Evaluating the impact of pharmacy driven interventions on patients with hyperglycemia who have been identified by use of a clinical surveillance software system.

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Abstract # 11
IRB Approved

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Disclosures

- Michael Wisner
- Potential conflicts of interest: none
- Sponsorship: none
- Proprietary information or results of ongoing research may be subject to different interpretations
- Speaker's presentation is educational in nature and indicates agreement to abide by the non-commercialism guidelines provided

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Objectives

- To identify the benefits and limitations associated with the use of a clinical surveillance software system.
- To describe the barriers related to implementing and measuring outcomes related to a pharmacist driven glycemic management program.

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Background

- Quality improvement project
- Goal:
  - Assess the impact of implementing a pharmacist focused glycemic management tool
  - Assess the feasibility of system wide implementation of such a tool

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Impact of Hyperglycemia

- Increased risk of infections, cardiovascular events and mortality
- Longer lengths of stay
- Quality Measures
  - Surgical Care Improvement Project
    - SCIP-Inf-4 - Retired
  - National Quality Forum (NQF) Measures
    - Recommended for endorsement
      - NQF 2362 – Inpatient - Hyperglycemia
      - NQF 2363 – Inpatient - Severe Hypoglycemia

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Glucometrics

- Patients with only Sliding Scale Insulin
- Patient groups - ICU vs non-ICU patients
- Source of lab data - Point of care glucose tests
- How to measure hyperglycemia
  - Patient day weighted mean glucose level
  - Patient days with weighted mean glucose > X
- How to measure hypoglycemia
  - Patient days with one reported glucose < X
- Benchmarking
  - Remote Automated Laboratory Systems (RALS), Yale Glucometrics, and Society of Hospital Medicine

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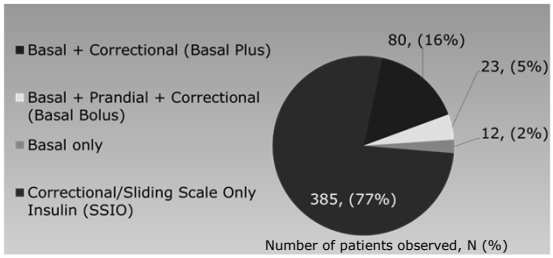
Pre-Intervention Insulin Prescribing Trends at NRHS



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Pre-intervention Comparison of NRHS Glucometrics with a National Benchmark

	Benchmark Study (Non-ICU)	Norman Regional Health System
Time period	1/1/12 – 12/31/12	8/1/17 – 10/31/17
Location	635 hospitals nation wide	Medical/Surgical unit and Cardiac PCU
Day weighted mean blood glucose	167	172
% of patient days with mean blood glucose		
> 180 mg/dL	32.3%	37.9%
> 200 mg/dL	21.9%	27.2%
> 250 mg/dL	7.4%	10.0%
> 300 mg/dL	2.3%	3.6%
Patient day prevalence of hypoglycemia		
< 70 mg/dL	6.1%	3.3%
< 60 mg/dL	3.5%	1.6%
< 50 mg/dL	1.7%	0.5%
< 40 mg/dL	0.7%	0.1%

Bersoux S, Cook CB, Kongable GL, et. al. Benchmarking Glycemic Control in U.S. Hospitals. *Endocr Pract.* 2014 Sep;20(9):876-83. doi: 10.4158/EP13516.OR.

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Methods

- Location: med/surg and cardiac PCU floor of Norman Regional Healthplex Hospital
- Time frame: January 2018
- Interventions included:
  - Identifying and addressing medication errors
  - Admission medication reconciliation
  - Suggesting adjustments to medication therapy to patient's prescriber

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Identifying Patients for Interventions

- Sentri7
  - Clinical Surveillance Software System
  - Identifies patients based on user built rules
- Hyperglycemia
  - 2 or more POC-BG > 200 in past 24h
  - 1 or more BG > 300 in past 48h
- Hypoglycemia
  - Any BG < 70 in past 48h

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Five Rights of Clinician Decision Support

- Right information
- Right person
- Right CDS intervention format
- Right channel
- Right time in workflow

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Sentri7 Dashboard

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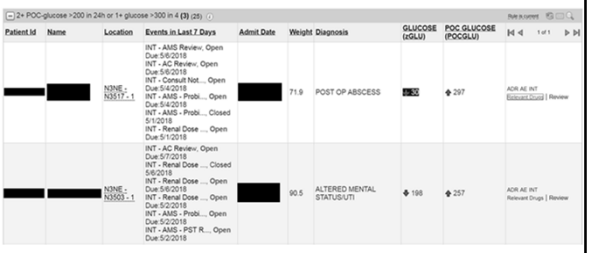
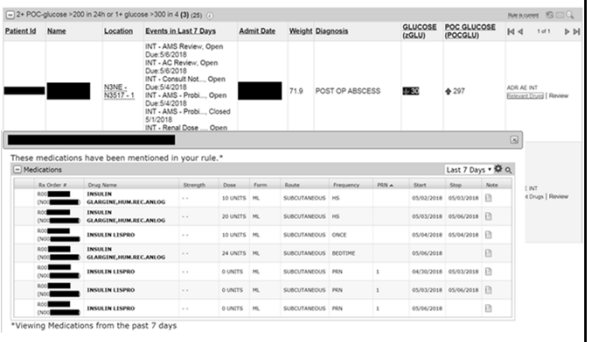
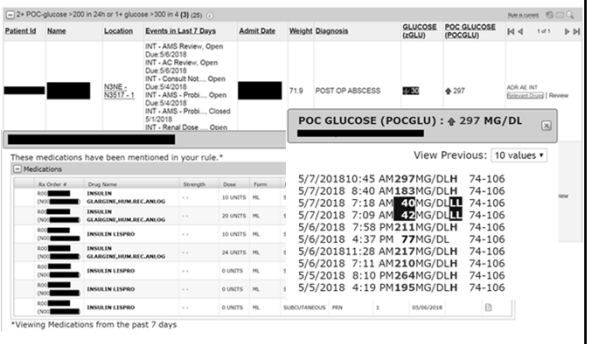
Sentri7 Dashboard



Sentri7 Dashboard



Sentri7 Dashboard



Results: Rule performance

- Patients identified – 157
- Daily rule catch per month – 474
  - Identified by rule once in any given day
- Potentially reviewable daily rule catches per month – **183 (76 patients)**
  - Active on rule for > 4 hours during the normal working hours for clinical pharmacist at NRHS

Results: Interventions

Total Interventions: 25

Medication interventions (6)
- 5 initiations (3 accepted, 2 rejected)
- 1 discontinuation (accepted)

Medication errors identified (17)
- 11 related to administration
- 4 related to ordering
- 2 related to medication reconciliation

Other interventions (2)
- 2 laboratory errors related to ordering

Barriers

- Time needed to assess patients
- Physician acceptance of suggested medication changes
- Necessary information not immediately available
- Reactive vs proactive interventions

Primary Outcome

- Day weighted mean blood glucose
  - Pre Study period: 172 mg/dL
  - Study Period: 164 mg/dL
  - Results were **not significant**
    - Kruskal-Wallis chi-squared, p-value = 0.5773

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Results: Glucometrics

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Discussion

- A statistically significant impact on the primary outcome was not observed but several types of medication errors were identified
- Reviewing patients with this Sentri7 rule is too time consuming to consider implementing hospital wide
- Some of these medication errors can be addressed and corrected independently from the methods used in this project

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Medication Error Specific Sentri7 Rules

- Proposed new Sentri7 rules
  - Hypoglycemia and an active order for a sulfonylurea
  - Mismatched insulin type for prandial and correctional insulin
  - Duplicate basal insulin orders
  - Recent hyperglycemia or active order for insulin and no finger stick blood glucose level in last 24h
- More specific and less time consuming for a pharmacist to review

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Systems based changes: NovoLOG Mix

- Medication errors related to NovoLOG Mix 70/30 Flexpen
- Updated drug names in drug dictionary used for medication reconciliation

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Systems Based Changes: Hyperglycemia Order Set

- Order strings for correctional insulin differed based upon if the order was submitted via CPOE vs manually entered by pharmacy
- CPOE
  - ADD TO meal coverage as necessary. GIVE ALONE at BEDTIME. ADMINISTER even if patient is NPO.
- Manual entry
  - PRN meal coverage,give alone at bedtime,admin. even if NPO.
- Order strings standardized to CPOE version

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Late and Missed Doses of Insulin

- Not identified as an issue until late in the project
- Potentially a huge problem
- Currently no effective tool to track cases of late or missed doses of prn correctional insulin
- Retrospective review of sample of patients performed
- Will encourage nursing management to undertake process review

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Conclusion

- Systematically screening all patients who are persistently hyperglycemic may not be a feasible option for improving glycemic control in the inpatient setting.
- Screening a sample of patients in this manner can be helpful to identify certain negative trends that can be then be addressed and corrected by other means.

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References

- Bersoux S, Cook CB, Kongable GL, et. al. Benchmarking Glycemic Control in U.S. Hospitals. *Endocr Pract.* 2014 Sep;20(9):876-83. doi: 10.4158/EP13516.OR
- HM Glycemic Control Task Force. Workbook for Improvement: Improving Glycemic Control, Preventing Hypoglycemia, and Optimizing Care of the Inpatient with Hyperglycemia and Diabetes. Society of Hospital Medicine website, Glycemic Control Quality Improvement implementation toolkit http://www.hospitalmedicine.org accessed 10/27/2017

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Self Assessment

1. CMS currently enforces two quality measures, NQR 2362 and NQR 2363, for measuring inpatient glycemic control.
   A. True
   B. False
2. Which of the following are potential barriers to implementing a pharmacist driven glycemic management program?
   A. Time necessary for patient case review
   B. Difficulty finding relevant data points at the right time and place
   C. Buy-in from other healthcare providers
   D. All of the above

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