Data Driven Approach to Improve Inpatient Diabetes Care
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Introduction
Diabetes mellitus (DM) is widely prevalent in hospitalized adults and hyperglycemia is a predictor of poor outcomes. Medications, consistent carbohydrate meal planning (CCMP) and certified diabetes educators (CDEs) are important to achieve optimal glucose control, reduce adverse outcomes and make healthcare more cost-effective [1]. Our multi-disciplinary, diabetologist-led glucometrics team took a bundled, informatics-driven approach to optimize DM care. The bundle has 3 pillars: standardized physician order entry, clinician education, and a near-real-time and historic DM dashboard. Previously, retrospective reports for care quality reporting were not actionable in a timely fashion and challenging to interpret by stakeholders. With prior efforts showing usefulness of glucometrics [2], we developed the dashboard as a data visualization tool that leverages the electronic health record (EHR) to enable near-real-time population management. The dashboard enabled actionable data-driven care with an internally built infrastructure that best fit our institution’s needs.

Methods
The dashboard is built with Tableau Server, hosted on the hospital intranet. Data is extracted hourly from the Cerner Millennium EHR to balance data availability and system burden. The Dashboard inclusion criteria are based on the American Diabetes Association (ADA) standards and capture patients upon admission with: (1) known diabetes within last 10 years or (2) 2 consecutive blood glucose ≥180mg/dL during admission or (3) hemoglobin A1c (HbA1c) > 6.4%. Adopting standards of care primarily from ADA [1], Centers for Medicare and Medicaid Services, and The Joint Commission [3], the team implemented key quality metrics such as 30-day readmission rates, HbA1c order rates, length of stay, standardized insulin order utilization rates, hyper- and hypoglycemia, point of care glucose measurements, insulin pump presence, CCMP orders, as well as active consults. Of the monthly 700-plus admitted patients with DM the Dashboard clearly identifies those at greatest risk of acute complications from DM in a single display, to drive optimal nutrition and effective use of limited CDE resources.

Outcomes
Since introducing the bundled implementation of the dashboard, standardized order entry, and clinician education in 2015, the length of stay index was reduced from 1.22 to 1.06, 30-day readmission rate was reduced from 16.82 to 12.99, and HbA1c monitoring rate within 90 days of admission has increased from 57% to 88%.

Conclusion
Dashboard implementation has enhanced monitoring by providing a curated near-real-time, actionable data display, and has been a key component of system-wide improvements in outcomes for patients with DM. Moving forward, we hope to create a provider team-based dashboard to allow integration into daily rounds. Further, we plan to add features to surveil for the development of diabetic ketoacidosis in the hospital, a potentially lethal but preventable acute DM complication.

References