

Supplementary Online Content

This appendix has been provided by the authors to give readers additional information about their work.

Dai D, Sharma A, Alvarez P, Woods S. Multiple comorbid conditions and healthcare resource utilization among adult patients with hyperkalemia: a retrospective observational cohort study using association rule mining

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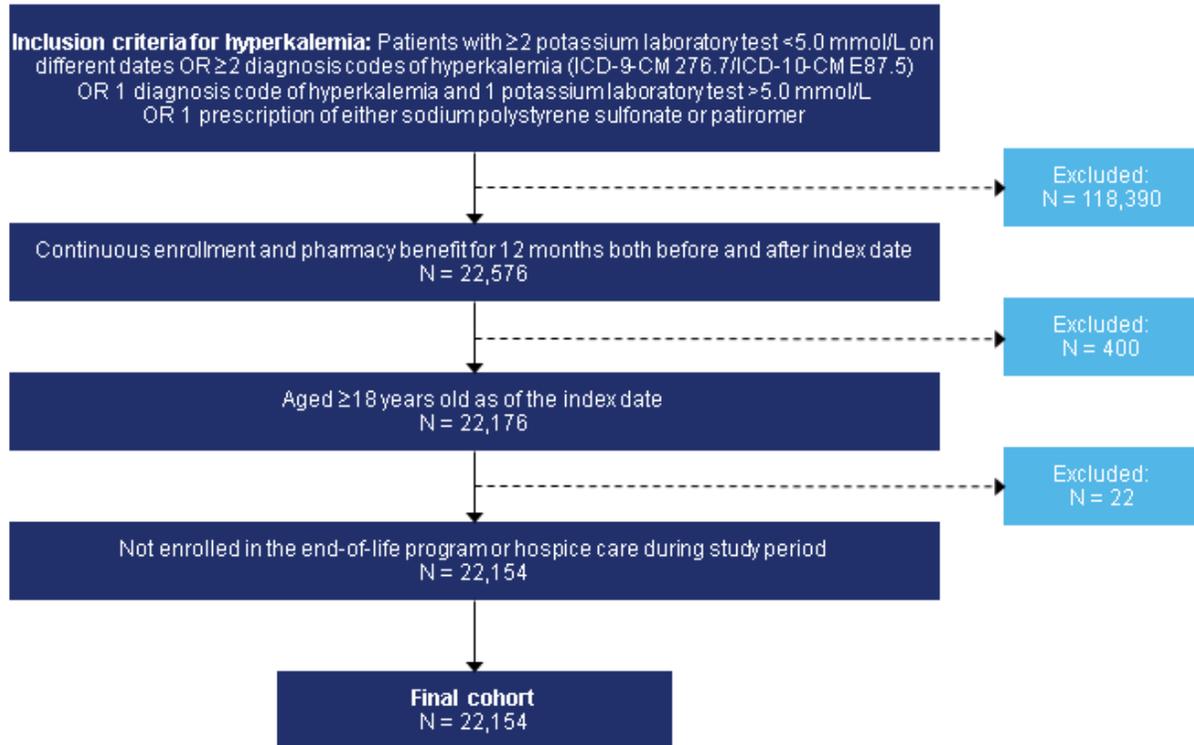
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Supplemental Table 1 List of ICD-10-CM codes for comorbid conditions

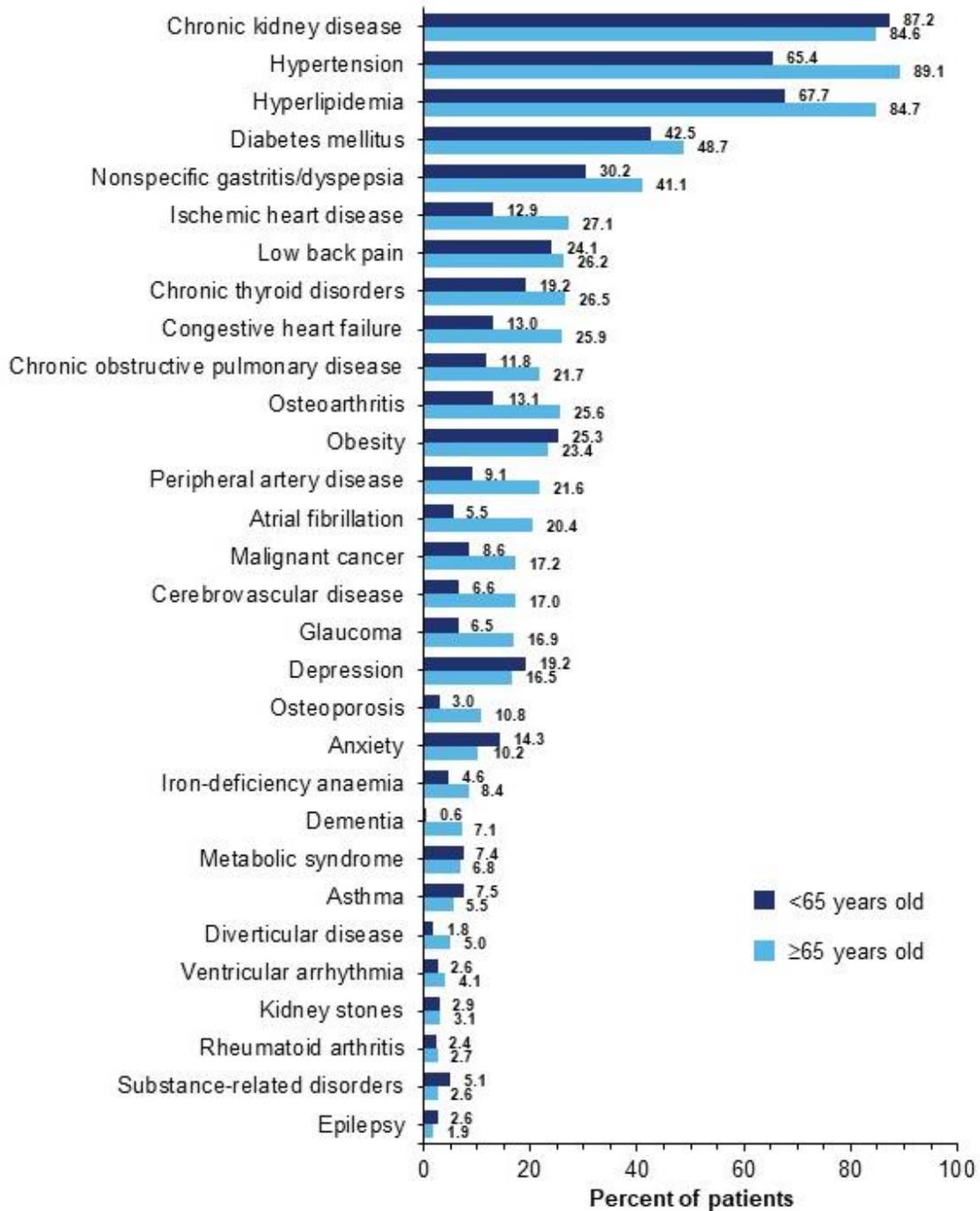
Comorbidity	Abbreviation	ICD-10-CM Code(s)
Atrial fibrillation	AFF	I48.0–I48.2, I48.4, I48.91
AIDS/HIV	AID	B20.x–B22.x, B24.x
Anxiety	ANX	F40.x F41.x
Asthma	AST	J45.2–J45.5, J45.90
Bipolar disorder	BIP	F31.x
Cancer (malignant)	CAN	C00.x–C97.x
Cerebrovascular disease	CBD	G45.x, G46.x, I60.x–I69.x, H34.0
Congenital heart disease	CHD	Q20.x–Q28.x
Congestive heart failure	CHF	I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5–I42.9, I43.x, I50.x, P29.0
Cholelithiasis/cholecystitis	CHO	K80.x
Chronic kidney disease	CKD	N18.1–N18.6, N18.9
Chronic obstructive pulmonary disease	COP	J41.x–J44.x
Inflammatory bowel disease	CRO	K50.x–K52.x
Chronic thyroid disorders	CTD	E00.x–E03.x, E06.5, E07.9, E89.0
Dementia	DEM	F00.x–F03.x, F05.1, G30.x, G31.1
Depression	DEP	F32.x, F33.x
Diabetes mellitus	DM	E10.x–E14.x
Diverticular disease	DTD	K57.x
Epilepsy	EPL	G40.x
Fibromyalgia	FIB	M79.7
Glaucoma	GLC	H40.x, H42.x
Hypercoagulable syndrome	HCG	D68.59, D68.69
Chronic hepatitis	HEP	K73.x, K75.x
Hyperlipidaemia	HLD	E78.0–E78.5
Hypertension	HTN	I10.x–I13.x, I15.x
Iron deficiency anaemia	IDA	D50.8, D50.9
Ischemic heart disease	IHD	I20.x–I25.x
Kidney stones	KST	N20.x
Low back pain	LBP	M54.5
Multiple sclerosis	MSS	G35.x
Metabolic syndrome	MSX	E88.81
Nonspecific gastritis/dyspepsia	NGD	K29.70, K30.x
Obesity	OBE	E66.x, Z68.3x, Z68.4x
Osteoporosis	OSP	M80.x, M81.x
Osteoarthritis	OST	M15.x–M19.x
Pancreatitis	PAN	K85.x
Parkinson's disease	PAR	G20.x

Psychoses	PSY	F20.x, F22.x–F25.x, F28.x, F29.x, F30.2, F31.2, F31.5
Peptic ulcer disease	PUD	K25.x- K28.x
Peripheral vascular disease	PVD	I70.x, I71.x, I71.1, I73.1, I73.8, I73.9, I77.1, I79.0, I79.2, K55.1, K55.8, K55.9, Z95.8, Z95.9
Rheumatoid arthritis/collagen vascular disease	RHA	L94.0, L94.1, L94.3, M05.x, M06.x, M08.x, M12.0, M12.3, M30.x, M31.0–M31.3, M32.x–M35.x, M45.x, M46.1, M46.8, M46.9
Sickle cell anaemia	SCA	D57.x
Substance use disorders	SDO	F10.x-F19.x
Systemic lupus erythematosus	SLE	M32.x
Ventricular arrhythmia	VNA	I47.x, I49.0x, I49.3

Supplemental Figure 1 Selection of eligible patients from claims databases.



Supplemental Figure 2. The prevalence of specific CCs in adult patients with chronic hyperkalemia. Displayed are the percentages of patients in the cohort with the 30 most prevalent CCs stratified by age groups. CC, comorbid condition.



Supplemental Table 2. HRU and costs of patients with hyperkalemia within 1 year

Resource Utilization and Costs	Overall (N = 22,154)	Age <65 Years (n = 5409)	Age ≥65 Years (n = 16,745)	P-value
HRU				
Patients with at least one all-cause healthcare visit, N (%)				
PCP visits	19,181 (86.58)	4724 (87.34)	14,457 (86.34)	0.0631
Specialist visits	19,737 (89.09)	4561 (84.32)	17,176 (90.63)	<0.0001
Emergency room visits	7973 (35.99)	1728 (31.95)	6245 (37.29)	<0.0001
Inpatient admissions	7734 (34.93)	1561 (28.86)	6178 (36.89)	<0.0001
Number of all-cause healthcare visits, mean (SD)				
PCP visits	5.27 (5.29)	4.84 (5.06)	5.41 (5.35)	<0.0001
Specialist visits	7.95 (8.51)	7.56 (9.46)	8.07 (8.17)	<0.0001
Emergency room visits	0.84 (1.91)	0.82 (2.33)	0.85 (1.75)	<0.0001
Inpatient admissions	0.68 (1.28)	0.62 (1.38)	0.70 (1.25)	<0.0001
Length of inpatient hospital stay (days)				
	4.42 (11.72)	4.02 (11.69)	4.55 (11.73)	<0.0001
Allowed costs				
Total medical costs	25,454 (52,801)	34,215 (83,678)	22,612 (3,7329)	<0.0001
Pharmacy	5796 (16,004)	8103 (20,796)	5051 (14,032)	<0.0001
Total allowed costs	31,251 (56,913)	42,355 (88,201)	27,664 (41,475)	<0.0001

HRU, healthcare resource utilization; PCP, primary care physician; SD, standard deviation

Supplemental Table 3 Generalized linear regression model results

Outcomes	Variable	Estimate*	Standard Error	P-value
Length of hospital stay (days)				
	Age	-0.0108	0.0011	<0.0001
	Gender (female)	-0.0501	0.0222	0.0213
	Region (Northeast)	-0.0816	0.0566	0.1492
	Region (Midwest)	-0.0849	0.0575	0.1400
	Rural	-0.0623	0.0269	0.0208
	Suburban	-0.0142	0.0297	0.6337
	Commercial insurance	-0.2720	0.0460	<0.0001
	Median household income 1 st quartile	0.1359	0.0333	<0.0001
	Median household income 2 nd quartile	0.0912	0.0302	0.0060
	Median household income 3 rd quartile	0.0425	0.0328	0.1957
	Number of comorbid conditions	0.0573	0.0036	<0.0001
Total healthcare cost (US\$)				
	Age	-0.0130	0.0008	<0.0001
	Gender (female)	-0.1867	0.0162	<0.0001
	Region (Northeast)	-0.0163	0.0383	0.6702
	Region (Midwest)	0.0619	0.0399	0.1206
	Rural	0.1049	0.0196	<0.0001
	Suburban	0.0357	0.0211	0.0905
	Commercial insurance	0.4292	0.0299	<0.0001
	Median household income 1 st quartile	0.0367	0.0240	0.1265
	Median household income 2 nd quartile	0.0267	0.0236	0.2573
	Median household income 3 rd quartile	0.0105	0.0232	0.6515
	Number of comorbid conditions	0.1444	0.0029	<0.0001

*Parameter was estimated by maximum likelihood method.