POCT in Action: Addressing Inpatient Glycaemic Control with an Automated Inpatient Glucometry Alert System

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Background: Poor inpatient glycaemic control results in higher rates of hospital complications, increased length of stay and likelihood of readmission and significantly higher inpatient mortality. The prevalence of inpatient hypoglycaemia (<4 mmol/L or 70 mg/dL) is approximately 6%, with the prevalence of hyperglycaemia (>10 mmol/L or 180 mg/dL) being up to 30%. A significant number of inpatients with poor glycaemic control go unrecognized and/ or are never referred to the Diabetes consult services for optimal management. Current networked Point-of-Care technology offers a novel way to address this problem. We aimed to improve inpatient glycaemic control by developing an automated system to process Point-of-Care Testing Blood Glucose (POCT-BG) results stored on our network server and to alert the Diabetes Consult team about patients with out-of-control results.

Methods: Microsoft Excel (v 2013) was used to develop Macros for the processing of glucometry data downloaded from the Roche Cobas® IT 1000 database. All POCT-BG values taken from Roche AccuChek™ II glucometers in our hospital are automatically uploaded to the server. The Excel Macros were loaded onto a Windows 8™ tablet. Daily downloads were done from the Cobas® IT database and uploaded to a shared network folder. The downloaded data was automatically appended to an input data file, which was analyzed by the Excel Macros. Daily reports were generated according to ward location and alerts were triggered for any value less than 4 mmol/L (70 mg/dL, hypoglycaemia) or greater than 15 mmol/L (270 mg/dL, moderate hyperglycaemia). The Diabetes Team provided a daily consult service for all patients flagged on the daily reports. The tablet displayed the POCT-BG results for the previous week for any patient with results on the Cobas® IT database. Alerts were also uploaded to the Laboratory Information System for all hypoglycaemic and hyperglycaemic values to inform the hospital teams of out-of-control glucometry results. This system was implemented on April 11th, 2014 and will be tested over a 3-month period. Data were analyzed in Stata v 13.

Results: The results for the first 18 days after implementation are presented in this abstract. All hospital inpatient wards were included in the analysis apart from the Emergency Department, Renal Wards and Paediatric Wards. The baseline mean POCT-BG for our hospital was ~ 9.10 mmol/L [164 mg/dL] with about 10% of values greater than 15 mmol/L and 3% of values less than 4 mmol/L. The Diabetes Team had 24 additional consults based on the glucometry alert system. A significant increase in out-of-control glucometry values was seen in the 11-day period prior to implementation. The alert system resulted in a statistically significant reduction in the percentage of hyperglycaemic values and the percentage of hyperglycaemic patient-day weighted values compared to January – March 2014 and April 2014 prior to implementation. There was no reduction in the percentage of hypoglycaemic values or hypoglycaemic patient-day weighted values. There was a significant fall in the mean POCT-BG and mean patient-day weighted POCT-BG and a reduction in the mean time to normalization of blood glucose if a single patient value was classified as hypoglycaemic or hyperglycaemic.

Conclusion: The Automated Inpatient Glucometry Alert System reduced the percentage of out-of-control glucose values and the time to normalization of blood glucose. The system also highlighted an additional 24 patients with suboptimal glycaemic management while in hospital.

Conflicts of Interest: None.