

## Background

- Diabetic ketoacidosis (DKA) is a serious, life-threatening complication of diabetes mellitus that affects approximately 30 million people in the United States each year<sup>1</sup>
- It is characterized by hyperglycemia, metabolic acidosis, dehydration, and electrolyte imbalances<sup>2</sup>
- Continuous intravenous (IV) insulin is the current standard of care for acute management of DKA. Once DKA has resolved, patients are transitioned back to subcutaneous insulin therapy<sup>3</sup>
- Studies have shown that early initiation of basal insulin is associated with a faster resolution of DKA, shorter duration of continuous infusion insulin, and shorter length of hospital stay<sup>3-5</sup>

Wesley Medical Center Practice

- Our DKA order-set states that subcutaneous long-acting insulin is only to be considered when the patient has a stable blood glucose
- It is up to provider discretion to initiate early administration of basal insulin, outside of the order-set

## Purpose

- To evaluate the efficacy and safety of early initiation of basal insulin compared to continuous IV insulin monotherapy, for acute DKA management

## Study Design

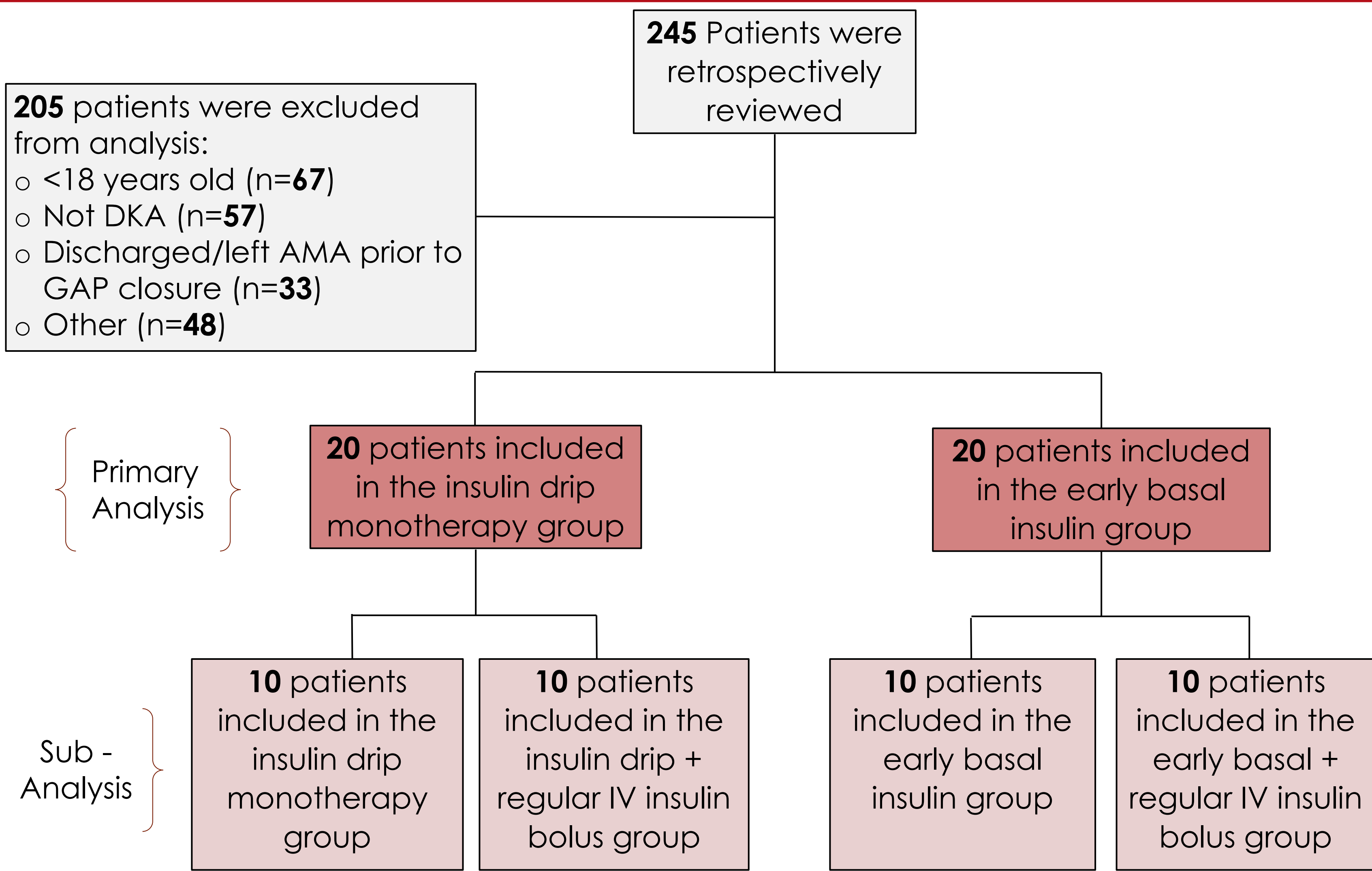
Study Design	Retrospective, single-center, cohort study
Study Period	May 2020 – October 2020
Study Approval	Wesley Pharmacy and Therapeutics Committee on 12/1/2020
Statistical Analysis	Descriptive statistics

Inclusion	Exclusion
<ul style="list-style-type: none"> <li>≥ 18 years old</li> <li>Diagnosis of DKA</li> <li>Initiated on DKA order-set between 5/2020-10/2020.</li> </ul>	<ul style="list-style-type: none"> <li>Protected populations (i.e. prisoners and pregnant females)</li> <li>Treated with systemic steroids</li> <li>Transferred from outside hospital</li> <li>Diagnosis of end stage renal disease</li> </ul>

## Study Outcomes

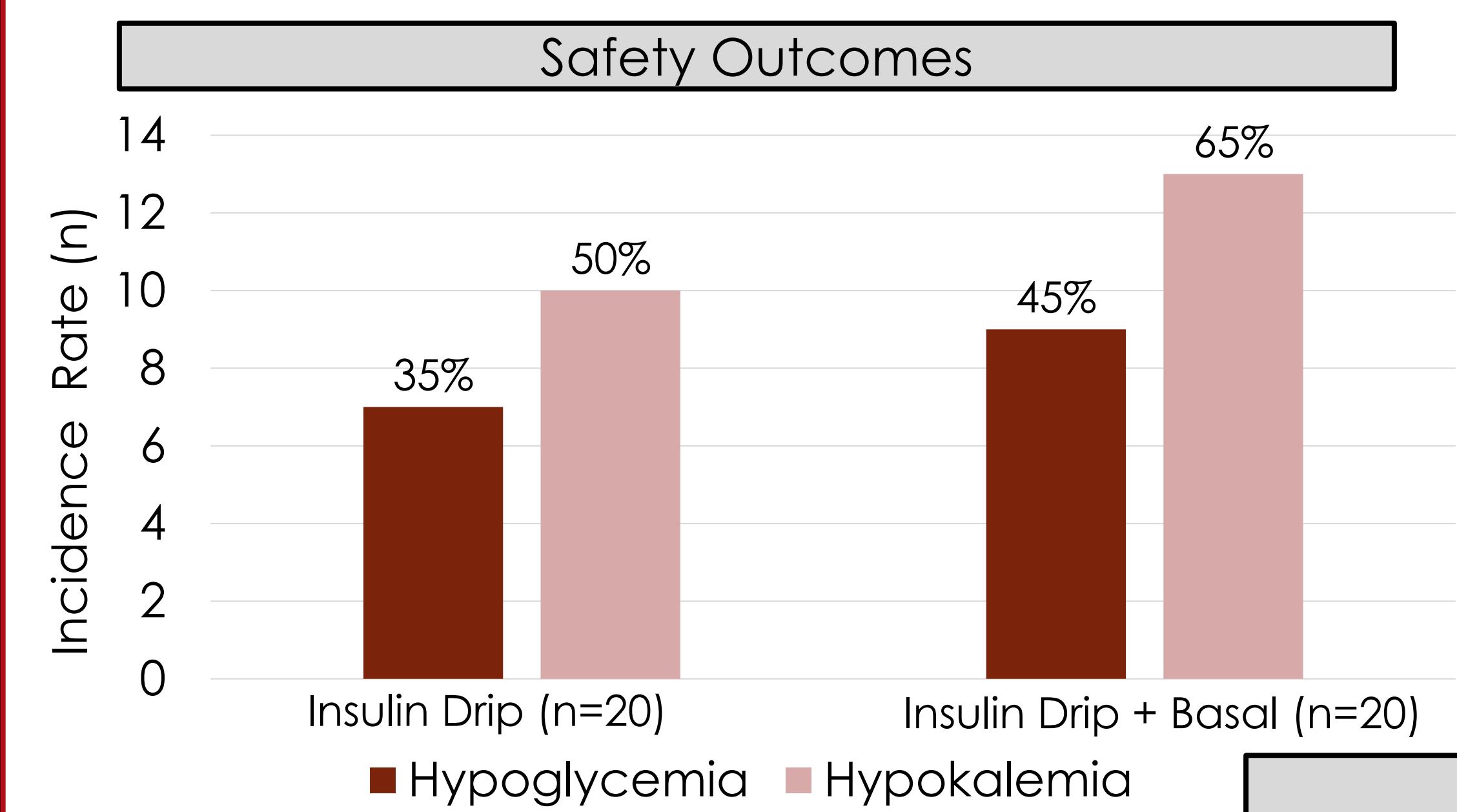
<b>Primary</b>
Time to anion gap closure
<b>Secondary</b>
<ul style="list-style-type: none"> <li>Rate of DKA relapse</li> <li>Duration of IV insulin drip (hours)</li> <li>Mean total IV insulin dose (units/kg)</li> <li>Mean total IV fluid requirements (L)</li> <li>Rate of ICU admission</li> <li>Length of ICU stay</li> <li>Length of hospital stay</li> </ul>
<b>Safety</b>
<ul style="list-style-type: none"> <li>Rate of hypoglycemia</li> <li>Rate of hypokalemia</li> </ul>

## Study Population



## Results

Baseline Demographics	Insulin Drip (n=20)	Early Basal (n=20)
Mean Age [range]	45 [19-72]	35 [19-58]
Median BMI [Range]	25.4 [16.1-53.9]	24.8 [16.1-49.8]
Mean A1C [range]	11.7 [7.5-16.4]	12.2 [8.4-18.8]
DM History (%)	20 (100)	18 (90)
Type I (%)	15 (75)	14 (70)
Insulin naïve (%)	3 (15)	2 (10)



Outcome	Insulin Drip (n=20)	Early Basal (n=20)
Median time (hrs) to gap closure [range]	8.2 [2.7-22.5]	15.8 [7-54.5]

Outcomes	Insulin Drip (n=20)	Early Basal (n=20)
Rate of DKA relapse (%)	5 (25)	5 (25)
Median insulin drip duration (hrs) [range]	13 [1.4-41.6]	16.8 [4.9-47.6]
Median total IV insulin drip units [range]	80 [7.5-311]	113.5 [11-420]
Mean basal insulin dose U/kg [range]	-	0.24 [0.09-0.6]
Mean total (L) DKA fluids used [range]	5 [2-9]	6 [2-13]
Rate of ICU admission (%)	15 (75)	17 (85)
Median length (days) of ICU stay [range]	3 [1-8]	3 [2-9]
Median length (days) of hospital stay [range]	3 [1-8]	3 [2-14]

Outcomes	Insulin Drip (n=10)	Insulin Drip + Regular IV Bolus (n=10)	Early Basal (n=10)	Early Basal + Regular IV Bolus (n=10)
Median time (hrs) to gap closure [range]	7.3 [2.7-15.5]	9 [2.7-22.5]	12.3 [7-21.5]	24.5 [7-54.5]
Rate of DKA relapse (%)	2 (20)	3 (30)	3 (30)	2 (20)
Median insulin drip duration (hrs) [range]	12.2 [1.4-20]	16.5 [7.4-41.6]	17.1 [4.9-47.6]	16.6 [7.1-35.2]
Median total IV insulin drip units [range]	75 [4.5-166.9]	108.8 [40.8-311]	195 [11-420]	99.3 [32-209]
Rate of hypoglycemia (%)	3 (30)	4 (40)	2 (20)	7 (70)
Rate of hypokalemia (%)	3 (30)	7 (70)	6 (60)	7 (70)
Mean regular bolus dose U/kg [range]	-	0.13 [0.12-0.2]	-	0.1 [0.07-0.17]

## Limitations

- Small sample size
- Retrospective chart review
- Inconsistent documentation
- Inconsistent timing of repeat anion gap lab draw
- Basal insulin dose not standardized

## Conclusion

- Continuous IV insulin monotherapy is more efficacious and safe compared to early initiation of basal insulin
  - Faster time to anion gap closure
  - Shorter duration of continuous infusion insulin
  - Reduced continuous IV insulin requirements
  - Lower rates of hypoglycemia and hypokalemia
- Additional regular IV insulin boluses are associated with worse outcomes

## Author Disclosures

Authors have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:

- Caitlynn Tabaka, Tessa Reynolds, and Brian W. Gilbert: Nothing to disclose

## References

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