Appendix

Table 1. Page 2.

Multivariable analysis of risk factors and protective factors identifying the strongest predictors of hypoglycemia

Figure 1. Page 3

Orderset 1.1: Revised Hyperkalemia Orderset – January 1, 2016 to March 19, 2017

Figure 3: Page 4

Orderset 1.2: Newly Revised Hyperkalemia Orderset – March 20, 2017 to September 30, 2017
Table 1. Multivariable analysis of risk factors and protective factors for hypoglycemia

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female(^r)</td>
<td>0.6</td>
<td>0.289 – 1.421</td>
<td>0.274</td>
</tr>
<tr>
<td>&gt;0.14 Units/kg Insulin(^r)</td>
<td>2.8</td>
<td>1.318 – 5.806</td>
<td>0.007</td>
</tr>
<tr>
<td>Pre-Insulin Blood Glucose &lt;140 mg/dL(^r)</td>
<td>5.8</td>
<td>2.219 – 14.97</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Serum Creatinine &gt;2.5 mg/dL(^r)</td>
<td>1.6</td>
<td>0.777 – 3.265</td>
<td>0.204</td>
</tr>
<tr>
<td>Diagnosed with Type 2 Diabetes(^p)</td>
<td>0.7</td>
<td>0.290 – 1.537</td>
<td>0.342</td>
</tr>
<tr>
<td>Concomitant Albuterol(^p)</td>
<td>1.9</td>
<td>0.936 – 3.908</td>
<td>0.075</td>
</tr>
</tbody>
</table>

Risk Factors\(^r\); Protective Factors\(^p\)
Figure 1. Orderset 1.1: Revised Hyperkalemia Orderset – January 1, 2016 to March 19, 2017
Figure 2: Orderset 1.2: Newly Revised Hyperkalemia Orderset – March 20, 2017 to September 30, 2017

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**IP Adult Hyperkalemia Treatment Orders [3040000340]**

Protocol for management of acute hyperkalemia.

Please note that this order set provides guidelines to which there will always be exceptions, so please use your clinical judgment in treating patients. Call nephrology if you have questions or if dialysis is indicated.

**AHA/CPR 2005 guideline for treatment of hyperkalemia**

**URL:** http://circ.ahajournals.org/cgi/reprint/CIRCULATION.105.166563v1.pdf

**Treatment &amp; prevention of hyperkalemia**


source=search_result&search=hyperkalemia&selectedTitle=1-150;

AHA guidelines (although cutoff here for severe is 7)

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**General**

**Vital Signs and Monitoring**

- Continuous Cardiac Telemetry Orders
  - Please order both the Initiate and the Continuous orders
  - Initiate Continuous Cardiac monitoring
  - Continuous Cardiac monitoring

**Diet/Nutrition**

- Renal Diet

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Routine, Once For 1 Occurrences
Baseline Rhythm:
Other instructions:
Reason for telemetry:

Diet Effective Now, Starting today
Sodium Restriction: 2-3 gm Sodium
Potassium Restriction: 2-3 gm Potassium
Protein:
Other Restriction:
## Other Tests

### Cardiac Studies
- **ECG 12 Lead**
  - STAT, Once For 1 Occurrences
  - Describe Clinical Scenario: Nonspecific abnormal electrocardiogram (ECG) (EKG)
  - Device:

### Labs

#### Last Glucose:
- No results found for: GLU, POCTGLU, GLB, GLUPC, GUA, FBS, POCTGLUCUR, GLFP2H, FBSEXT, GT60EXT, GT120EXT, GLU3HREXL, GLC, GLT1EXT, GT60, GT120, NP120

#### Last Potassium:
- No results found for: K, KSB, POTTAS24EXT

### Chemistry - Hyperkalemia
- **Basic Metabolic Panel - UCSF/LabCorp/Quest (NA, K, CL, CO2, BUN, CR, GLU, CA)**
  - STAT, Every 6 Hours(Lab), Starting today with First Occurrence Include Now For 2 Occurrences
  - Container details: Light green top preferred, gold top acceptable
  - Specimen Site/Additional Info:
    - STAT, Once For 1 Occurrences
    - Container details: Light green top preferred, Gold top acceptable
    - Specimen Site/Additional Info:
      - 1 hour following completion of treatment (for severe hyperkalemia)
      - Routine, Once
      - Type:
        - Container details: Gold top or Light Green top
        - Specimen Site/Additional Info:

#### Potassium, Serum / Plasma
- **Potassium, Serum / Plasma**
  - STAT, Once For 1 Occurrences
  - Container details: Light green top preferred, gold top acceptable

#### Digoxin Level
- **Digoxin Level**

### Medications for Mild Hyperkalemia (K <6 & NO ECG Changes)

#### Remove Potassium from the Body (onset at least several hours)
- **Kayexalate PO/PR (Single Response)**
  - sodium polystyrene (KAYEXALATE) suspension
    - 15 g, Oral, Once, Once For 1 Doses
    - Contraindicated in post-op patients and patients at increased risk of bowel necrosis/perforation.
  - sodium polystyrene (KAYEXALATE) suspension
    - Consider repeat dose if no response in 6 hours.
    - 30 g, Rectal, Once, Once For 1 Doses
    - Contraindicated in post-op patients and patients at increased risk of bowel necrosis/perforation.
  - furaceamide (LASIX) IV
    - Consider repeat dose if no response in 6 hours.
    - 40 mg, Intravenous
    - Once, Once For 1 Doses
    - Contraindicated in acute renal failure
Medications for Moderate Hyperkalemia (K 6.0-6.4 & NO ECG Changes)
Shift Potassium Intracellularly (onset <1 hr, duration several hours)

Please select one of the insulin panels based on patient blood sugar levels

☐ Insulin for Blood Sugar < 150 mg/dL

Recommended insulin dosing is 0.1 units/kg (rounded to whole unit) up to a maximum of 10 units

☐ Dextrose 50% IV Push
☐ dextrose injection

“Followed by” Linked Panel
25 g, Intravenous
Once, Once For 1 Doses
Give 25 grams of IV dextrose prior to insulin push
25 g, Intravenous
Once, Once Starting H+1 Hours For 1 Doses
Give 25 grams of IV dextrose 1 hour after bolus dose of insulin to prevent hypoglycemia

☐ POCT glucose, Fingerstick

0.1 Units/kg, Intravenous, Once, Once Starting H For 1 Doses
Routine, Every Hour For 2 Occurrences
Container details:
q1 hour x2, then q2 hour x 2

☐ POCT glucose, Fingerstick

Routine, Every 2 Hours For 2 Occurrences
Container details:
q1 hour x2, then q2 hour x 2

☐ POCT glucose, Fingerstick

STAT, Once For 1 Occurrences
Container details:
Obtain within 15 min AFTER insulin for hyperkalemia if no POCT glucose drawn with the last 2 hours
Routine, Continuous
Notify Provider for:

☐ Notify Provider if BG is <70 mg/dL or >400 mg/dL

Insulin for Blood Sugar 150-300 mg/dL

Recommended insulin dosing is 0.1 units/kg (rounded to whole unit) up to a maximum of 10 units

☐ dextrose injection

25 g, Intravenous
Once, Once For 1 Doses
Give 25 grams of IV dextrose prior to insulin push

☐ insulin regular (Humulin R,NovoLIN R) injection 100 units/mL

0.1 Units/kg, Intravenous, Once, Once For 1 Doses
Routine, Every Hour For 2 Occurrences
Container details:
q1 hour x2, then q2 hour x 2

☐ POCT glucose, Fingerstick

Routine, Every 2 Hours, Starting today at 8:16 AM For 2 Occurrences
Container details:
q1 hour x2, then q2 hour x 2

☐ POCT glucose, Fingerstick

STAT, Once For 1 Occurrences
Container details:
Obtain within 15 min AFTER insulin for hyperkalemia if no POCT glucose drawn with the last 2 hours
Routine, Continuous
Notify Provider for:
<table>
<thead>
<tr>
<th>Insulin for Blood Sugar &gt; 300 mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended insulin dosing is 0.1 units/kg (rounded to whole unit) up to a maximum of 10 units</strong></td>
</tr>
<tr>
<td>□ insulin regular (Humulin R, Novolin R) injection 100 units/mL</td>
</tr>
<tr>
<td>□ POCT glucose, Fingerstick</td>
</tr>
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</tr>
<tr>
<td>□ Notify Provider if BG is &lt; 70 mg/dL or &gt; 400 mg/dL</td>
</tr>
<tr>
<td>□ Hypoglycemia Protocol (select if ordering insulin &amp; hypoglycemia protocol is not already ordered for the patient)</td>
</tr>
<tr>
<td>□ D5W IV</td>
</tr>
<tr>
<td>□ glucose chewable tablet</td>
</tr>
<tr>
<td>□ POCT glucose</td>
</tr>
<tr>
<td>□ albuterol (PROVENTIL) inhalation solution</td>
</tr>
</tbody>
</table>

**0.1 Units/kg, Intravenous, Once, Once For 1 Doses**

Routine, Every Hour For 2 Occurrences
Container details:
q1 hour x2, then q2 hour x 2

Routine, Every 2 Hours, Starting today at &:17 AM For 2 Occurrences
Container details:
q1 hour x2, then q2 hour x 2

STAT, Once For 1 Occurrences
Container details:
Obtain within 15 min AFTER insulin for hyperkalemia if no POCT glucose drawn with the last 2 hours
Routine, Continuous
Notify Provider for:

**25 mL, Intravenous**

Every 15 Min PRN, hypoglycemia, Every 15 Min PRN For 24 Hours
Give if patient cannot take PO or give 6 oz. Fruit juice.

For BG<70 mg/dL, give a fast acting carbohydrate per patient preference or Dextrose IV per order if patient cannot take PO.

Every 15 minutes: Recheck blood glucose per POCT orders and repeat treatment until BG is >/= 100 mg/dL.
20 g, Oral, Every 15 Min PRN, hypoglycemia, Every 15 Min PRN For 24 Hours
For BG<70 mg/dL, give a fast acting carbohydrate per patient preference if patient is taking PO.

Every 15 minutes: Recheck blood glucose per POCT orders and repeat treatment until BG is >/= 100 mg/dL.

May substitute with 6oz fruit juice and document in appropriate nursing flowsheet.
Routine, PRN For 24 Hours
Container details:
Every 15 minutes for hypoglycemia.
If BG < 70 mg/dL administer a fast-acting carbohydrate per order. Every 15 minutes: Repeat BG check and treatment until BG is >/= 100 mg/dL.

10 mg, Nebulization, Once, Once For 1 Doses
Second dose of 10mg albuterol may be ordered if inadequate response
Remove Potassium from the Body (onset at least several hours)

☐ Kayexalate PO/PR (Single Response)
  ○ sodium polystyrene (KAYEXALATE) suspension
    15 g, Oral, Once, Once For 1 Doses
    Contraindicated in post-op patients and patients at increased risk of bowel necrosis/perforation.

☐ sodium polystyrene (KAYEXALATE) suspension
  30 g, Rectal, Once, Once For 1 Doses
  Contraindicated in post-op patients and patients at increased risk of bowel necrosis/perforation.

☐ furosemide (LASIX) IV
  40 mg, Intravenous
  Once, Once For 1 Doses
  Contraindicated in acute renal failure.

Medications for ECG Changes or Severe Hyperkalemia (K ≥ 6.5)
Also consider aggressive treatment for rapidly rising K or underlying arrhythmia

Stabilize the Myocardium (onset within minutes, duration < 1 hr)
Recurrent treatment may be necessary for EKG changes

☐ calcium gluconate 100 mg/mL injection (1st choice)
  2 g, Intravenous, Once, Once For 1 Doses
  IV push over 5 min

☐ calcium chloride 100 mg/mL injection (2nd choice)
  1 g, Intravenous, Once, Once For 1 Doses
  IV push over 5 min.

Critical care / central-line administration preferred (2nd line given high-risk)

Shift Potassium Intracellularly (onset < 1 hr, duration several hours)
Please select one of the insulin panels based on patient blood sugar levels

☐ Insulin for Blood Sugar < 150 mg/dL
  Recommended insulin dosing is 0.1 units/kg (rounded to whole unit) up to a maximum of 10 units

☐ Dextrose 50% IV Push
  ☐ dextrose injection
  ☐ dextrose injection

☐ insulin regular (Humulin R, NovoLog R) injection 100 units/mL
  0.1 Units/kg, Intravenous, Once, Once Starting H For 1 Doses

"Followed by" Linked Panel

  25 g, Intravenous
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POCT glucose, Fingerstick
  Routine, Every Hour For 2 Occurrences
  Container details:
  q1 hour x 2, then q2 hour x 2
  Routine, Every 2 Hours For 2 Occurrences
  Container details:
  q1 hour x 2, then q2 hour x 2
  STAT, Once For 1 Occurrences
  Container details:
  Obtain within 15 min AFTER insulin for hyperkalemia if no POCT glucose drawn with the last 2 hours
  Routine, Continuous

☐ Notify Provider if BG is < 70 mg/dL or > 400 mg/dL
  Notify Provider for:
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<td>□ POCT glucose, Fingerstick</td>
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<td>Routine, Every 2 Hours, Starting today at 8:16 AM For 2 Occurrences</td>
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