Hospital and Emergency Department Utilization in US Veterans With Hyperkalemia

Csaba P. Kovesdy[1], Elvira O. Gosmanova[2], Steven D. Woods[3], Jeanene Fogli[3], Christopher G. Rowan[4], Jared L. Hansen[5], Brian C. Sauer[5]

[1]University of Tennessee Health Science Center, Memphis, TN; [2]Albany Medical College, Albany, NY; [3]Relypsa, Inc., a Vifor Pharma Group Company, Redwood City, CA; [4]COHRDATA, Santa Monica, CA; [5]Salt Lake City VA Medical Center (IDEAS), Salt Lake City, UT

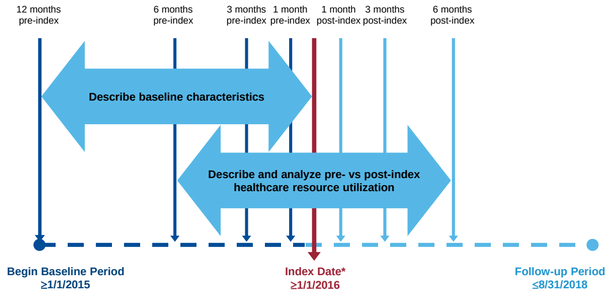
BACKGROUND

- Hyperkalemia (HK) is a potentially life-threatening metabolic disorder and a challenging clinical problem for clinicians caring for patients with cardiorenal comorbidities: chronic kidney disease (CKD), diabetes mellitus (DM), or congestive heart failure (CHF).
- HK is one of the most frequently identified electrolyte abnormalities in the emergency department (ED) and hospital.
- Patiromer is a sodium-free, nonabsorbed, potassium (K^+)-binding polymer approved for the treatment of HK in the United States[1] and the European Union,[2] among other countries.
- Little has been reported about the real-world healthcare resource utilization (HRU) of this medication.

OBJECTIVE

- This historical cohort study evaluated electrolyte-related HRU in US Veterans with HK who initiated patiromer or discontinued renin-angiotensin-aldosterone system inhibitor (RAASi DC) therapy and not receiving a K^+ binder (noKB).

Figure 1. Study Aims and Study Dates



*The index date is the date of the first outpatient pharmacy-dispensing event for patiromer or RAASi DC/noKB during the study period.

METHODS

- Patiromer treatment and RAASi DC were evaluated using the Veterans Health Administration (VA) Corporate Data Warehouse (CDW) database from 1/1/16 to 8/31/18.
- Using retrospective, observational data, patients utilizing the hospital or ED during the 6 months prior to the index date were assessed at 1-, 3-, and 6-months post-index.
- The index date was the date of patiromer initiation or the date of RAASi DC in patients not receiving a K^+ binder (RAASi DC/noKB).
- Patients were included who had a pre-index serum K^+ ≥5.1 mEq/L and CHF, DM, and/or CKD prior to the index date. Patients with end-stage renal disease (ESRD) were excluded.
- Continuous exposure (CE) was defined as ≤30 days of a gap in exposure to patiromer therapy and those who did not restart RAASi therapy.
- CE follow-up began at index date and ended at first censoring event (discontinuation or switch of index K^+ binder, death, end of follow-up, or 6 months post-index).

RESULTS

Table 1. Patient Characteristics

	Patiromer n=288	RAASi DC n=26,543
Demographics (as of index date)		
Mean age, years	70	72
Age ≥75 years, n (%)	68 (24)	8598 (32)
Male, n (%)	283 (98)	25,978 (98)
Caucasian, n (%)	199 (69)	20,529 (77)
African American, n (%)	70 (24)	3854 (15)
Comorbidities (12 months pre-index), n (%)		
Cardiac dysrhythmias	80 (28)	7594 (29)
Cerebrovascular disease	51 (18)	3875 (15)
CHF	92 (32)	7697 (29)
CKD	273 (95)	12,333 (47)
Coronary artery disease	113 (39)	10,621 (40)
DM	238 (83)	22,007 (83)
PVD	79 (27)	5634 (21)
Medications (12 months pre-index), n (%)		
Beta-blocker	198 (69)	16,531 (62)
Cyclosporine/tacrolimus	10 (3.5)	289 (1.1)
Loop diuretic	170 (59)	9556 (36)
Thiazide diuretic	71 (25)	5238 (20)
RAASi (total)	175 (61)	26,543 (100)
ACE inhibitor	125 (43)	21,272 (80)
ARB	57 (20)	5960 (23)
SPS	125 (43)	1209 (4.6)
HRU (6 months pre-index), n (%)		
Hospital admissions	103 (36)	7683 (29)
ED visits	122 (42)	9834 (37)

ACE, angiotensin-converting enzyme; ARB, angiotensin II receptor blocker; PVD, peripheral vascular disease; SPS, sodium polystyrene sulfonate.

- Baseline patient characteristics (**Table 1**):
  - Mean age was 70 years (patiromer) and 72 years (RAASi DC), with the majority of patients being male (98%) and 24%/15% African American (patiromer/RAASi DC).
  - Comorbidities: higher percentage of CKD (95%), CHF (32%), and PVD (27%) in the patiromer cohort.
  - Medications: patiromer cohort observed a higher percentage of beta-blocker, cyclosporine/tacrolimus, loop and thiazide diuretics, and SPS use and a lower percentage of RAASi use.
  - HRU (6 months pre-index): higher percentage of hospitalizations and ED visits in patiromer cohort.

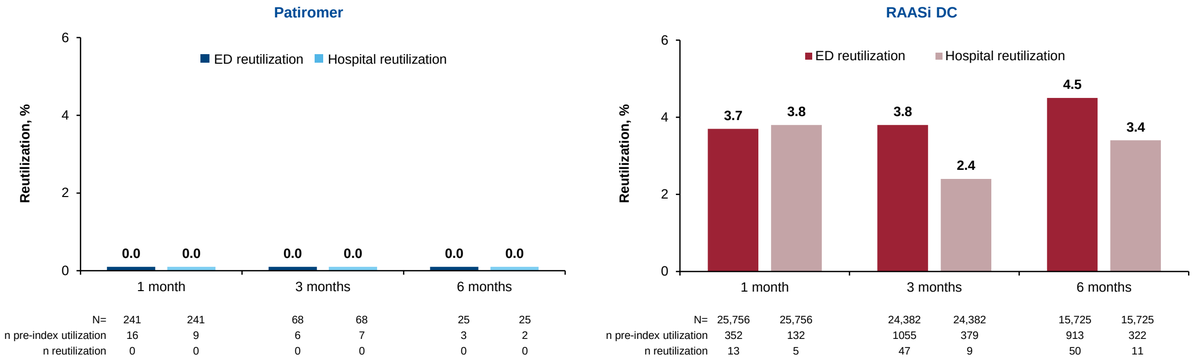
DISCLOSURES

CPK reports consultant fees from AstraZeneca and Relypsa, Inc., a Vifor Pharma Group Company; **EOG** reports no relevant disclosures; **SDW** and **JF** report employment by Relypsa, Inc., a Vifor Pharma Group Company and Vifor stock ownership; **CGR** reports consultant fees from AbbVie, Halozyme, and Relypsa, Inc., a Vifor Pharma Group Company; **JHL** and **BCS** report research support from COHRDATA.

REFERENCES

1. Veltassa® (patiromer) for oral suspension [package insert]. Redwood City, CA: Relypsa, Inc. 2018.
2. Veltassa® (patiromer): European public assessment report. European Medicines Agency.

Figure 2. Difference in Percent of Patients with Electrolyte-Related ED and Hospital Reutilization Pre-Index vs Post-Index in the Patiromer and RAASi DC Cohorts (CE analysis)



	Patiromer						RAASi DC					
N=	241	241	68	68	25	25	25,756	25,756	24,382	24,382	15,725	15,725
n pre-index utilization	16	9	6	7	3	2	352	132	1055	379	913	322
n reutilization	0	0	0	0	0	0	13	5	47	9	50	11

- Following CE to patiromer at 1-, 3-, and 6-months post-index, no electrolyte-related ED or hospital reutilization was observed.
- In the RAASi DC group, 2–5% of patients reutilized the ED or hospital at 1, 3, and 6 months (**Figure 2**).

Table 2. Laboratory Values (Baseline K^+ and eGFR)

Baseline patient characteristics (non-ESRD)	Patiromer n=288			RAASi DC n=26,543		
Baseline laboratory values (last value 3 months pre-index date)	Mean	SD	Med	Mean	SD	Med
Number of K^+ assessments	3.3	2.2	3.0	2.4	1.7	2.0
K^+ value, mEq/L	5.8	0.4	5.7	5.5	0.4	5.4
K^+ categories, n (%)						
K^+ 5.1–5.4 mEq/L	54 (18.8)			16,152 (60.9)		
K^+ 5.5–5.9 mEq/L	153 (53.1)			7848 (29.6)		
K^+ ≥6.0 mEq/L	81 (28.1)			3017 (9.6)		
CKD-EPI formula	Mean	SD	Med	Mean	SD	Med
eGFR value, mL/min/1.73m²	28.4	15.9	24.3	51.8	23.2	49.1

CKD-EPI, chronic kidney disease epidemiology correlation; eGFR, estimated glomerular filtration rate; med, median; SD, standard deviation.

- Baseline laboratory values (3 months pre-index date) (**Table 2**):
  - Mean serum K^+ was 5.8 mEq/L for patiromer and 5.5 mEq/L for RAASi DC cohort.
  - Mean eGFR was lower in the patiromer group (28 mL/min/1.73m²) vs RAASi DC (52 mL/min/1.73m²).

Table 3. Patiromer Initial Dose and Supply

Initial Dose/Strength, %			
Patiromer 8.4 g	96.3		
Patiromer 16.8 g	3.7		
Analysis interval 0–1 month (n=241)	Mean	SD	Med
Days supplied/fill	38	19	30
Dose increase, n (%)	4 (1.7)		
Dose decrease, n (%)	0 (0.0)		
Analysis interval 0–3 months (n=68)	Mean	SD	Med
Days supplied/fill	43.6	22.7	30
Dose increase, n (%)	2 (2.9)		
Dose decrease, n (%)	0 (0.0)		
Analysis interval 0–6 months (n=25)	Mean	SD	Med
Days supplied/fill	45.8	24.8	30
Dose increase, n (%)	1 (4.0)		
Dose decrease, n (%)	0 (0.0)		

- The initial dose of patiromer was 8.4 g daily in 96% (**Table 3**).
  - Patiromer dose increases were uncommon (≤4%).
- The median number of days supplied/fill was 30 at all time points (**Table 3**).

LIMITATIONS

- This is a descriptive observational study; therefore, no causal or comparative claims can be derived.
- We have assumed that patients are taking their dispensed medications as directed.
- Small sample size for patiromer cohort when evaluated from a CE perspective.

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CONCLUSIONS

- At baseline, a greater percentage of patients in the patiromer cohort had advanced kidney disease and congestive heart failure.
- Among patients with an electrolyte-related ED visit or hospital admission who subsequently initiated and used patiromer continuously for 1, 3, and 6 months, zero electrolyte-related ED visits and hospital readmissions were observed.
- Correction of serum K values appears to have a beneficial effect on electrolyte-related HRU.
- These findings warrant additional investigation as patiromer use increases.

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