

Investigation of Short-Term Safe Discharge Predictors in Patients Presenting to the Emergency Department with Hyperglycemia

Mustafa Furkan Uzun^{1*}

¹Derince Training and Research Hospital Turkey

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*Corresponding author: Mustafa Furkan Uzun
Derince Training and Research Hospital Turkey

Abstract

Original Research Article

Objective: To identify reliable predictors for short-term safe discharge in hyperglycemic patients presenting to the emergency department (ED). **Methods:** A retrospective cohort study was conducted on 206 patients presenting with blood glucose ≥ 200 mg/dL to Kocaeli University Faculty of Medicine Hospital ED between September 2018 and March 2019. Demographics, laboratory parameters, comorbidities, and 72-hour ED revisit rates were analyzed. Multivariate logistic regression was used to determine predictors of one-week hospitalization. Model performance was evaluated using ROC curve analysis. **Results:** 21.4% of patients revisited the ED within 72 hours. Patients who returned had significantly higher initial blood glucose, BUN, and creatinine levels, and lower bicarbonate and pH. Non-diabetics were more likely to present with DKA or HHS. Multivariate analysis revealed that abnormal physical examination findings (OR: 4.4, 95% CI: 1.4-13.4) and elevated creatinine (OR: 3.5, 95% CI: 1.3-9.9) independently predicted one-week hospitalization. The AUC for the model was 0.76, indicating acceptable discriminative performance. **Conclusion:** Clinical examination and renal function testing are essential for predicting short-term risk in ED hyperglycemia cases. Implementation of these findings into discharge protocols may optimize resource utilization and patient outcomes. Further prospective validation is recommended.

Keywords: Hyperglycemia, Emergency Department (ED), Discharge predictors, Hospitalization, Retrospective cohort.

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INTRODUCTION

Hyperglycemia is a frequent emergency department presentation, encompassing a wide spectrum from mild glucose elevation to life-threatening metabolic derangements such as diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS). While severe cases require hospitalization, many patients may be safely discharged after initial management. However, standardized discharge criteria remain insufficiently defined. The global burden of diabetes and increasing ED utilization underscore the need for validated predictors of short-term safety following discharge. Recent literature highlights the utility of early warning scores and biochemical markers for risk stratification in various ED contexts. However, limited data exist specifically for hyperglycemic patients. This study addresses this gap by analyzing predictors of early ED revisits and hospitalizations among patients discharged after presenting with hyperglycemia. We hypothesize that simple clinical and laboratory parameters can help identify patients at risk for short-term deterioration.

METHODS

Study Design and Population: We conducted a single-center, retrospective cohort study at Kocaeli University Faculty of Medicine ED. Adult patients (≥ 18 years) with initial blood glucose ≥ 200 mg/dL who were discharged between September 2018 and March 2019 were included. Patients with incomplete data, transfers, or hospital admissions at index visit were excluded.

Data Collection: Data extracted included age, sex, medical history, presenting symptoms, vital signs, laboratory values (glucose, BUN, creatinine, electrolytes, bicarbonate, pH, anion gap, lactate), treatment modalities, and outcomes (72-hour ED revisit, 1-week hospitalization).

Statistical Analysis: Descriptive statistics were calculated. Categorical variables were compared using chi-square tests; continuous variables using t-tests or Mann-Whitney U tests. Multivariate logistic regression was performed to identify independent predictors of one-week hospitalization. Model calibration was assessed

with the Hosmer-Lemeshow test; discrimination was evaluated using ROC analysis with AUC.

RESULTS

Of 206 eligible patients, 113 (54.9%) had known diabetes. The most common presenting complaint was fatigue. A total of 44 patients (21.4%) revisited the ED within 72 hours; 42 required hospitalization within one week. Compared to non-hospitalized patients, those hospitalized had higher initial glucose, BUN, creatinine, and lactate, and lower bicarbonate and pH. Abnormal physical examination findings were more frequent among hospitalized patients (73.8% vs 32.8%, $p<0.001$).

Multivariate analysis identified two independent predictors of hospitalization:

- Presence of abnormal physical exam findings (OR: 4.4; 95% CI: 1.4-13.4; $p=0.010$)
- Elevated creatinine level (OR: 3.5; 95% CI: 1.3-9.9; $p=0.016$)
- The final model demonstrated good fit (Hosmer-Lemeshow $p=0.80$) and acceptable discrimination (AUC: 0.76).

DISCUSSION

This study contributes to ED risk stratification in hyperglycemia by identifying two simple, actionable predictors: abnormal physical exam and elevated creatinine. These findings are consistent with prior work indicating the prognostic value of renal dysfunction and clinical assessment in hyperglycemic emergencies. However, unlike some recent studies utilizing machine learning or complex scores, our model emphasizes easily accessible ED data. The AUC of 0.76 suggests that the model has reasonable discriminatory capacity for early adverse outcomes. Integration of such predictors into clinical decision support tools may aid in discharge planning and reduce preventable revisits. Nonetheless, caution is warranted due to study limitations, including single-center setting, retrospective design, and modest

sample size. Future research should validate these findings prospectively and explore additional parameters such as capillary ketone testing, inflammatory markers, and social determinants of health. Additionally, implementation studies could assess the real-world impact of using these predictors in structured discharge protocols.

CONCLUSION

Our findings suggest that the presence of abnormal physical examination findings and elevated serum creatinine are independent predictors of short-term hospitalization among hyperglycemic patients discharged from the ED. These parameters can aid clinicians in identifying patients who may benefit from closer follow-up or hospital admission. Incorporating such predictors into discharge algorithms may enhance patient safety and ED efficiency.

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