

Glytec®

**TIME TO
TARGET**



*Uniting Around
Patient Safety*

Return on Investment Financial Benefits of Optimal Glycemic Management

Jordan Messler, MD, SFHM, FACP

LaTivia Carr, RN, MSN, NEA-BC

Priyathama Vellanki, MD

10.27.2021



Speakers



Jordan Messler, MD, SFHM, FACP
Chief Medical Officer, Glytec



LaTivia Carr, RN, MSN, NEA-BC
Vice President and Chief Nursing
Officer, Riverside Healthcare



Priyathama Vellanki, MD
Associate Professor, Division of
Endocrinology, Metabolism &
Lipids, Emory University School of
Medicine



PREVENT HYPOGLYCEMIA
TREAT HYPERGLYCEMIA

Impact of Preventable Hypoglycemia

Common, Costly, Largely Preventable

Common

- 20% patients in the hospital with <70 mg/dl

Preventable

- 40% patients with hypoglycemia have a repeat event

Costly

- Severe hypoglycemia tied to excess costs up to \$21K per episode

Hypoglycemia Impact on Costs


Advent Health

\$10,405

**COST PER SEVERE
HYPO EVENT**

Cost of Not Preventing
Severe Hypoglycemia²

\$33,560

**COST FOR 1
RECURRENT SEVERE
HYPO EVENT**

Cost of Allowing
Hypoglycemia to
Recur


Kaweah Delta
HEALTH CARE DISTRICT

\$2,934

SAVINGS

Per hypoglycemic event¹

Impact of Untreated Hyperglycemia

Common

- 38% patients in the hospital with DM or hyperglycemia

Treatment Concerns

- Hyperglycemia often not treated
 - SSI alone commonly used
 - Often cited: "fear of hypoglycemia"

Patient Safety Impact

- Hyperglycemia is associated with morbidity and mortality

Hyperglycemia Reduction Results with eGMS



Tighter Glycemic Control

40% improvement of BGs in target range (80-120), patients on IV insulin in ICU¹



Time to Target Range

5 hours median time to target BG for DKA patients on IV insulin²

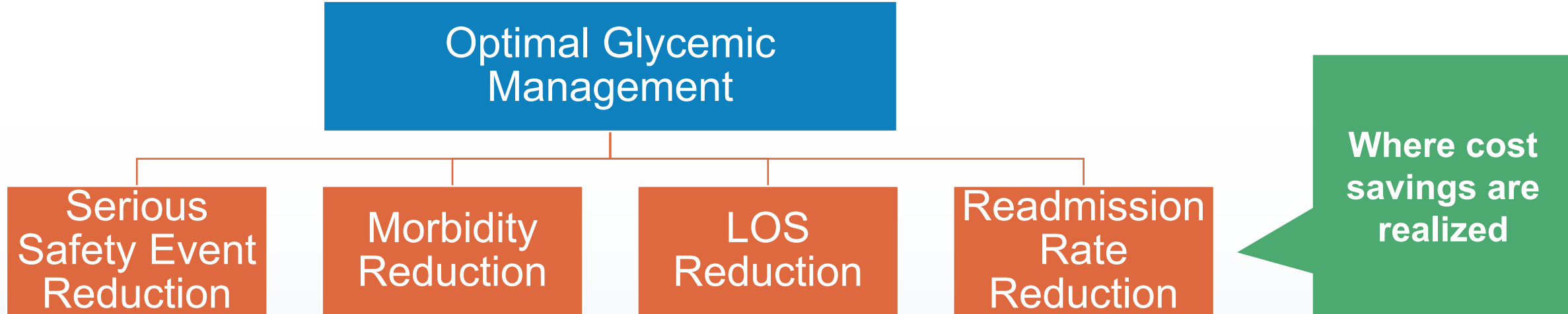


Hyperglycemia management

BBI managed with Glucommander SubQ: target range (140-180) 81% of BGs, no severe hypo³



Impact of Glycemic Management on Broader Health System Goals





FINANCIAL BENEFITS OF OPTIMAL GLYCEMIC MANAGEMENT

Optimal Glycemic Management:

Improves Patient Safety and Reduces Costs

HYPOGLYCEMIA	Reduction in Severe Hypoglycemia	\$2,934 per case
CABG	Improvement in Hyperglycemia: Tighter Control (100-140 mg/dl)	\$3,654 per case
NEW OPEN ICU BED-DAYS	Improved Time to Target	0.26 LOS reduction

Projections Based on 400 Beds with Glytec eGMS



279 Fewer Severe Hypoglycemia (40 mg/dL) Events Per Year



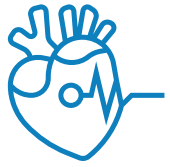
Severe Hypoglycemia Reduction with Glucommander IV

# Severe Hypoglycemia (40 mg/dL) Events Per Year	372
% Severe Hypoglycemia Reduction With Glytec eGMS®	75%
# Severe Hypoglycemia Events Avoided Per Year With Glytec eGMS®	279
Excess Cost Per Severe Hypoglycemia Event Avoided	\$2,934
Projected Annual Savings with Glytec eGMS®	\$818,586

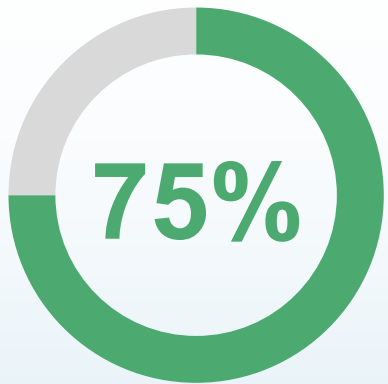
*Projected based on conservative estimates using real data

1. Newsom R, Patty C, Camarena E, et al. Safely Converting an Entire Academic Medical Center From Sliding Scale to Basal Bolus Insulin via Implementation of the eGlycemic Management System. J Diabetes Sci Technol. 2018;12(1):53-59. doi:10.1177/1932296817747619
2. Rabinovich, M., Grahl, J., Durr, E., Gayed, R., Chester, K., McFarland, R., & McLean, B. (2018). Risk of Hypoglycemia During Insulin Infusion Directed by Paper Protocol Versus Electronic Glycemic Management System in Critically Ill Patients at a Large Academic Medical Center. Journal of Diabetes Science and Technology, 12(1), 47–52.

Projections Based on 400 Beds with Glytec eGMS



586 CABG
Per Year With
Lower Cost of
Care



CABG Treated with Glytec eGMS[®] and Intensive IV Insulin Control

# CABG Per Year	782
% CABG Treated With Glytec eGMS [®] and Intensive IV Insulin Control	75%
# CABG Per Year Treated With Glytec eGMS [®] and Intensive IV Insulin Control	586
Excess Cost Per CABG Treated With Glytec eGMS [®] and Intensive IV Insulin Control	\$3,654
Projected Annual Savings with Glytec eGMS[®]	\$2,141,244

*Projected based on conservative estimates using real data

Cardona S, Pasquel FJ, Fayfman M, et al. Hospitalization costs and clinical outcomes in CABG patients treated with intensive insulin therapy. Journal of Diabetes and Its Complications. 2017 Apr;31(4):742-747. DOI: 10.1016/j.jdiacomp.2017.01.003.

Projections Based on 400 Beds with Glytec eGMS

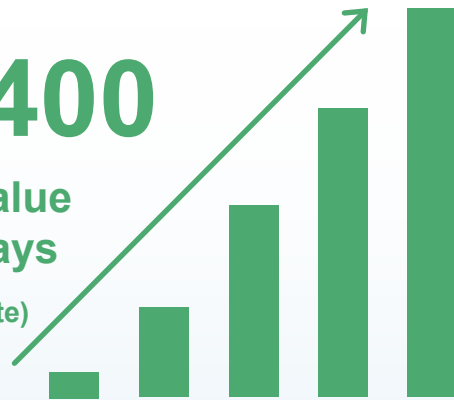


288 Additional Open ICU Bed Days Per Year

\$158,400

Throughput Value
for ICU Bed Days

(Conservative estimate)



# Insulin-Requiring Patients Per Year With ICU Stay	1,108
# ICU Days Avoided Per Insulin-Requiring Patient With Glytec eGMS®	0.26
# of Additional ICU Bed Days OPEN Per Year With Glytec eGMS®	288
Throughput Value for ICU Bed Days	\$550
Projected Annual Savings with Glytec eGMS®	\$158,400

1. Gaines M, Pratley R, Tanton D. Financial Implications of Poor Glycemic Management & Improvement Strategies for Optimal Outcomes. IHI National Forum on Quality Improvement in Health Care. 2018.
2. Newsom R, Patty C, Camarena E, et al. Safely Converting an Entire Academic Medical Center From Sliding Scale to Basal Bolus Insulin via Implementation of the eGlycemic Management System. J Diabetes Sci Technol. 2018;12(1):53-59.
3. Ellison A. Average hospital expenses per inpatient day across 50 states. Becker's Hospital Review. 2019.

Optimal Glycemic Management: Improves Patient Safety and Reduces Costs

Projections Based on 400 Beds with Glytec eGMS

HYPOGLYCEMIA	279 Fewer Severe Hypoglycemia (<40 mg/dL) Events Per Year	\$818,586
CABG	586 CABG Procedures with a Lower Cost of Care	\$2,141,244
NEW OPEN ICU BED-DAYS	288 Additional Open ICU Bed-Days Per Year	\$158,400
Projected Annual Savings for 400 Beds with Glytec eGMS®		\$3,279,600

* Based on average 400 bed hospital or hospital system, conservative estimates based on published study data

Results of switching to Glytec's eGMS⁹

\$9M

Glytec's eGMS helped
save Kaweah Delta
**over \$9 million
annually**



71%

Reduction in hypoglycemic patients during stay



24%

Reduction in average length of stay



33%

Reduction in hyperglycemic patients during stay



64%

Reduction in point-of-care BG tests



RIVERSIDE HEALTHCARE

Cost Savings Case Study



LaTivia Carr, RN, MSN, NEA-BC

**Vice President and Chief Nursing Officer,
Riverside Healthcare**



Acute Care

300-bed hospital

- Level 2 Trauma Center
- Stroke Certified
- Chest Pain Certified
- Heart Failure Certified
- Inpatient Behavioral Health
 - Pediatric
 - Adult
 - Senior

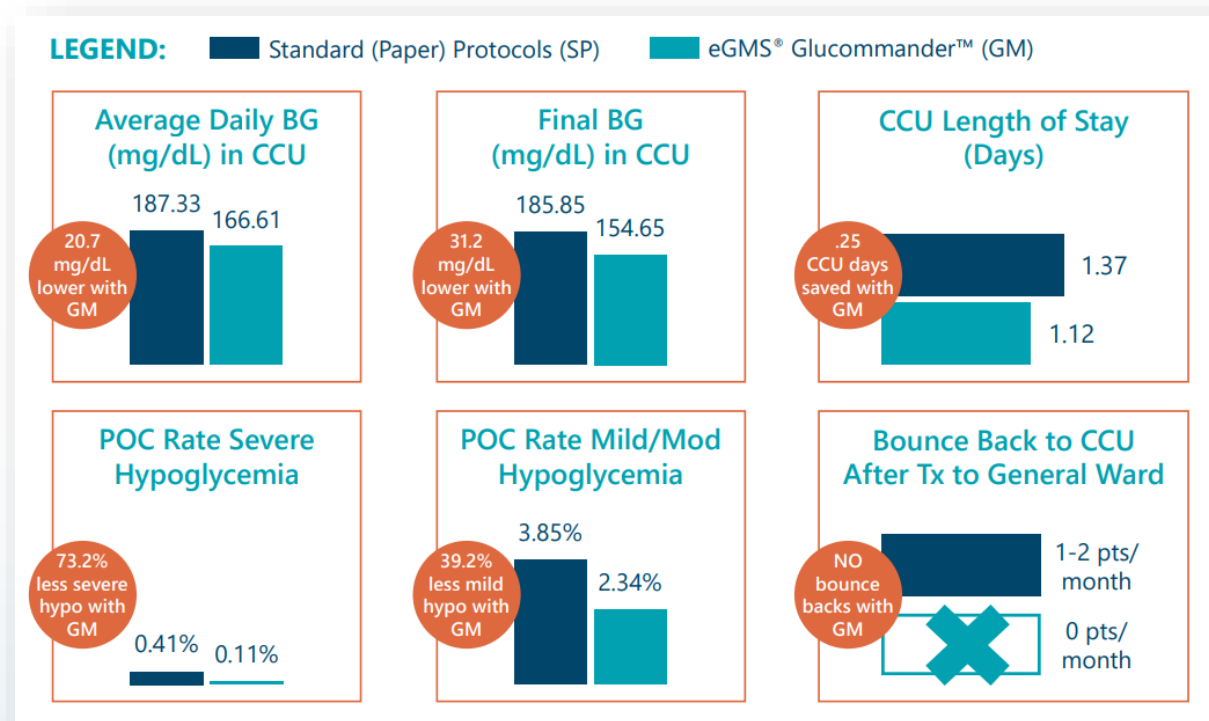


How do clinical and financial outcomes differ between patients whose insulin titrations were managed using Glucommander software and patients whose insulin titrations were managed using standard (paper) protocols, with a focus on COPD, CHF and DKA populations?

Clinical Outcomes

Evaluating the Impact of Glucomander on Length of Stay, Hypoglycemia and Glucose Control

- Retrospective quality improvement study
- Critical care units of a 300-bed regional medical center
- 12 months of data (11/1/16-10/31/17)
- Population: 382 patients requiring glucose management with intravenous and/or subcutaneous insulin
 - Glucomander (GM): n= 174
 - Standard (paper) protocols (SP): n = 208



Outcomes that translate to cost savings



18% lower CCU LoS

- CCU length of stay index was 1.12 days with GM vs 1.37 days with SP.



73% fewer BGs <40

- Point-of-care rate of severe hypoglycemia was 0.11% with GM vs 0.41% with SP



No CCU Bounce-backs

- Bounce-back rate for transfers from the CCU to general wards was zero patients per month with GM vs 1-2 patients per month with SP over the 12 months prior.

LOS Cost Savings Case Study

Cost Savings Estimate – Length of Stay (LOS)

Patients with Diabetes and on
Glucomander

Seeing an average 0.25%
reduction in LOS

* 2016 Illinois new bed state
cost: \$2,460

SAVINGS

3,500 patients

\$2,152,500

Severe Hypoglycemia Cost Savings Case Study

Cost Savings Estimate – Hypoglycemia IV and SubQ

If Riverside's baseline remains at 0.41% at a cost of \$2,934 per patient <40 = ~\$545k in savings

SAVINGS

IV <40 reduction	\$237,654
SQ <40 reduction	\$307,102
Total	\$544,756

Key Takeaways



Multimodal Engagement

- Patient
- Provider
- Nurse
- Ancillary

Workflow Optimization

- Standardized Order Sets
- Custom Order Algorithm
- Nurse Driven Protocols
- EMR integration

Data Transparency

- Dashboard Utilization
 - Data drives change!
- Review
 - Real Time
 - Weekly
 - Monthly
 - Quarterly



GLUCO-CABG STUDY

Case Study



EMORY
UNIVERSITY
SCHOOL OF
MEDICINE

Priyathama Vellanki, MD

**Associate Professor, Division of Endocrinology,
Metabolism & Lipids, Emory University School of
Medicine**

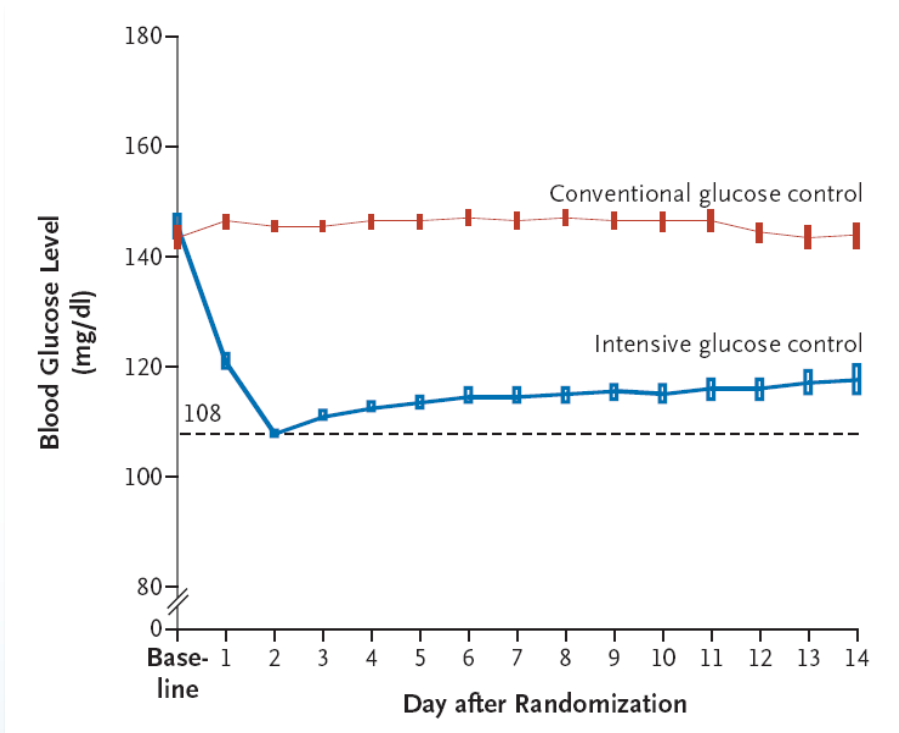




What are the clinical and cost advantages of managing CABG patients in a blood glucose range of 100-140 mg/dL (intensive control), compared to the standard practice of targeting 141-180 mg/dL (conservative control)?

The NICE-SUGAR Study

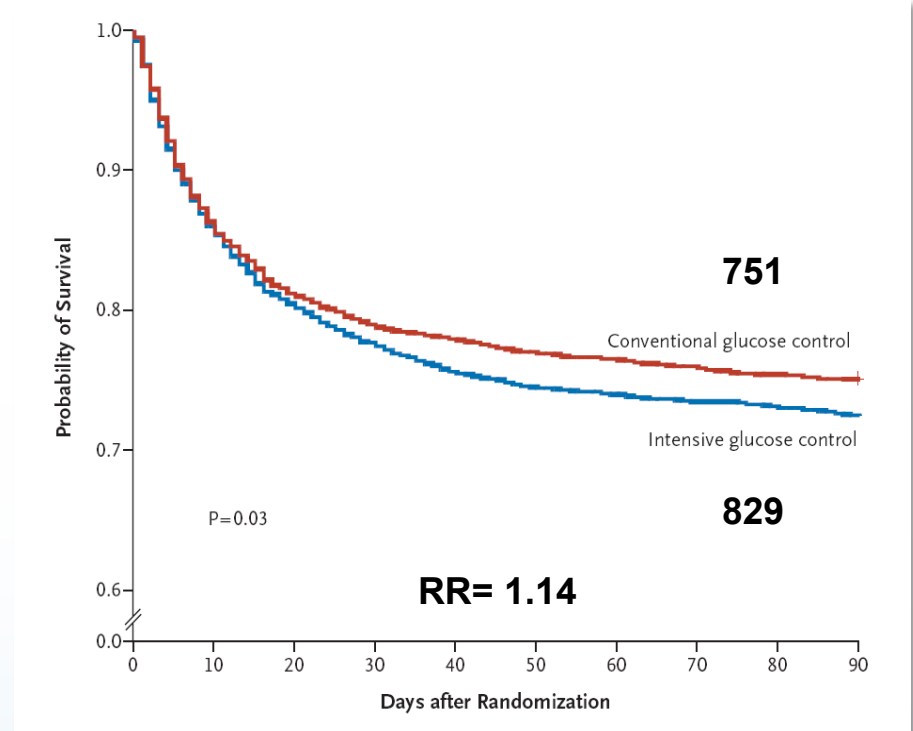
Blood Glucose Level, According to Treatment Group



IIT goal: 81 – 108 mg/dL
(mean BG 118 mg/dL)
CIT goal: <180 mg/dL
(mean BG 145 mg/dL)

NICE-SUGAR Trial. N Engl J Med. 360:1283-1297, 2009.

Probability of Survival

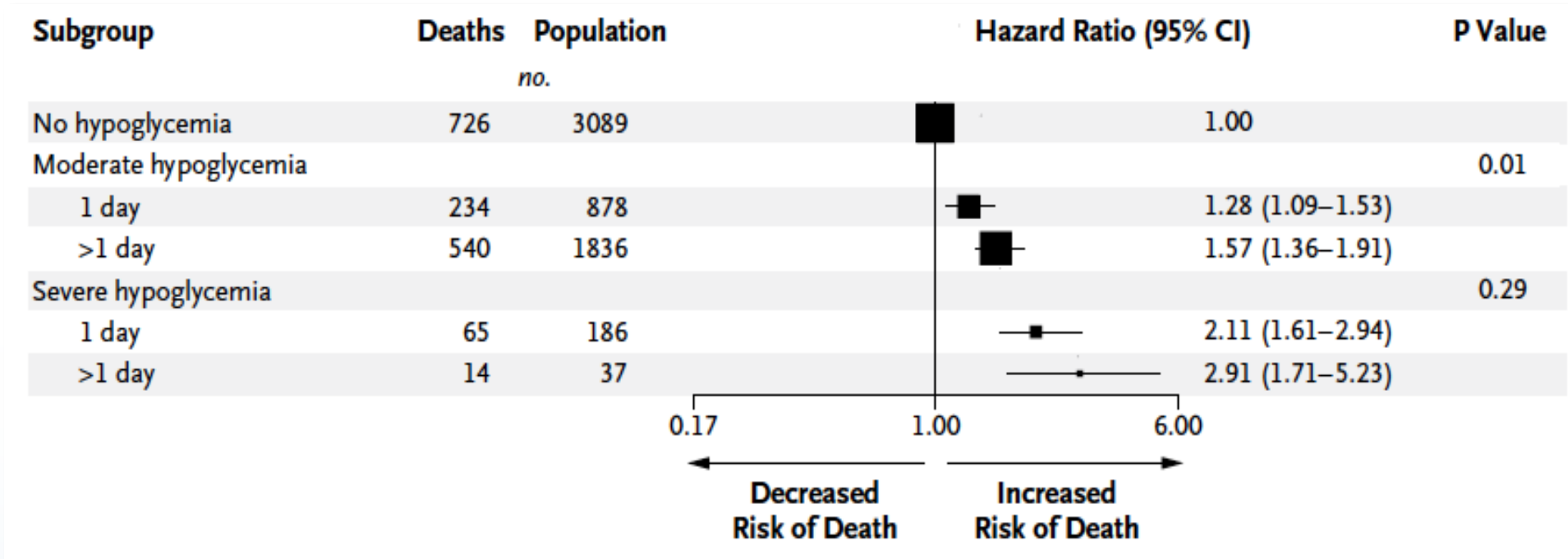


90 days: Absolute mortality difference of 2.6%
(95% CI, 0.4 to 4.8);
Odds ratio for death with IIT: 1.14 (95% CI,
1.02 to 1.28; p = 0.02).

N=6026 patients

NICE-SUGAR Trial: Hypoglycemia and Mortality

Hazard Ratio for Death According to the Occurrence of Hypoglycemia on 1 Day or More Than 1 Day



N=6026 patients: 2714 (45.0%) had moderate hypoglycemia.

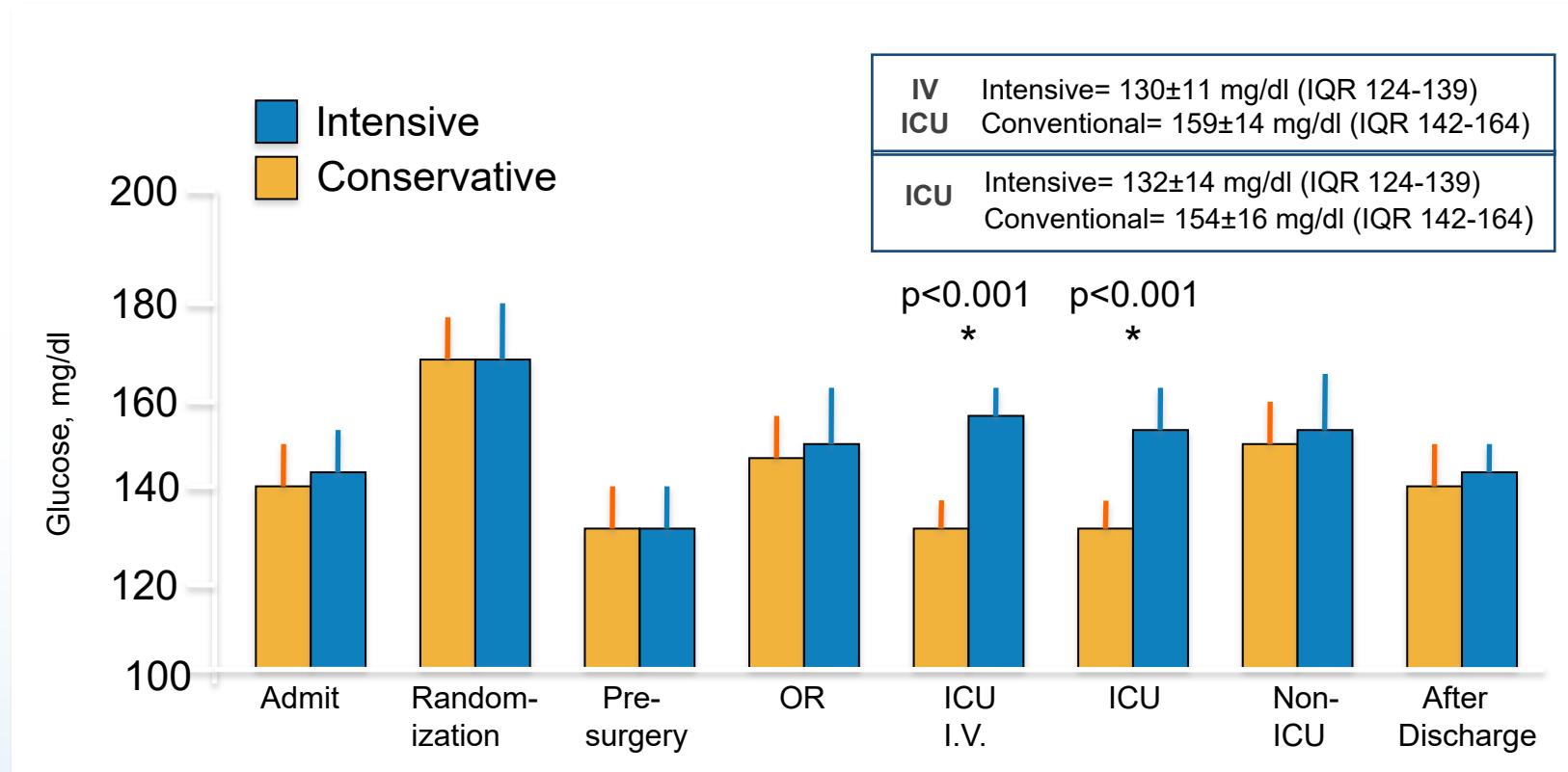
Mortality was 23.5% in subjects with no hypoglycemia, 28.5% with moderate and 35.4% with severe hypoglycemia. Adjusted HR for death among patients with moderate and severe hypoglycemia vs no hypoglycemia= 1.41 (95% CI, 1.21 to 1.62; P<0.001) and 2.10 (95% CI, 1.59 to 2.77; P<0.001), respectively.

The NICE-SUGAR Study Investigators. N Engl J Med 2012;367:1108-1118

GLUCO-CABG Trial | Perioperative Blood Glucose Concentration

Are there advantages to keep CABG patients in a blood glucose range of 100-140 mg/dL, compared to the standard practice of targeting 141-180 mg/dL?

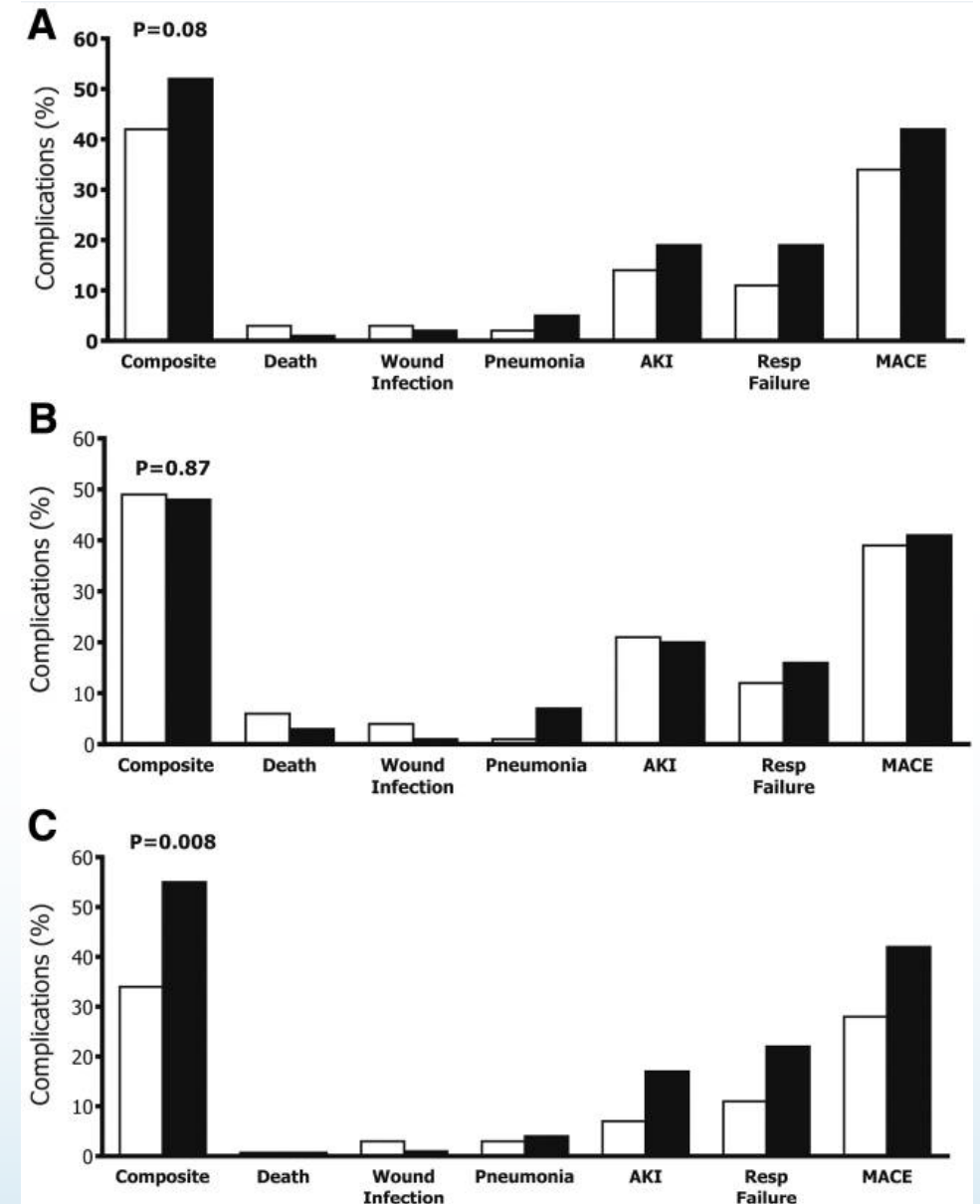
- Glucomander IV was used to achieve lower target BG without increasing the incidence of severe hypoglycemia.
- Tight control group:
 - Fewer perioperative complications
 - Reductions in average ICU length of stay
 - Lower resource utilization



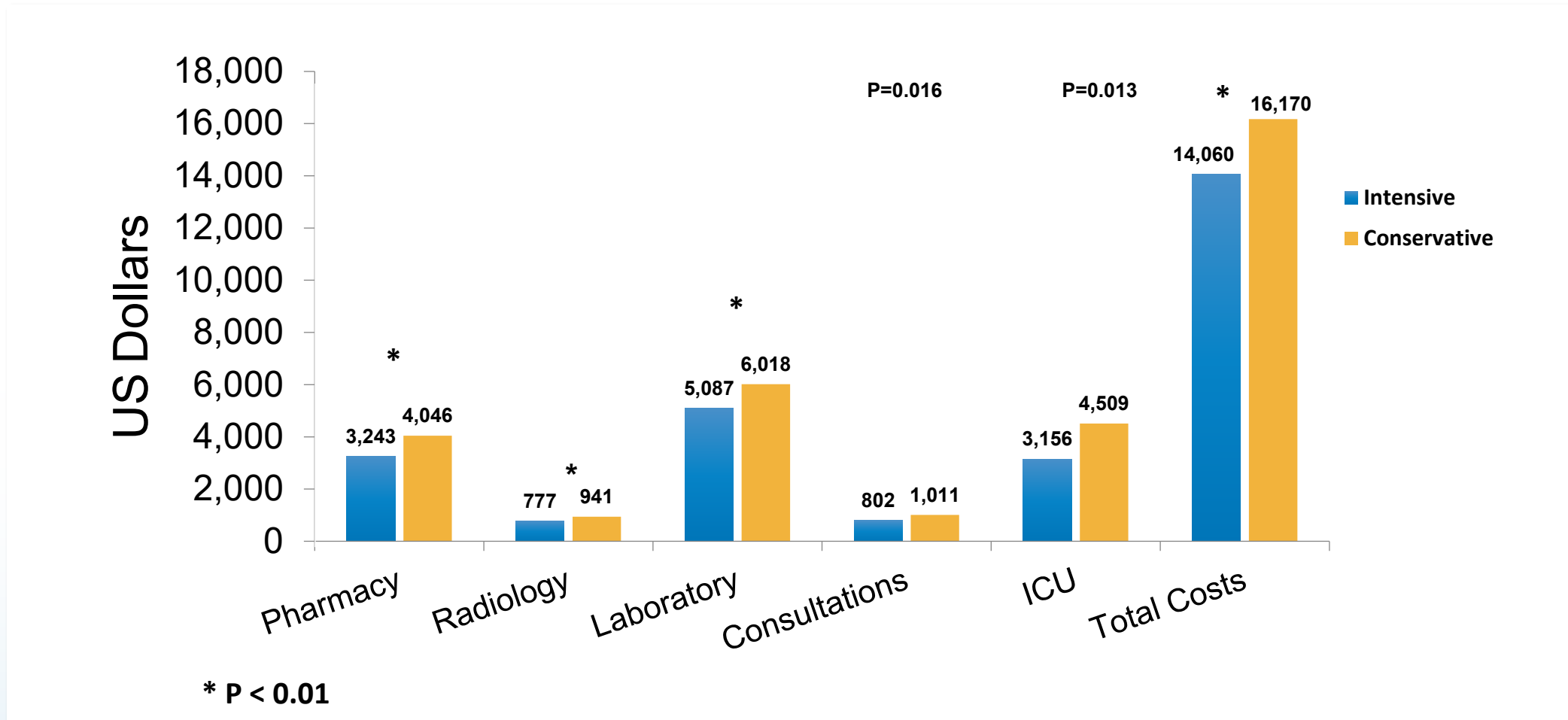
Data are means ± SEM
 Intensive (n=151): Target BG 100-140 mg/dl
 Conservative (n=151): Target BG 141-180 mg/dl

Composite of Perioperative Complications

- There were no differences in complication rates with intensive vs conservative control (*clear bars- intensive control, black bars- conservative control*)
- When subdivided by history of diabetes vs no diabetes
 - In participants without a history of diabetes (*Graph C*), intensive control resulted in lower complications compared to conservative control
 - In participants with a history of diabetes (*Graph B*), there were no differences in complications



Resources Costs (CMS)



Resource data expressed as median (IQR)

Intensive BG control resulted in a median cost savings of \$3,654 (95% CI: 1,780-3723)

Cost Savings with eGMS & Intensive Glycemic Control of CABG Patients

Tight control of CABG patients vs. previous standard practice

\$3,654

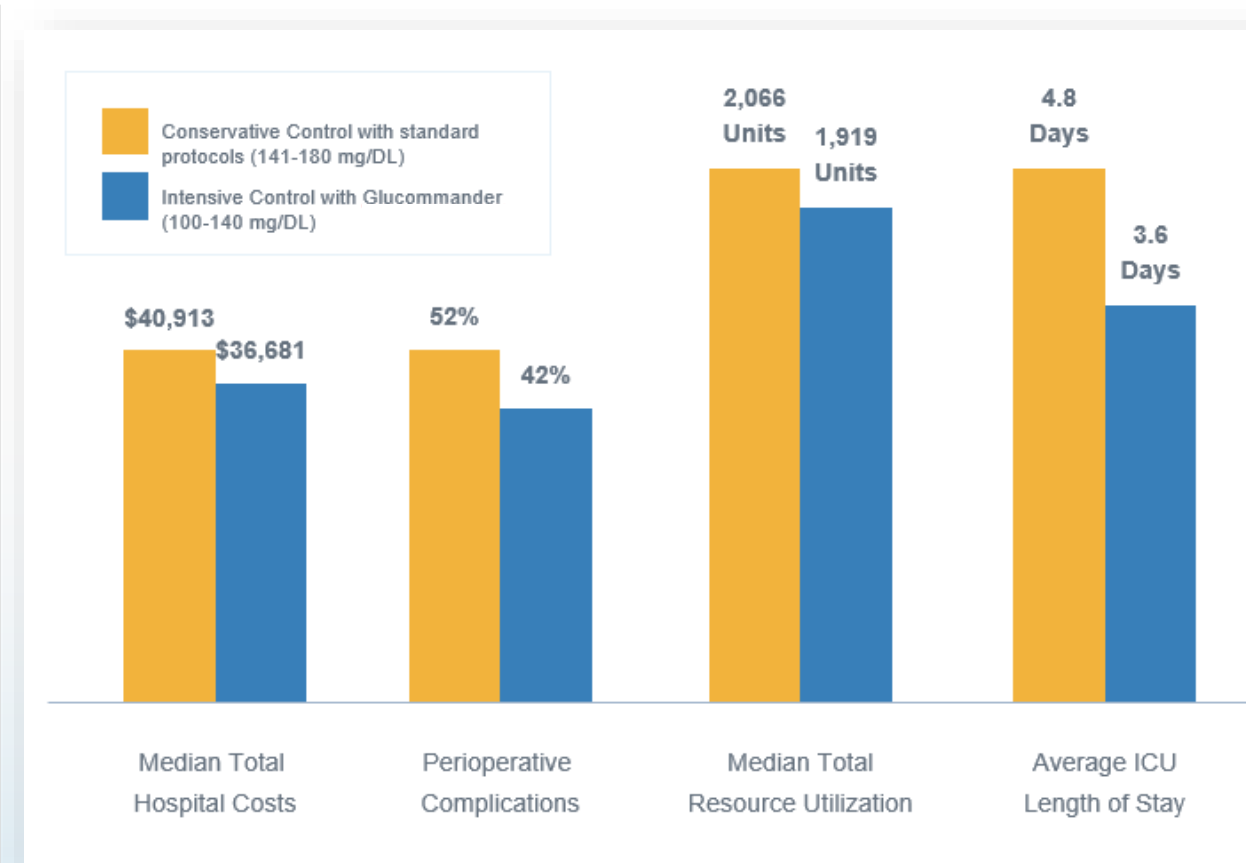
Average cost savings per CABG patient, achieved with intensive glycemic control

37% lower LoS

Intensive control with eGMS led to fewer perioperative complications, which reduces length of stay from 10.7 days by 4 full days.

20% fewer complications

Perioperative Complications were reduced from 52% to 42% of patients – a 20% reduction compared to the conservative control group.



Cost Savings Case Study

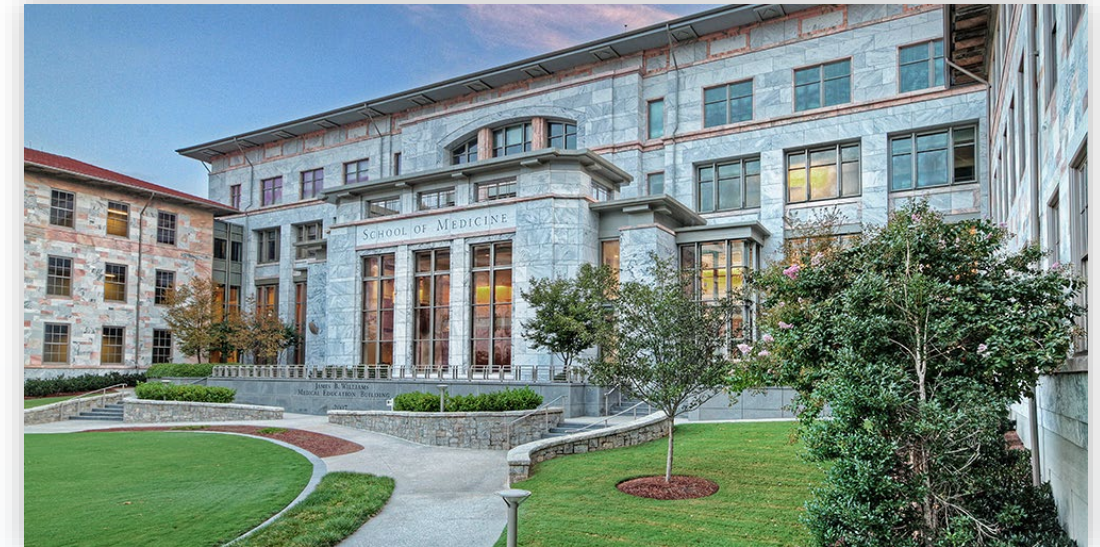


EMORY
UNIVERSITY
SCHOOL OF
MEDICINE

Priyathama Vellanki, MD

**Associate Professor, Division of Endocrinology,
Metabolism & Lipids, Emory University School of
Medicine**

(short bio or description of role, responsibilities,
specialty)



(brief healthcare system/facility info to provide
context)

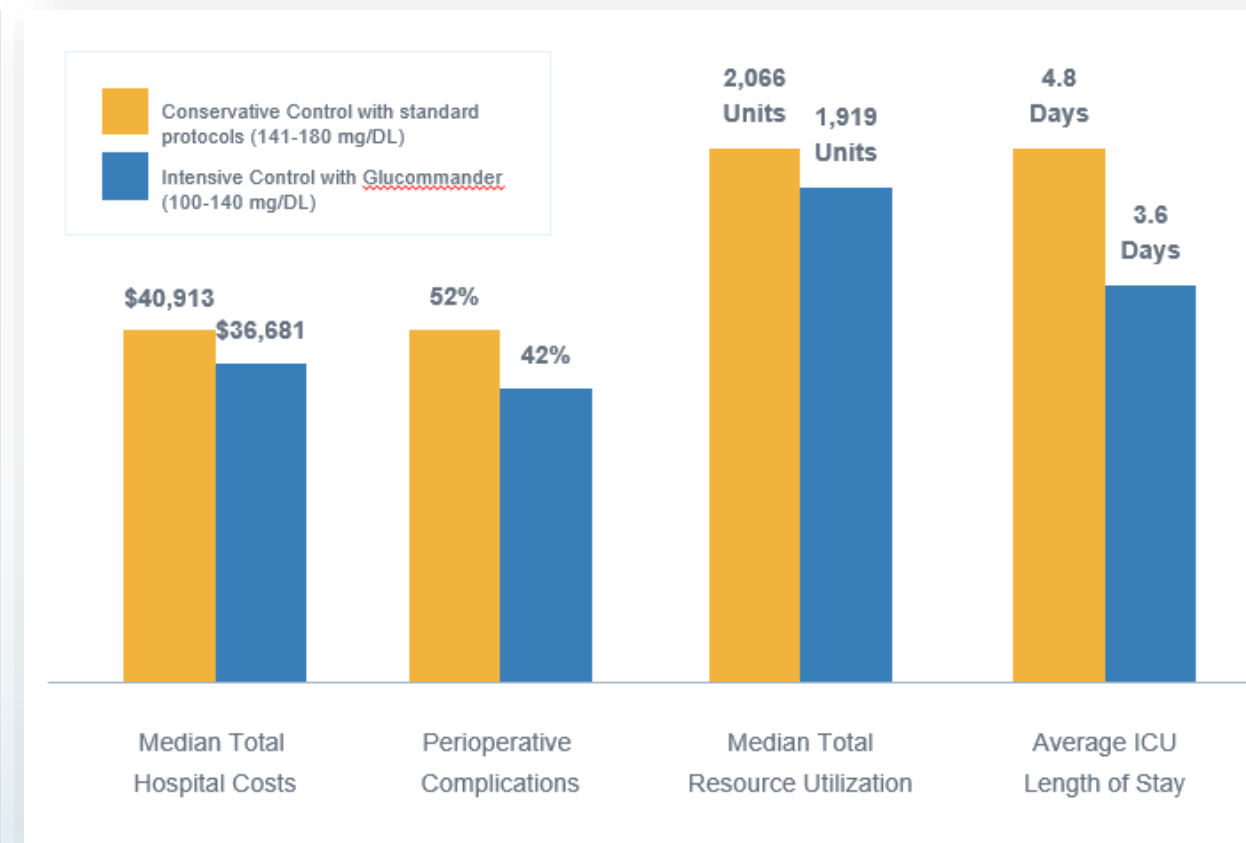


What are the clinical and cost advantages of managing CABG patients in a blood glucose range of 100-140 mg/dL (intensive control), compared to the standard practice of targeting 141-180 mg/dL (conservative control)?

Gluco-CABG Trial (2015)

Tight control of CABG patients vs. previous standard practice

- Are there advantages to keep CABG patients in a blood glucose range of 100-140 mg/dL, compared to the standard practice of targeting 141-180 mg/dL?
- Glucomander IV allowed clinicians to achieve lower target BG without increasing the incidence of severe hypoglycemia.
- Tight control group:
 - Fewer perioperative complications
 - Reductions in average ICU length of stay
 - Lower resource utilization



Cost Savings with eGMS & Intensive Glycemic Control of CABG Patients

COST SAVINGS

A follow-up post-hoc study of the results of the GLUCO-CABG trial asked whether there was a difference in cost of care between the intensive (100-140 mg/dL) and conservative (141-180 mg/dL) groups.

The results showed that intensive glycemic control of CABG patients led to significant reductions in hospitalization costs and resource utilization, with an average total cost savings of \$3,654 per case.

- Cost savings from:
 - LoS reduction
 - Hospitalization costs
 - Reduction in Perioperative complications
 - Resource Utilization

To break treatment inertia, we need safe tools to improve glycemic control with minimal risk of hypoglycemia. I think the GLUCO-CABG trial and other studies recently published have clearly indicated that improving glycemic control with minimal risk of hypoglycemia results in improved outcomes.

Dr. Guillermo E. Umpierrez, MD

\$3,654

Average cost savings per CABG patient, achieved with intensive glycemic control

37% lower LoS

Intensive control with eGMS led to fewer perioperative complications, which reduces length of stay from 10.7 days by 4 full days.

20% fewer complications

Perioperative Complications were reduced from 52% to 42% of patients – a 20% reduction compared to the conservative control group.

Thank you!



EMORY
UNIVERSITY
SCHOOL OF
MEDICINE

Priyathama Vellanki

priyathama.vellanki@emory.edu

Glytec®

**TIME TO
TARGET**  *Uniting Around
Patient Safety*