

Reducing Critical Hypoglycemia Through Quality Improvement Initiatives and Implementation of an eGlycemic Management System®

Debra Dudley, BS, RN, CDE¹
 Gam Narapanya, MSIE, LSSGB²
 Michael Yurso, MD, FACS²
 Mary Gaines, MSN, RN, BC-ADM³
 Jennifer Crowe, MHA, CPHQ, ASQ-SSBB³

BACKGROUND

On average, one of every three hospitalized patients requires insulin therapy to control blood glucose during their stay, which places them at risk of hypoglycemia. Evidence shows hypoglycemia can lead to infections and other complications, prolonged lengths of stay, increased readmission rates and sentinel events. Preventing hypoglycemia is imperative to patient safety and quality of care.

AdventHealth Waterman, a 269-bed community hospital in central Florida, performed a review of all-cause inpatient hypoglycemic events using data over a one-year period, April 1, 2016 - March 31, 2017. The results indicated an opportunity to implement clinical practice changes and other strategies to reduce critical hypoglycemia.

AIM

Reduce critical hypoglycemia (blood glucose <40 mg/dL) among hospitalized patients within two years.

METHODS

We conducted standardized root cause analysis on all blood glucose values <40 mg/dL. Results identified four areas for targeted interventions: (1) failure to follow policy, (2) stacking insulin, (3) wrong insulin dose, and (4) failure to adjust insulin. An interdisciplinary team was tasked with designing and implementing appropriate clinical practice changes and quality improvement initiatives.

Patient Population Characteristics	Pre-Intervention	Post-Intervention	p
Female	50.3%	46.6%	—
Male	49.7%	53.4%	—
Total # Patients	4,615	4,104	—
Total # Patient Days (PDs)	27,475	22,970	—
% PDs BG <40 mg/dL	0.65%	0.54%	0.09
% PDs BG <70 mg/dL	6.19%	5.74%	0.04
% PDs BG >300 mg/dL	7.69%	9.83%	0.00
% PDs Avg BG 70-180 mg/dL	77.50%	71.39%	0.00

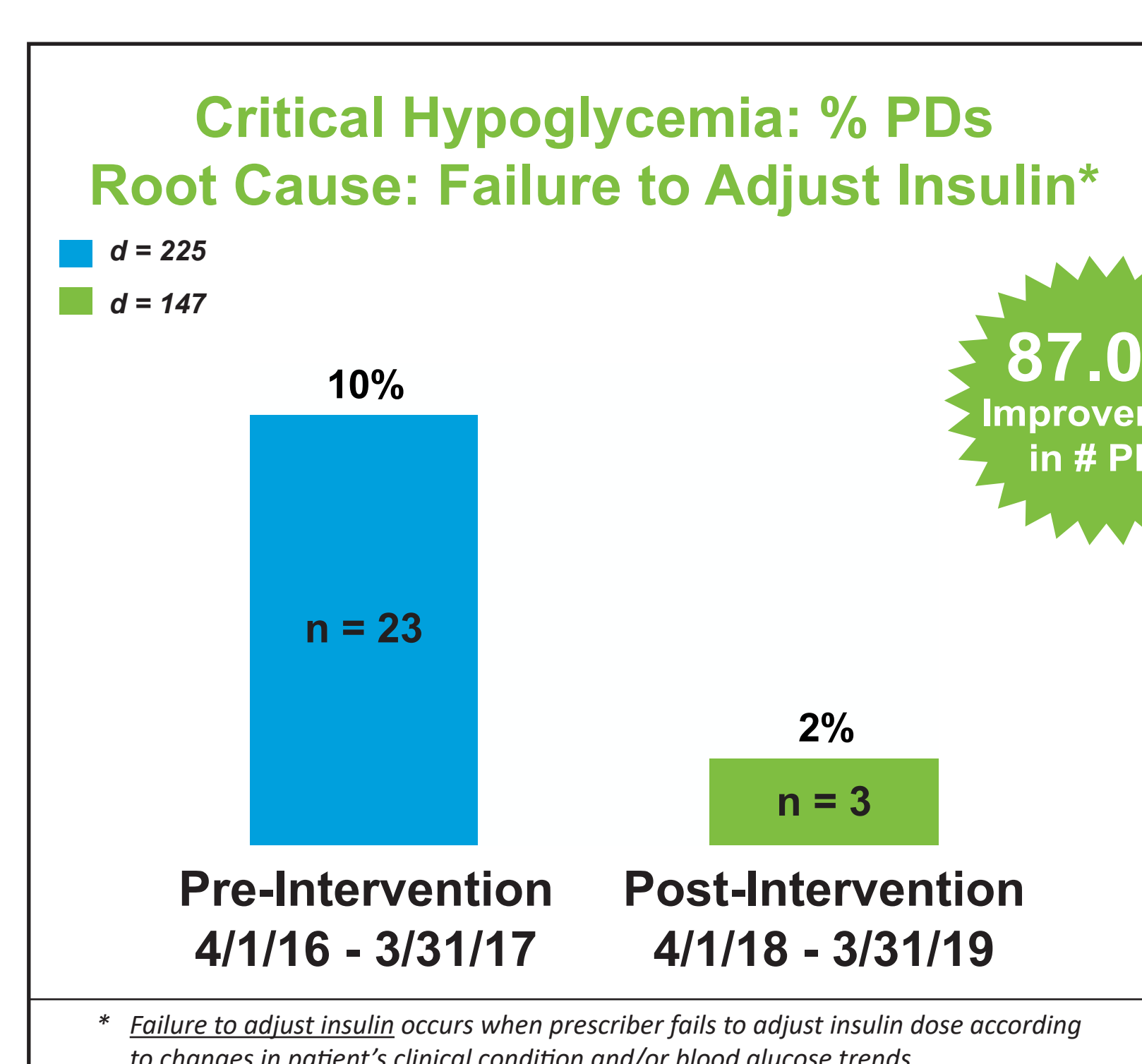
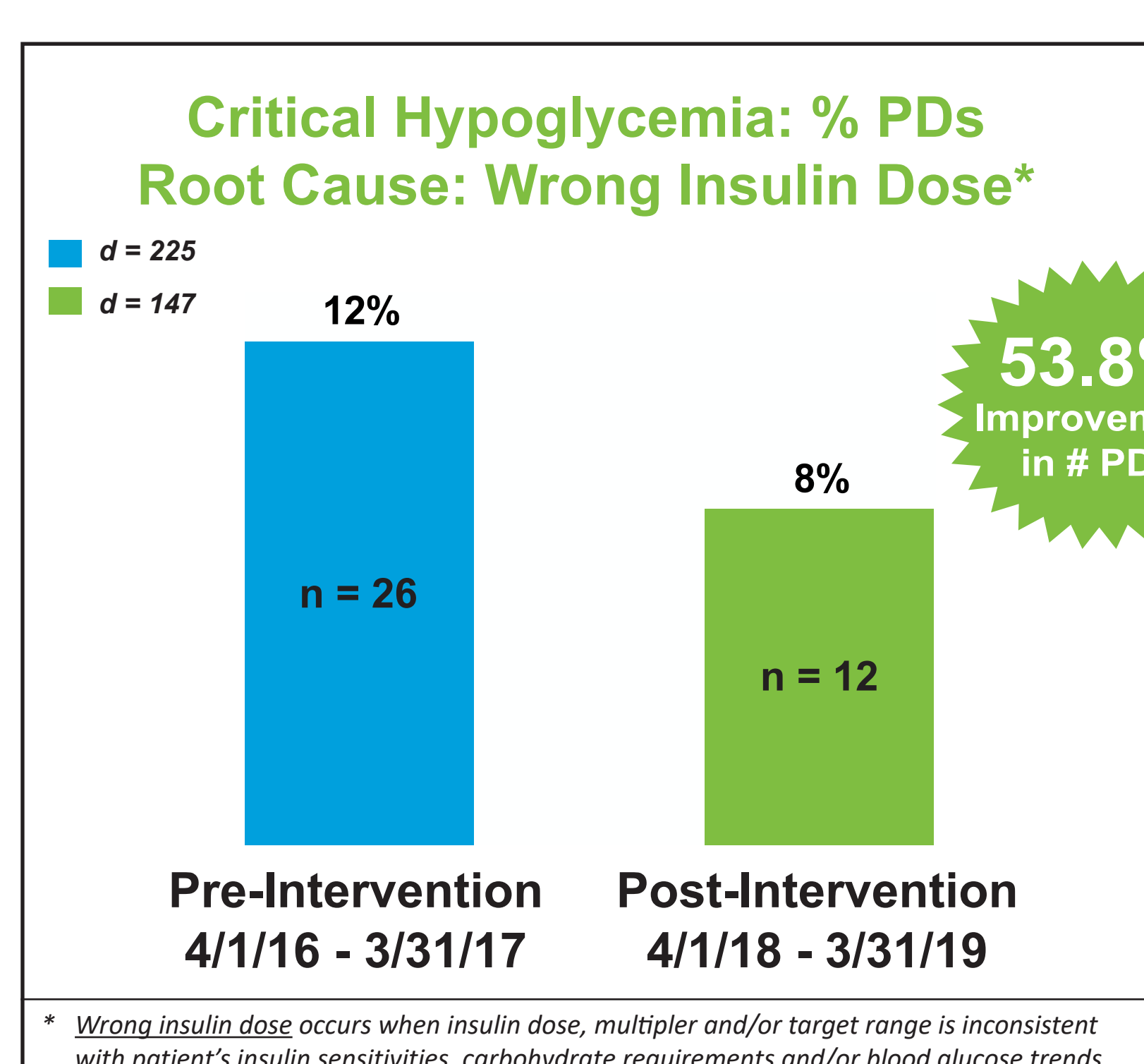
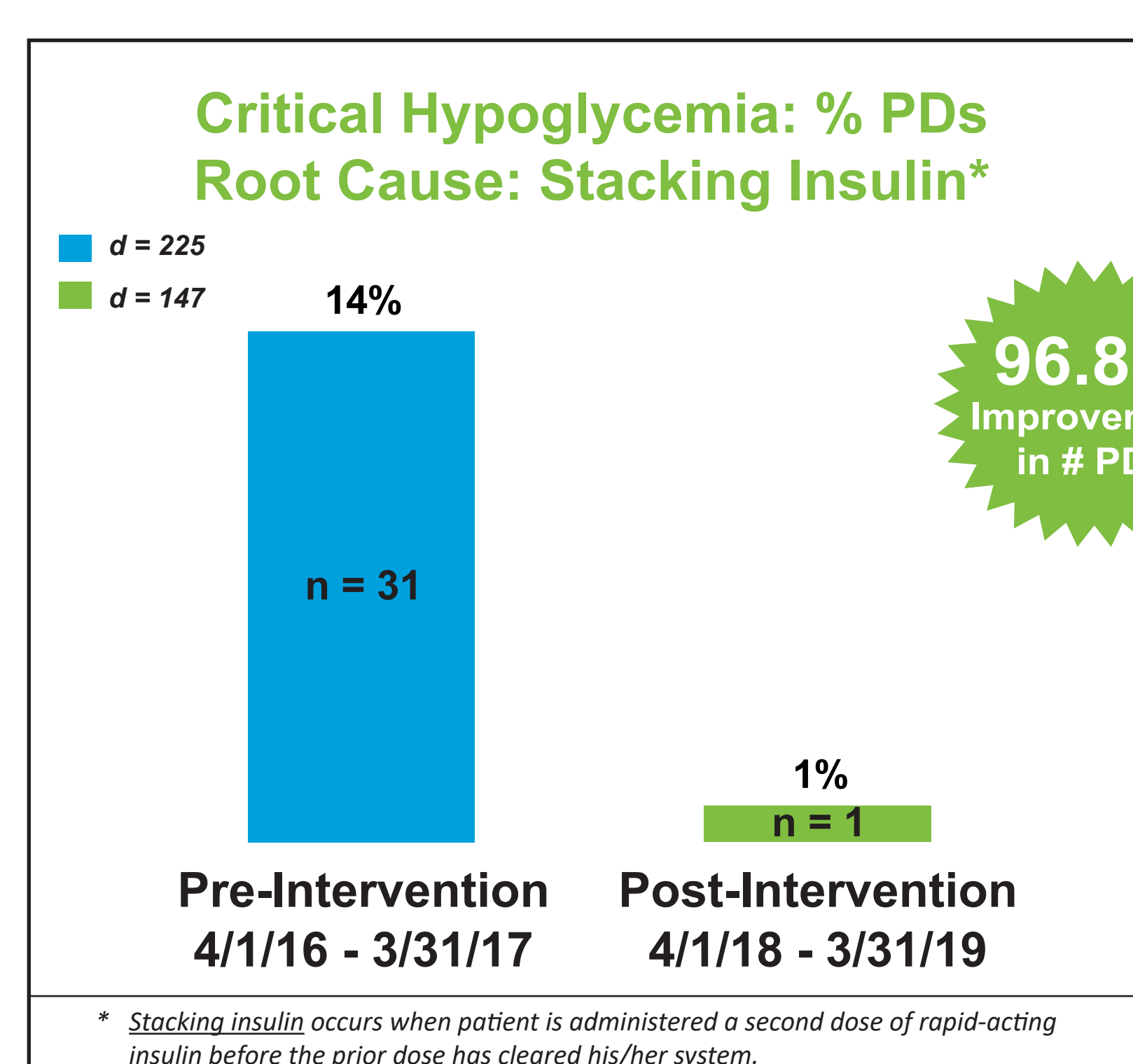
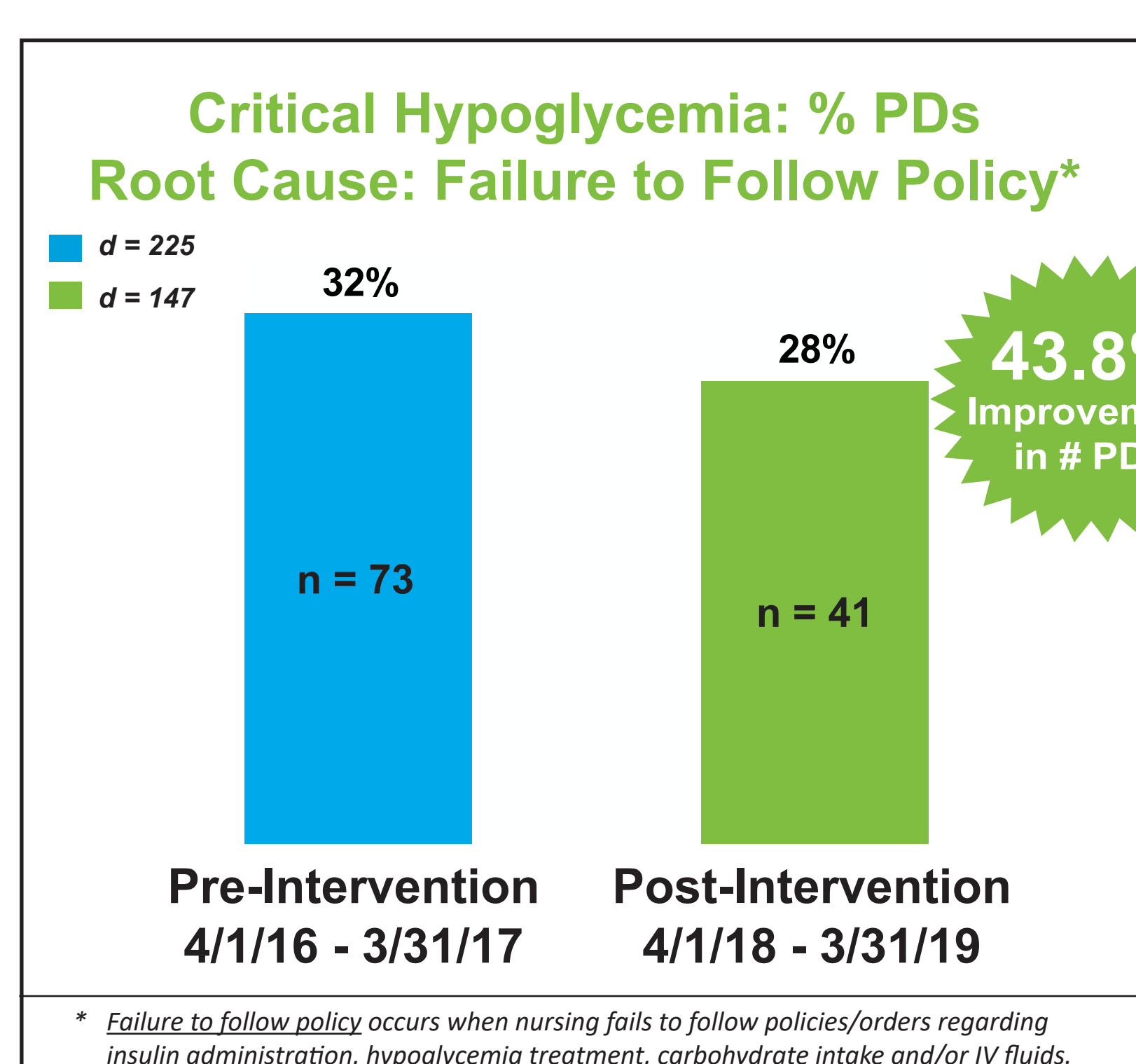
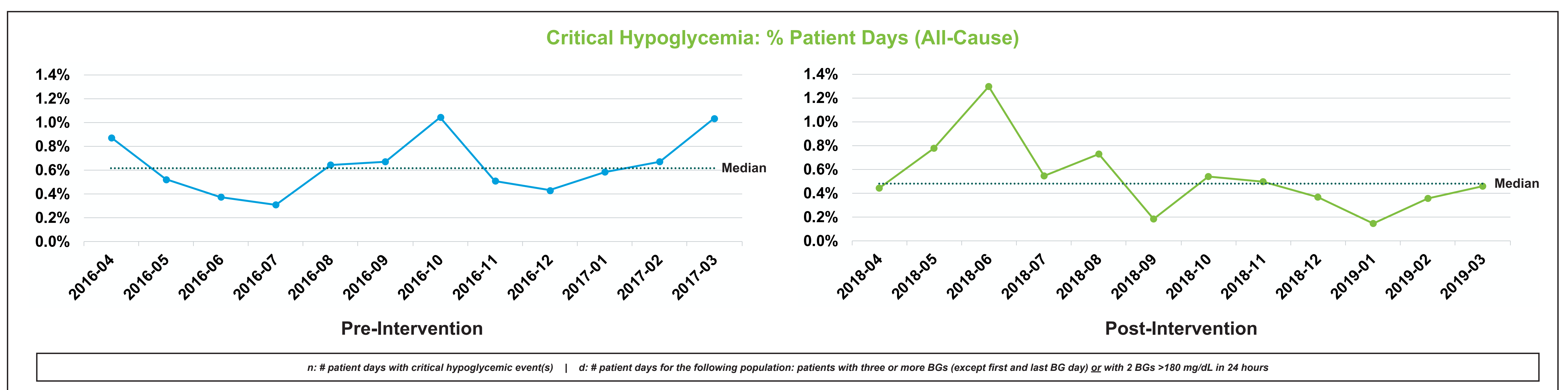
Critical Hypoglycemic Patient Days <40 mg/dL: Root Cause	Pre-Intervention	Post-Intervention
Total # Patient Days: All-Cause	225	147
Total # Patient Days: Non-Preventable	72	90
Total # Patient Days: Preventable	153	57

Education
Jan 2017 - Diabetes education for nursing champions
Oct 2017 - eGlycemic Management System® training for providers and nurses
Nov 2017 - Diabetes and insulin education for nurses
Feb 2018 - Carb counting education for nurses

Accountability
May 2017 - Implementation of hypoglycemia audit tool
Nov 2017 - Review of provider and nursing opportunities by leadership
Nov 2017 - Development of structured accountability model for providers & nurses

Workflow & Policies
Dec 2017 - Go live of eGlycemic Management System® for IV & SubQ insulin dosing
Dec 2017 - Update of insulin management policies
Mar 2018 - Implementation of carb counting on menus

RESULTS



CONCLUSIONS

A comparison of pre-intervention data (April 1, 2016 - March 31, 2017) to post-intervention data (April 1, 2018 - March 31, 2019) revealed we reduced all-cause critical hypoglycemia <40 mg/dL by 16.9% of patient days (from 0.65% to 0.54%). The most significant improvements were associated with four areas of targeted interventions: (1) failure to follow policy, (2) stacking insulin, (3) wrong insulin dose, and (4) failure to adjust insulin. We attribute our success to clinical practice changes and quality improvement initiatives coupled with the implementation of a technology-enabled approach to intravenous infusion and subcutaneous basal-bolus insulin dosing using an eGlycemic Management System®.

We recommend that any hospital seeking to achieve best practice and clinical excellence in glycemic management perform a similar root cause analysis of critical hypoglycemic events, define the most appropriate targeted interventions, and utilize education, accountability, workflow and policy measures to achieve their goals.

AFFILIATIONS

1. AdventHealth Waterman, Tavares, FL
2. AdventHealth Corporate, Altamonte Springs, FL
3. Glytec, Waltham, MA and Greenville, SC