

Glycemic Outcomes for Adult Type 1 Diabetes (T1D) With and Without DKA

Jordan Messler, MD, SFHM, FACP¹ | Priyathama Vellanki, MD² | Bruce Bode, MD, FACE³ | John Clarke RN, CDCES¹ | Robert Booth, CPHQ¹

Author Affiliations: ¹Glytec, Waltham, MA, USA, ²Emory University School of Medicine, Atlanta, GA, USA, ³Atlanta Diabetes Associates, Atlanta, GA, USA

BACKGROUND

T1D accounts for 10% of all diabetes and DKA accounts for 8.1 per 1,000 hospitalizations. Glycemic outcomes have not been reported for adults with specifically Type 1 diabetes. We describe hospital glycemic outcomes for patients with T1D with and without DKA. Comparison outcomes for hypoglycemia rates and Time To Target for T1D without DKA do not exist.

METHODS

We extracted individual-level data from the Glytec® Inpatient Database to examine glycemic outcomes and insulinometrics based on prespecified target blood glucose (BG) ranges. Data was extracted from 154 hospitals located in 17 different states in the United States (2015-2020). All patients were treated with a standard continuous insulin infusion (CII) process, managed by Glucommander™ IV, the dosing module within Glytec's eGMS®. T1D was determined based on ICD E10 and subclassifications. The non-DKA group included patients who did not meet the DKA criteria. DKA was defined as per the ADA definitions. Prevalence of hypoglycemia and time-to-target (TTT) BG were stratified by target BG ranges.

DKA CRITERIA (All patients >18 years)

1. Bicarbonate <18 mmol/L, 2. BG >250 mg/dl, 3. Anion gap >12 mEq/L.

RESULTS

In patients with DKA (n=4592), the rates of <40 mg/dl and <70 mg/dl were 0.015% and 0.588%, respectively. Within target 140-180 mg/dl, rates of <40 mg/dl were 0.009% with a faster TTT (6.6 hours). The average admission BG was 591 mg/dl and BG at the time of stopping IV insulin was 169 mg/dl, when including all targets. In the 10,886 patients without DKA, the rates of <40 mg/dl and <70 mg were 0.030% and 0.88%, respectively. TTT was 7.1 hours.

CONCLUSION

This is the largest descriptive analysis of adult T1D patients with DKA and without DKA treated with insulin management software. A standard CII process, managed with Glucommander IV, can safely get patients into prespecified target range, with minimal rates of hypoglycemia.

Patients with T1D and DKA																
Target Low	Target High	N	Admission BG	Discharge BG	Avg Age	Avg A1C	% BG<40	% BG<54	% BG<70	% BG<180	% BG<250	Avg First GM BG	Avg Final GM BG	Insulin Unit/hr	TTT (minutes)	TTT (hours)
100	140	216	553 (±212)	198 (±75)	39 (±15)	11.1 (±1.9)	0.000%	0.045%	0.967%	60%	78%	474	154		551	9.2
120	160	1,348	580 (±239)	195 (±76)	39 (±17)	11.3 (±3.6)	0.036%	0.199%	0.798%	61%	80%	430	157		501	8.4
140	180	3,260	595 (±264)	197 (±78)	39 (±17)	11.0 (±2.7)	0.009%	0.105%	0.490%	55%	79%	435	172		395	6.6
All Targets		4,592	589 (±256)	196 (±77)	3939 (±17)	11.1 (±2.9)	0.015%	0.126%	0.588%	56%	79%	435	167	4.2 (±5.0)	470	7.8
Patients with T1D and No DKA																
100	140	1,233	443 (±248)	183 (±77)	40 (±17)	10.4 (±2.7)	0.048%	0.380%	2.025%	74%	87%	396	143		372	6.2
120	160	4,984	497 (±249)	194 (±79)	37 (±15)	11.1 (±3.3)	0.031%	0.171%	0.916%	62%	82%	414	159		421	7.0
140	180	5,202	502 (±281)	197 (±80)	39 (±16)	10.9 (±2.7)	0.023%	0.120%	0.541%	55%	81%	407	177		333	5.6
All Targets		10,886	493 (±265)	194 (±79)	38 (±16)	10.9 (±3.0)	0.030%	0.173%	0.877%	60%	82%	409	165	3.8 (±5.2)	426	7.1

GM = Glucommander, TTT = Time to Target, BG = Blood Glucose, T1D = Type 1 Diabetes, all BG values = mg/dl

