

## Background

- Hyperglycemia ( $\geq 140$  mg/dL) is reported to occur in 60-80% of patients undergoing cardiac surgery<sup>1</sup>
  - Prevention of hyperglycemia in the perioperative period is correlated with improved outcomes<sup>2,3</sup>:

↓ Incidence of Wound Infection	↓ Incidence of Acute Kidney Injury
↓ Hospital Length of Stay	↓ Mortality

- Recommendations from Society of Thoracic Surgeons - Guidelines for Blood Glucose Management During Adult Cardiac Surgery<sup>4</sup>:
  - Maintain blood glucose  $> 180$  mg/dL perioperatively
  - Utilize IV insulin for at least 24-48h postoperatively → transition to subcutaneous insulin
  - Ideally a standard institutional protocol is used to facilitate transition

## Objective

- Analyze efficacy and safety of pharmacy managed protocol for conversion of intravenous to subcutaneous insulin in adult cardiac surgery patients

## Methods

- Data Collection Range:**
  - Pre-protocol:** November 1, 2021 – August 30, 2022
  - Post-protocol:** November 21, 2022 – March 30, 2023
- Patient data was identified utilizing the electronic health record integrated surgical scheduler

### Inclusion Criteria:

- $\geq 18$  years of age
- Open heart surgery (AVR, CABG, MVR, SMVR)
- Received postoperative insulin infusion
- Primary Outcome:**
  - Achievement of target glycemic goals (70-180 mg/dL) in the 48 hours after transition from intravenous to subcutaneous insulin
- Secondary Outcomes:**
  - Hypoglycemic events (glucose  $< 70$  mg/dL), duration of intravenous insulin infusion, insulin glargine dosage, and incidence of atrial fibrillation

## Preliminary Results

Baseline Characteristics		
	Pre-Protocol (N=141)	Post-Protocol (N=54)
Age, yr (SD)	68.6 (9.5)	68.7 (9.8)
Female, n (%)	47 (33.3)	15 (27.8)
CABG, n (%)	116 (82.3)	43 (79.6)
Body Mass Index, (SD)	29.1 (6.1)	28.5 (6.6)
Diabetic History, n (%)	63 (44.6)	27 (50)
Preoperative HbA1c, % (SD)	6.6 (1.6)	6.7 (1.6)

Primary Outcome		
	Pre-Protocol (N=141)	Post-Protocol (N=54)
Glucose Readings in Goal – Diabetic, n (%)	423 (72.4)	196 (76.3)
Glucose Readings in Goal – Nondiabetic, n (%)	558 (94.9)	195 (96.1)

Secondary Outcomes		
	Pre-Protocol (N=141)	Post-Protocol (N=54)
Hypoglycemic Events, n (%)	4 (0.3)	2 (0.4)
Time on Insulin Drip, h (SD)	38.1 (24.8)	33.3 (15.4)
Insulin Glargine Dose, units (SD)	8.8 (10.3)	12.5 (10.6)
Acute Kidney Injury, n (%)	73 (51.8)	27 (50)
Atrial Fibrillation, n (%)	56 (39.7)	26 (48.1)

## Discussion

- Patient groups are relatively well matched at baseline, with the exception of more patients in the post-protocol group having diabetic history (44.6% vs 50%)
- Primary Outcome:**
  - Amount of glucose readings within goal range (70-180 mg/dL) has improved by 3.9% in the post-protocol group vs pre-protocol group
- Secondary Outcomes:**
  - Reassuring regarding safety of protocol as there was a similar incidence of hypoglycemic events between groups
  - Decrease in time on insulin drip + increase in insulin glargine dose show positive trend toward achievement of more efficient patient transitions and improved initial insulin coverage

## Conclusion

- Education:** Ensuring that the entire team (pharmacist, physician, and nurse) are all aware of how to utilize protocol to optimize patient glycemic control
- Further Research:** Medication use evaluation to validate appropriate use of the pharmacist managed insulin transition protocol
- Overall outcomes and possible protocol improvements pending final results

## References

- Galindo RJ, Fayfman M, Umpierrez GE. Perioperative Management of Hyperglycemia and Diabetes in Cardiac Surgery Patients. *Endocrinol Metab Clin North Am.* 2018;47(1):203-222. doi:10.1016/j.ecl.2017.10.005
- Elizabeth W. Duggan, Karen Carlson, Guillermo E. Umpierrez; Perioperative Hyperglycemia Management: An Update. *Anesthesiology.* 2017; 126:547-560
- McAlister FA, Man J, Bistritz L, et al. Diabetes and coronary artery bypass surgery: an examination of perioperative glycemic control and outcomes. *Diabetes Care.* 2003;26(5):1518-24
- Lazar HL, McDonnell M, Chipkin SR, et al. The Society of Thoracic Surgeons practice guideline series: Blood glucose management during adult cardiac surgery. *Ann Thorac Surg.* 2009;87(2):663-669