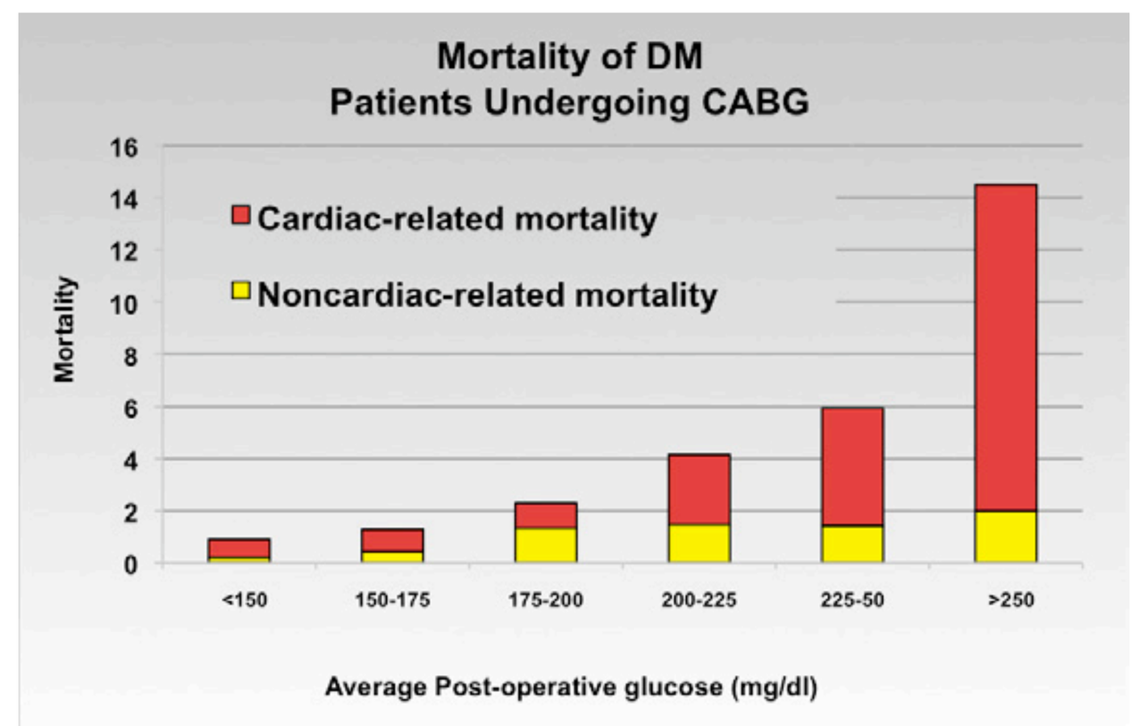
Baton Rouge General Medical Center

Cardiac Glucose Control

Define — "The Evidence"

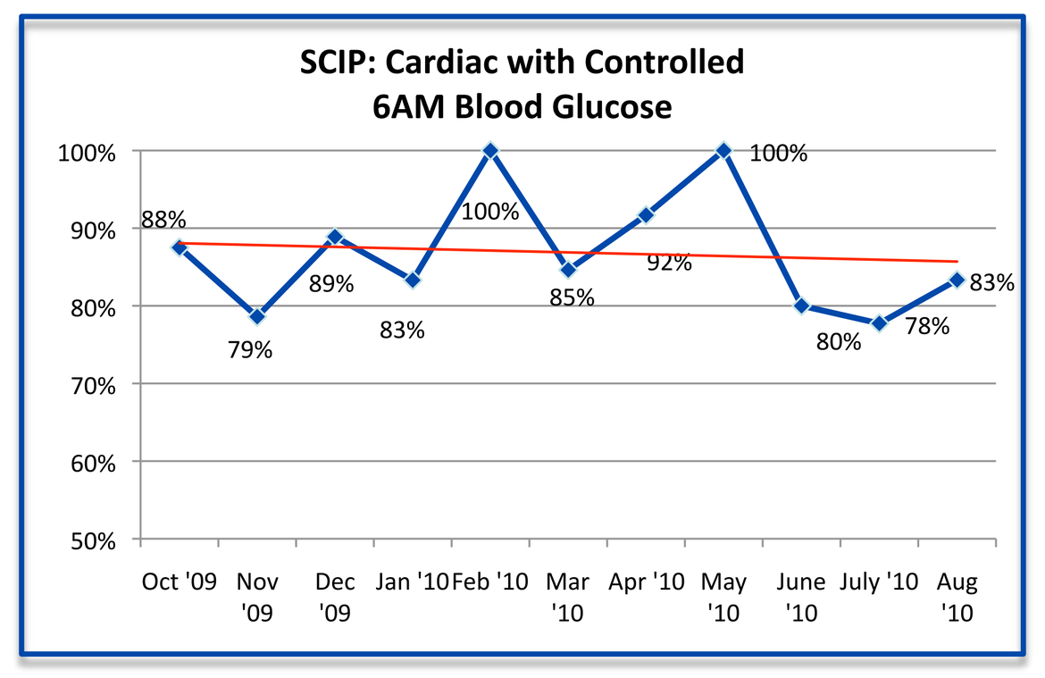
Research indicates that the mortality of patients undergoing open heart surgery with higher glucose levels have a significantly higher mortality



Reference: Furnary et al J Thorac Cardiovasc Surg 2003;123:1007-21

Define — "The Problem"

- Lack of consistent Glucose Control in postoperative cardiac surgery patients
- Root causes were varied
- Evidence-based practice to reduce or elimination of surgical infections
- Publicly reported measure
- Contributes to Value Based Purchasing Score



Define — High Level Process Map

START: Patient Arrives to ICU From Surgery

- Initial Accucheck Done
- Patient Placed on Appropriate Protocol
- Accuchecks and Insulin Administration as Indicated
- Patient is Extubated and Starts on Liquids
- If diabetic, patient is given Lantus at 6am POD 1
- If applicable, drip is discontinued 2 hours after Lantus
- Patient transferred to Telemetry
- Patient is placed on Hospitalist Sliding Scale

END: Glucose Results 6am POD 2

Measure — Critical to Quality

Y = # of patients with Glucose ≤ 200 6am POD 1 **and** POD 2 / Total # of eligible patients

One Unit = One Patient
Opportunities / Unit = 1 (Glucose measure on 2 post op days)
Defect = Glucose > 200 at 6am on POD 1 **or** POD 2

BASELINE MEASURE – What is the Process Capability?

Y = 47 patients with glucose < 200 6am POD 1 & POD 2 / 55 eligible patients

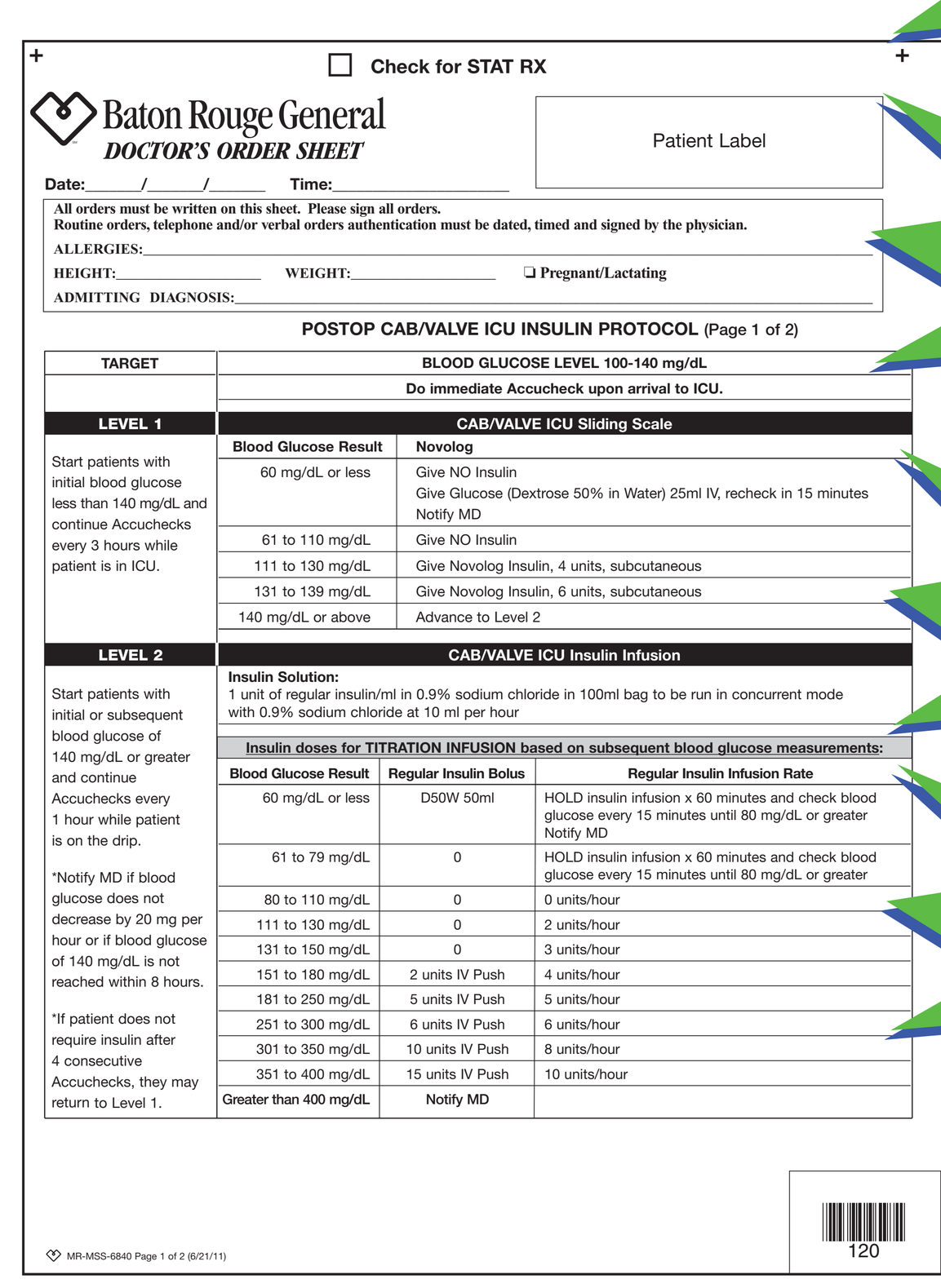
Defects per total opportunities (DPO) = 8/55 = 0.1454545
Defects per million opportunities (DPMO) = 0.1454545 x 1,000,000,000 = 145,454
Z score or Sigma Score = 2.56 (*Perfect would be a Sigma Score of 6*)

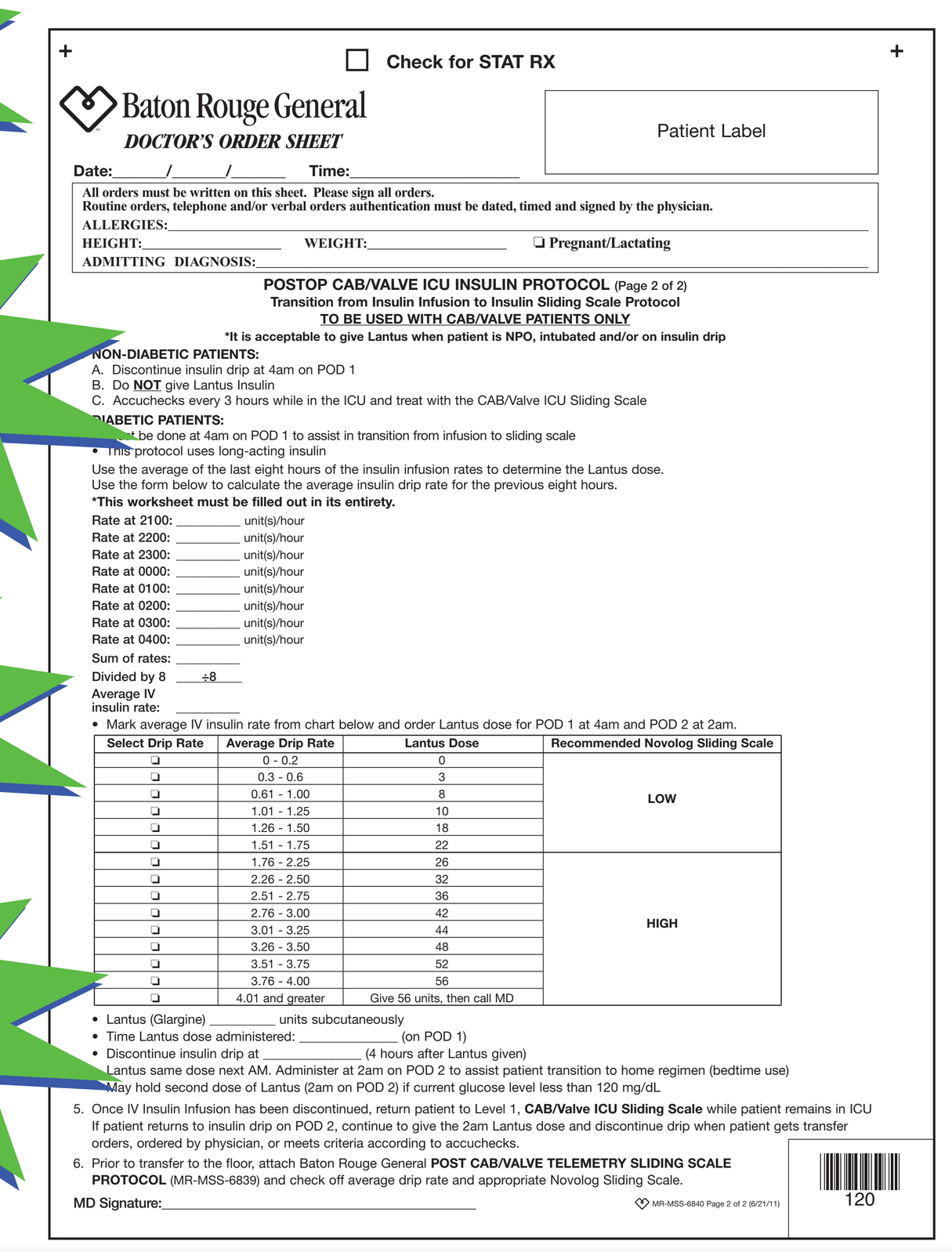
14.5% Defect Rate

Improve — Interdisciplinary Team Work Out

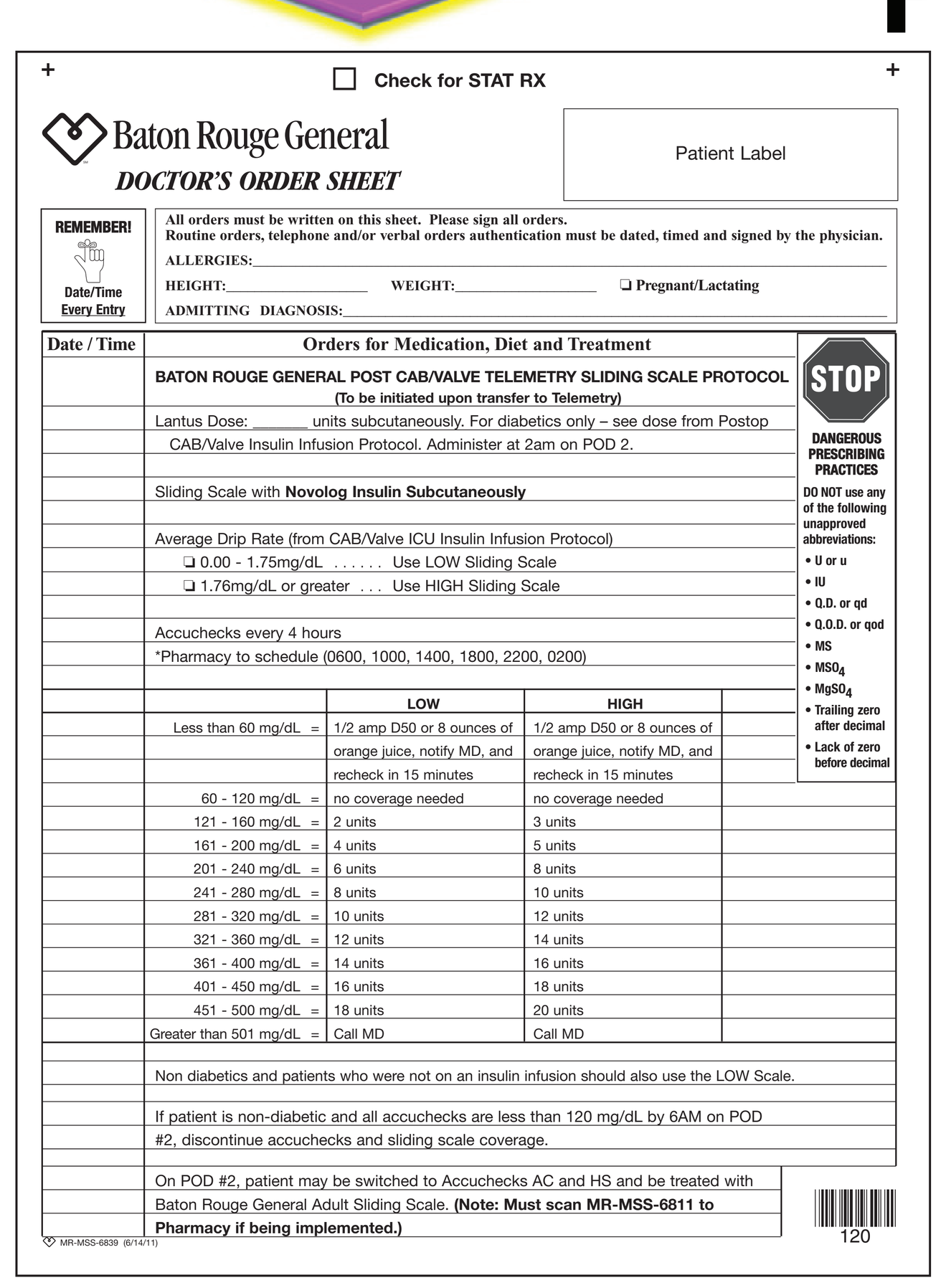
Improve — New ICU Protocols

- Clearer pathways
- Use of Novolog vs. Regular Insulin
- Clarified IV push for bolus doses
- Elimination of rising and falling boxes





Improve — New Telemetry Protocols



New Telemetry Scale Designed Specifically for Cardiac Surgery Patient's Needs

Analyze — Chi Square

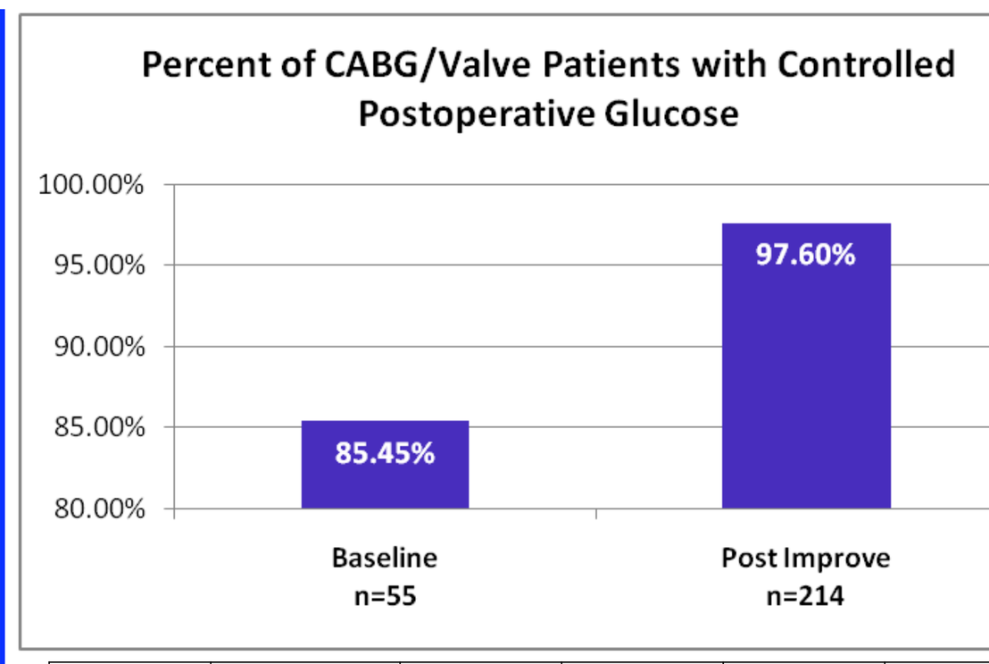
	Variable	Data Type	Statistically Significant?	p value	Practically Significant?
x_1	6am Lantus	Discrete	YES	Chi Square: 0.011	YES
x_2	POD 2	Discrete	YES	N/A (small n size, but 63% of fallouts occur on day 2)	YES
x_3	Diabetic	Discrete	YES	Chi Square: 0.00	YES
x_4	2am AC on POD 1	Discrete	YES	Chi Square: 0.011	YES
x_5	Additional MD orders	Discrete	YES	Chi Square: 0.022	YES
x_6	Protocol followed from Arrival in ICU-6am POD 1	Discrete	?	Chi Square Inconclusive	YES
x_8	6am Lab	Discrete	NO	Chi Square: 0.579	NO
x_9	2am AC on POD 2	Discrete	NO	Chi Square: 0.246	NO
x_{10}	1st BG w/in 1 hr	Discrete	NO	Chi Square: 0.395	NO
x_{12}	DC Drip 2hrs	Discrete	NO	Chi Square: 0.423	NO
x_{13}	ICU LOS	Discrete	NO	Chi Square: 0.339	NO
x_{14}	Protocol followed from 6am POD 1-6am POD 2	Discrete	NO	Chi Square: 0.156	YES

Analyze — Root Causes

- Lantus was not given at recommended time or dose
- Recommended dose was not AACE recommendations
- The ICU protocol was confusing & open to interpretation
- Hospitalist scale was not effective on Telemetry
- Documentation of bolus doses was incomplete; the workflow was not user friendly
- Variation in insulin ordering practices of consulting MDs
- Knowledge deficits
  - glucose control importance in this population
  - lead to hesitation to give Lantus in recommended dose

Control — Results

- Implemented new protocols and processes in February
- Continue to work closely with interdisciplinary team for continued improvement
- Improved Sigma and DPMO



	Compliant	Defect	Total	DPMO	Sigma Score
Baseline	47	8	55	145,455	2.56
Post-Improve	209	5	214	23,364	3.49

***2-sample % defective, p=0.001*