (Serum phosphate level less than 1 mg/dL): 30 mMol of potassium phosphate administered at a rate of 7.5 mMol/hour. May repeat 15 mMol of potassium phosphate administered at a rate of 5 to 7.5 mMol/hour times two within 24 hours if level remains less than 2 mg/dL.

g. Orders for 40 mEq Potassium Riders will be dispensed as two (2) X 20 mEq or four (4) X 10 mEq Potassium Riders as delineated in the above chart (1. Potassium Chloride).

5. Accessibility of Potassium Salts IV Solutions after the Pharmacy Closes:
   Concentrated Potassium Salts Injection vials are not available after the pharmacy closes. Commercially available pre-mixed potassium chloride solutions will be available in the night cabinet and/or automated dispensing units.

6. Administration Procedures
   a. Check the prescriber’s order and verify the patient identification.
   b. Labels must indicate the flow rate (mL/hour) and/or appropriate mEq/hour or mMol/hour drip rates for all types of potassium infusions.
   c. Patient care issues:
      - If extemporaneously compounding the potassium infusion, ensure proper mixing by inverting the bag several times.
      - Do not exceed the maximum recommended concentration as indicated in the appropriate tables above.

      - Take all precautions to avoid extravasation; if extravasation is suspected, discontinue the infusion immediately and refer to Policy VII-K, Medication Administration – Nursing Management of Extravasation.
      - Serum potassium levels will be monitored according to prescriber’s orders. If serum potassium is greater than 6 mEq/L, discontinue further infusions and notify the prescriber.
immediately. Monitor the patient for signs/symptoms of hyperkalemia (numbness and tingling in the extremities, flaccid paralysis, atrioventricular block, QRS widening greater than 25% of baseline).

7. Management of Adverse Events: Potassium Toxicity
   (Orders for treatment must be made by a prescriber.)
   a. Calcium Chloride, 1 gram IV over 5 – 10 minutes, may be used to reverse cardiac effects such as conduction blocks and ventricular fibrillation.
   b. Sodium Bicarbonate, 50 mEq IV over 2 – 5 minutes, may be used to shift potassium intracellularly.
   c. Dextrose 50%, 50 mL IV with 10 units of regular human insulin may be used to shift potassium intracellularly.
   d. Hemodialysis may be used to remove potassium in life-threatening situations.
   e. Sodium polystyrene sulfonate (Kayexalate®) orally or rectally will decrease total body potassium; each gram of resin binds approximately 1 mEq of potassium. A wide range of exchange capacity exists; therefore, close monitoring of serum electrolytes is necessary.

   Pharmacy Services. University of Kentucky.

   University of Michigan Hospitals and Health Centers, Policy 07-01-020, Intravenous Electrolyte Ordering and Administration in Adult Patients at UMHHC.