Treatment of DKA in Patients with Decreased Renal Function

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EndoTool™ A system by Monarch Medical Technologies

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Introduction

- The kidney plays an important role in insulin clearance; impaired kidney function increases hypoglycemia risk, especially in diabetic ketoacidosis (DKA).
- EndoTool IV (ETIV) software adjusts insulin dosing based on estimated glomerular filtration rate (eGFR), accounting for delayed insulin clearance.

Analysis

- The incidence of hypoglycemia and the duration of insulin infusion were assessed based on the severity of renal insufficiency.
- Patients were categorized into four groups based on eGFR, eGFR > 30 ml/min, 20-30 ml/min, 10-20 ml/min, and < 10 ml/min.
- The study analyzed blood glucose (BG) levels, focusing on hypoglycemia and hyperglycemia rates.

Results

2023 Data Overview

- A total of **7,378 patients were treated for DKA; 810** had an eGFR < 30 ml/min.
- **171,868 blood glucose measurements** were obtained.

Hypoglycemia Incidence

- Severe hypoglycemia (BG < 40 mg/dl) occurred in **less than 0.01%** readings across all groups, indicating effective management.
- Moderate hypoglycemia (BG < 70 mg/dl) was significantly higher in patients with eGFR < 30 ml/min (0.5%) compared to those with eGFR > 30 ml min (0.2%, $p < 0.0001$).

Infusion Duration

- Patients with eGFR between 10-30 ml/min required longer insulin infusion times (29 hrs) compared to those with eGFR > 30 ml/min (24.5 hrs, $p < 0.001$).

	eGFR <10	eGFR 10-20	eGFR 20-30	eGFR >= 30
# Readings	4780	8861	8327	149900
# Runs	185	311	314	6568
% BG < 70 mg/dL	0.56%	0.49%	0.34%	0.22%
% ETIV Runs with < 70	8.6%	10.9%	5.1%	3.8%
% BG > 300	1.3%	0.6%	0.9%	0.9%
% BG 70 - 180	73.2%	75.0%	72.8%	69.7%
Time to Target (hours)	5.2	8.1	7.0	5.0

Summary

- ETIV safely manages DKA in patients with renal insufficiency.
- No increase in severe hypoglycemia (BG < 40 mg/dl) with impaired renal function.
- Moderate hypoglycemia incidence higher in renal insufficiency but much lower than rates in other studies (>10%) when not using ETIV.
- Comparable hyperglycemia rates and time in safe glucose range for all patients.

Conclusion

This study underscores the importance of tailored insulin management strategies in DKA patients with impaired kidney function. ETIV software provides a safe and effective means of mitigating hypoglycemia risks while ensuring patients achieve optimal glycemic control for patients irrespective of renal function.

References

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