Digital evaluation of ketosis and other diabetes emergencies (DEKODE) algorithm: Automated auditing system for diabetic ketoacidosis (DKA) management

P Kempegowda[1,2], A Kolesnyk[3], E Melson[1,2], L Thomas[3], A Johnson[3], D Zhou[3], S Ghosh[1], P Narendran[1,4]

[1]Department of Diabetes and Endocrinology, Queen Elizabeth Hospital Birmingham, UK; [2]Institute of Metabolism and Systems Research, University of Birmingham, Birmingham; [3]University of Birmingham Medical School;[4]Institute of Immunology and Immunotherapy, University of Birmingham, Birmingham, UK

University Hospitals Birmingham NHS Foundation Trust

IMSR INSTITUTE OF METABOLISM AND SYSTEMS RESEARCH

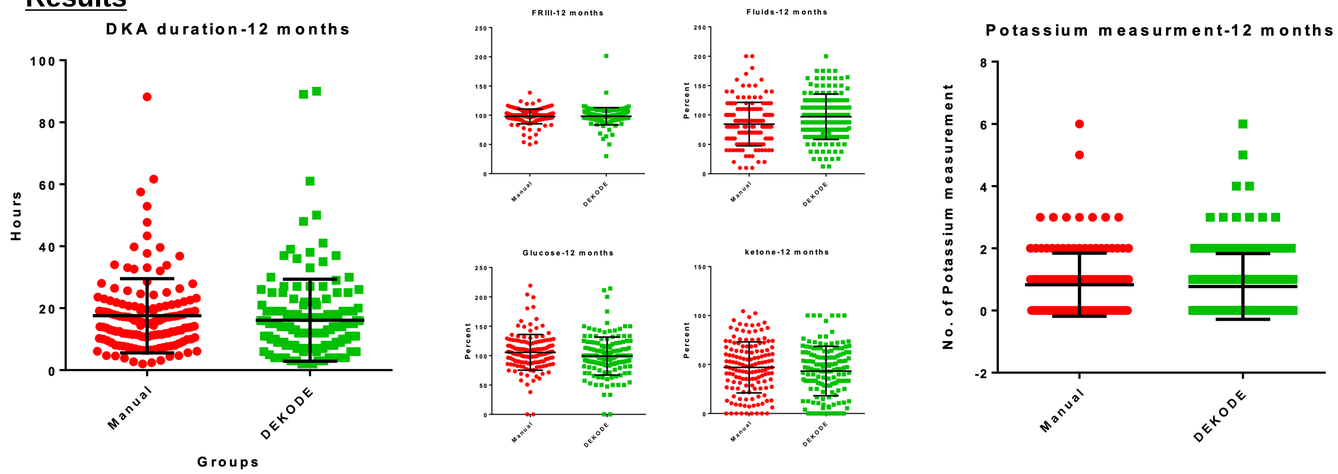
Background

- Effective management of diabetic ketoacidosis (DKA) improves clinical outcomes.
- Regular auditing and performance feedback are key to achieving sustained improvements in DKA management.
- The delay from audit initiation to results represents a significant limitation of audit.
- In order to overcome this, we created an automated auditing system, DEKODE, developed in collaboration between the departments of diabetes and health informatics at our centre in the West Midlands, UK.
- DEKODE identifies DKA episodes based on fixed rate intravenous insulin infusion (FRIII) prescription. The algorithm, collects data from patient electronic records to provide a summary of how the DKA episode was managed.
- **We aimed to retrospectively validate DEKODE for its ability to audit DKA management.**

Methods

- This study took place at the Queen Elizabeth Hospital Birmingham.
- All episodes identified by DEKODE from September 2018 to August 2019 were manually verified for confirmation of diagnosis.
- DKA duration was defined as the difference in time between FRIII prescription time and end of prescription time for DEKODE, and time from diagnosis to resolution as per standard criteria for manually collected data.
- Duration of DKA, appropriateness of glucose and ketone measurements during entire DKA duration and fluids prescribed in the first 12 hours of diagnosis were compared between the two datasets.
- The difference between manual and automated data were analysed using Prism v6.0 (Graphpad Inc) and results are presented as mean and standard error of mean (SEM).
- Difference in frequencies of hypokalemia and hyperkalemia between manual and automated data was analysed by chi-square test.

Results



- 150 episodes were identified by DEKODE. Of these, 147 had manually confirmed DKA.
- There was no significant difference in DKA duration between DEKODE and manual data (16.0 ± 1.0 hours; 17.5 ± 0.9 hours; P = ns) respectively.
- There was no difference in FRIII appropriateness (98.3% ±1.2%; 97.9% ± 1.1%; P = ns), glucose (98.5% ± 2.6%; 105.6% ± 2.5%; P = ns) and ketone measurements (43.3% ± 2.1%; 47.1% ± 2.2%; P = ns) between the two systems.
- DEKODE accurately predicted the frequency of hyperkalaemia (7/147; 6/150; P = ns) and hypokalaemia (9/147; 9/147; P = ns).
- However, DEKODE over-predicted proportion of fluids prescribed (96.9% ± 3.2%; 84.4% ± 3.1%; P =0.0047).

Discussion

- This is the first automated DKA management monitoring system that reliably predicts DKA duration and management.
- This could help reduce time from data collection to analysis, thus providing real-time performance results.
- Further prospective validation is currently underway.

References

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