Characterizing Potassium Replacement Prescribing Practices in General Medicine at Vancouver General Hospital

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Background

- Hypokalemia (K^+ < 3.5 mmol/L) is a common electrolyte abnormality found in hospitalized patients
- There is limited evidence in the literature to guide potassium replacement in general medicine
- At Vancouver General Hospital (VGH), the pharmacy department created a prescribing tool for electrolyte replacement for general medicine inpatients
- There is no local data on potassium prescribing practices and our prescribing tool has not been formally evaluated

Objectives

- **Primary:** To determine the rate of concordance between prescribed potassium replacement orders and VGH's prescribing tool
- **Secondary:** To characterize potassium replacement prescribing practices:
  - Mean total daily doses of potassium ordered
  - Rate of successful potassium replacement
  - Frequency of hyperkalemia

Methods

- **Design:** Retrospective, single-center, observational study
- **Inclusion:** Adult general medicine inpatients prescribed ≥1 potassium products (KCl, K citrate, K phos) from January 1 to June 30, 2019 with baseline and 24(±6) h post-replacement K^+ levels
- **Exclusion:** Comorbidities associated with potassium disturbances (eg. primary aldosteronism, Fanconi's syndrome), ketoacidosis, LVI containing potassium, TPN
- **Evaluation Parameters**
  - Concordance:
    - *Drug product:* KCl or K citrate recommended; K phos eligible if hypophosphatemic or at risk of refeeding syndrome
    - *Route:* Oral recommended; IV eligible for: K^+ < 2.5 mmol/L, symptomatic patients with K^+ < 3.0 mmol/L, contraindications to PO therapy
  - Successful Replacement: 24h post-replacement K^+ = 3.5-5.0 mmol/L

Results

Table 1. Patient characteristics

Characteristic	n = 98
Female, *n (%)*	62 (63%)
Mean age (SD), *years*	71.2 (17.8)
Medical history, *n (%)*	
Hypertension	55 (56%)
Atrial Fibrillation	25 (26%)
Diabetes	24 (24%)
Heart Failure	24 (24%)
Chronic Kidney Disease	14 (14%)
Medications on day of replacement, *n (%)*	
Diuretics	26 (27%)
Loop Diuretics	24 (24%)
Thiazides	4 (4%)
Potassium-sparing diuretics	4 (4%)
Insulin	21 (21%)
ACE inhibitors/ARBs	20 (20%)
Beta-agonist	14 (14%)
Digoxin	1 (1%)

Figure 1. Prevalence of hypokalemia risk factors in patients with baseline hypokalemia (n=82)

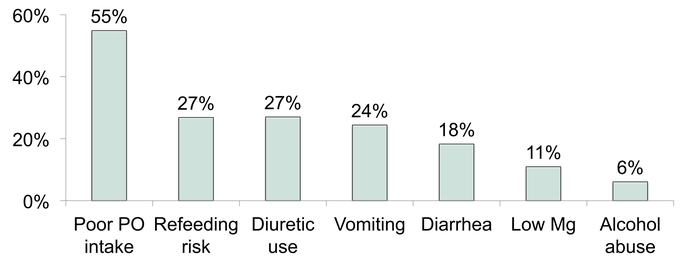
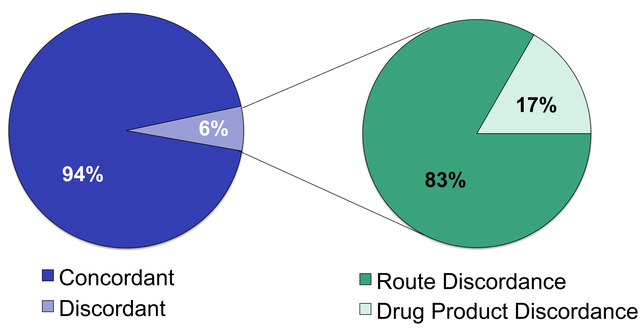


Figure 2. Concordance between potassium replacement orders and VGH's prescribing tool (n=98)



Secondary Outcomes

- Mean total daily dose of potassium ordered: 53.2 (SD 33.6) mmol
- Out of the 82 patients with hypokalemia at baseline, **57 (70%) achieved normalization of potassium levels (3.5-5.0 mmol/L) within 24 hours**
- **No patients developed hyperkalemia** (K^+ > 5.0 mmol/L) at 24 hours after replacement

Table 2. Mean K^+ levels and total daily doses of potassium replacement stratified by baseline serum potassium levels and hypokalemia severity

	Normal 3.5-5.0 mmol/L (n=16)	Mild 3.0-3.4 mmol/L (n=62)	Moderate 2.5-2.9 mmol/L (n=18)	Severe < 2.5 mmol/L (n=2)
Mean K+ levels (SD), mmol/L				
Baseline	3.7 (0.2)	3.2 (0.1)	2.8 (0.1)	2.3 (0.1)
Post-replacement	3.8 (0.3)	3.7 (0.4)	3.6 (0.4)	3.1 (0.1)
Mean total daily doses of potassium (SD), mmol				
Ordered	31.1 (13.9)	47.0 (24.2)	85.7 (41.6)	130 (14.1)

Table 3. Rate of successful potassium replacement stratified by baseline hypokalemia severity

	Mild 3.0-3.4 mmol/L (n=62)	Moderate 2.5-2.9 mmol/L (n=18)	Severe < 2.5 mmol/L (n=2)
Successful replacement, *n* (%)	44 (71%)	13 (72%)	0 (0%)

Limitations

- Retrospective chart review
- Convenience sampling and small sample size
- Excluded patients on LVI containing potassium
- Did not assess potassium dose as part of concordance criteria

Conclusions

- Majority of potassium orders were concordant with VGH's prescribing tool
- 70% of patients had successful potassium replacement within a 24 hour time frame
- Observed variability in prescribed potassium doses
- Revisions to the prescribing tool and educational sessions may further enhance potassium prescribing practices at VGH

Abbreviations: K^+ = serum potassium level; KCl = potassium chloride; K citrate = potassium citrate, K phos = potassium phosphate; LVI = large volume IV infusion; TPN = total parenteral nutrition; IV = intravenous; PO: enteral/oral; ACE = angiotensin-converting enzyme; ARB = angiotensin II receptor blocker; Mg = magnesium