Efficacy of Pharmacy Managed Conversion of Intravenous to Subcutaneous Insulin in Cardiac Surgery Patients

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Background

- Hyperglycemia (≥ 140 mg/dL) is reported to occur in 60-80% of patients undergoing cardiac surgery[1]
  - Prevention of hyperglycemia in the perioperative period is correlated with improved outcomes[2,3]:

↓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[4]:
  - 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:
- **≥ 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

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