

IV Insulin via Glucomander, eGlycemic Management System (eGMS), Demonstrates Low Rates of Hypoglycemia in Patients with Low eGFR Compared to Other Electronic Glycemic Management Tools

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BACKGROUND

Hyperglycemia (BG >140 mg/dl) and hypoglycemia (BG <70 mg/dl) occur frequently in the hospital and are linked to poor outcomes and increased cost. Chronic kidney disease and acute kidney injury patients require special attention when receiving insulin in the hospital. Hypoglycemia rates are higher in this group and the causes continue to be investigated. The American Diabetes Association (ADA) has recommended a glucose target of 140 to 180 mg/dl and a conservative starting insulin requirement for renal impaired and the elderly.

METHODS

We examined individual-level data from 2017 to 2021 from the Glytec[®] Inpatient Database, a group of 13,775 patients in the ICU across 206 hospitals, with eGFR <60 ml/min/1.73 m² and with at least two glucose values >180 mg/dl. All patients were treated using Glucomander[™] (GM) IV, the dosing module within Glytec's eGMS[®], to titrate IV insulin and followed order set initiation recommendations for renal failure. Confirmatory POC glucose measurements within 5 minutes of the initial hypoglycemia reading were used as the primary value if the reading was no longer below the hypoglycemia range.

RESULTS

The results were compared to published data from other electronic glycemic management tools. The line for eGFR <15 in the Insulin Rate /kg chart does not conform to the trend shown by the other three lines but requires less insulin, possibly related to reduced insulin clearance.

CONCLUSION

When using Glucomander's proprietary nonlinear IV insulin infusion software and an appropriate order set, renal impaired patients had low hypoglycemia rates and acceptable glycemic control. There were few large comparator studies, all with higher hypoglycemic rates and none of which reported outcomes in patients with renal impairment.

Glucomander IV – Hospitalized ICU Patients (eGFR <60)								
eGFR Range ml/min/(1.73m ²)	Unit	Target Range	# Patients	# BGs	%BG <40	%BG<70	After reaching target	
							Avg BG	%CV
eGFR <15	ICU	140-180	3,369	162,399	0.014%	0.372%	158	24.9%
eGFR 15-30	ICU	140-180	3,710	152,406	0.016%	0.260%	158	24.1%
eGFR 30-45	ICU	140-180	3,550	129,857	0.008%	0.217%	159	24.5%
eGFR 45-60	ICU	140-180	3,241	113,414	0.010%	0.175%	160	24.1%
All eGFRs <60	ICU	140-180	13,870	558,076	0.013%	0.266%	159	24.4%
Comparator glycemic management tool (all values of eGFR)								
References	Unit	Target Range	# Patients	# BGs	%BG <40	%BG<70	Avg BG	%CV
Tannenber P et al, 2017	18 Unit Types	6 Ranges	16,850	492,078	0.03%	0.46%	143	26.5%
Salinas P et al, 2019	Data from Tannenber & Fogel				0.03%	0.46%		
Cochran S et al, 2007	CCU		4,016	--	0.05%	--	119.5	30%
Fogel S et al, 2013	4 SICU's & 1 PCU		1,682	73,290	0.05%	--	--	--

eGFR = estimated glomerular filtration rate, BG = Blood Glucose, all BG values = mg/dl, %CV = coefficient of variation, SICU = surgical ICU, PCU = progressive care unit, GM = Glucomander

