

Pharmacist Impact on DKA Outcomes in the Emergency Department at Tucson Medical Center

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INTRODUCTION

Diabetic ketoacidosis (DKA) is a life-threatening complication of diabetes that often leads to emergency department (ED) visits followed by hospitalization. DKA is characterized by uncontrolled hyperglycemia, metabolic acidosis, and increased ketone concentration.

Of the approximate 110,000 annual hospitalizations for DKA in the US, 2-10% of them result in mortality¹.

Prompt diagnosis and effective acute treatment are important to prevent death or complications.

An interprofessional effort can be conducted between the ED physician and ED pharmacist regarding optimal insulin dosing. This initial critical care collaboration can be beneficial to DKA patients, especially in complicated cases.

OBJECTIVES

- Evaluate the effect of pharmacist involvement in initial DKA treatment in the ED on time to DKA resolution
- Determine the effect of pharmacist involvement in initial DKA treatment in the ED on intensive care unit (ICU), progressive cardiac care unit (PCCU), and overall hospital length of stay
- Assess the effect of pharmacist involvement in initial DKA treatment in the ED on key labs at 48 hours

METHODS

- Patient data were collected by running an electronic report of continuous infusion insulin orders in the ED at TMC from July of 2019 to July of 2021.
- All data points were collected retrospectively through the electronic health record, Epic™.
- Patients were divided into two groups based on whether the ED pharmacist left an 'iVent' in the EHR or if there was no iVent documented.

Table 1. Criteria for the Diagnosis of DKA

- pH ≤ 7.3
- Serum glucose ≥ 250 mg/L
- Anion gap > 12 mEq/l
- Serum bicarbonate ≤ 18 mEq/L

Table 2. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • >18 years of age • Admission to TMC's ED with a primary diagnosis of DKA per criteria 	<ul style="list-style-type: none"> • Pregnancy • Diagnosis of hyperosmotic hyperglycemic syndrome (HHS) • End-stage renal disease (ESRD) requiring dialysis • Transfer from outside hospitals

RESULTS

- There was no difference in mortality between groups.
- The pharmacist intervention group had a shorter mean time to DKA resolution than the non-pharmacist intervention group.
- Hospital length-of-stay was shorter in the pharmacist intervention group than the non-pharmacist intervention group.
- PCCU and ICU length-of-stay were both lower in the pharmacist intervention group.

Table 3. Length of stay

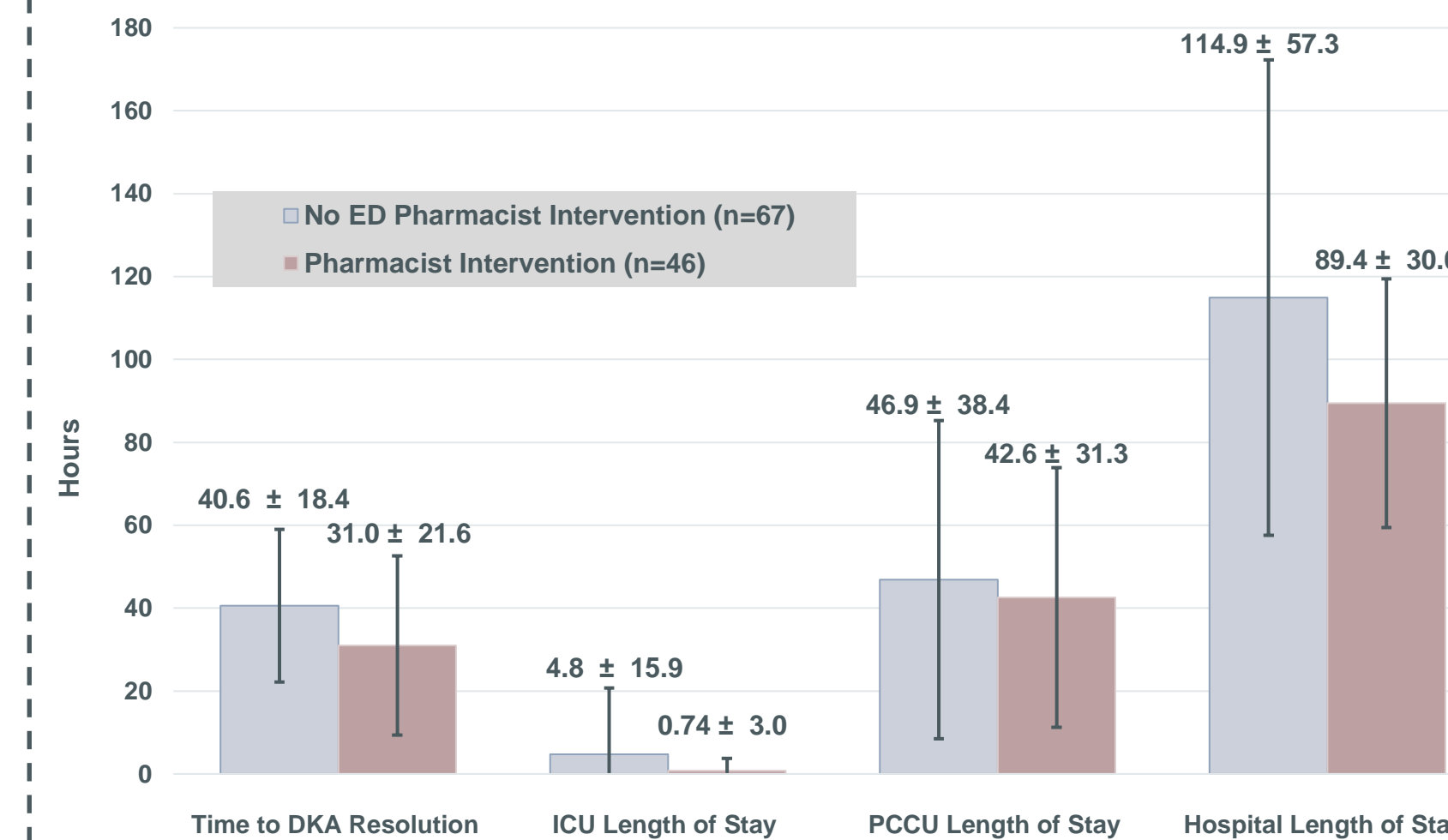


Table 4. Chemistry at 48 hours

	No ED Pharmacist Intervention (n=67)	Pharmacist Intervention (n=46)
Serum glucose (mg/dL)	212.0 ± 59.2	216.6 ± 54.4
Bicarbonate (mmol/L)	20.6 ± 3.5	21.0 ± 3.2
Anion Gap (mEq/L)	12.7 ± 2.7	12.9 ± 2.4
Potassium (mmol/L)	3.8 ± 0.4	3.9 ± 0.4
Phosphorus (mg/dL)	2.5 ± 0.9	2.6 ± 0.8
Chloride (mmol/L)	101.9 ± 12.8	102.3 ± 5.6
Creatinine Clearance (mL/min)	102.7 ± 49.9	113.1 ± 53.8

Table 5. Fluid Resuscitation

	No ED Pharmacist Intervention (n=67)	Pharmacist Intervention (n=46)
Patients that received isotonic fluid bolus (%)	98.5 %	100 %
Average total bolus fluid volume (mL)	2,126.9 ± 905.9	2039.1 ± 836.3
Percent of fluid bolus that is normal saline	88.8 %	79.4 %
Percent of fluid bolus that is balanced solution (lactated ringers)	11.2 %	20.6 %

CONCLUSION

- Pharmacist intervention in the emergency department at TMC improves patient time to DKA resolution and hospital length of stay.
- Patients were more likely to receive a balanced fluid bolus and less likely to experience hypoglycemia when a pharmacist was present
- Pharmacist presence in the ED decreased the time from patient ED admission to insulin infusion administration
- This study is limited in that it is a retrospective study in which data was only collected at one hospital.
- Further studies are required to establish statistical significance and achieve larger sample sizes with fewer uncontrolled variables.

REFERENCES

[1] Ford, W., Self, W. H., Slovis, C., & McNaughton, C. D. (2013). Diabetes in the Emergency Department and Hospital: Acute Care of Diabetes Patients. Current emergency and hospital medicine reports, 1(1), 1–9. <https://doi.org/10.1007/s40138-012-0007-x>

DISCLOSURE

The authors of this project have nothing to disclose.

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