

Effectiveness of Subcutaneous Insulin Regimens versus Intravenous Insulin Infusion Protocols on Glycemic Control in Critically Ill Patients

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BACKGROUND

- Appropriate glycemic control decreases mortality and secondary complications^{1,2}
- Current consensus guidelines in critically ill patients recommend intervention when blood glucose (BG) values exceed 150 mg/dL to maintain a value absolutely < 180 mg/dL³
- Data suggest that an increase in infection risk due to poorly controlled blood sugar is independent of diabetes in the ICU setting, meaning that large swings in patients' blood glucose levels are undesirable to all⁴
- There are lacking evaluations of glycemic control and patient outcomes using correctional dose insulin compared to continuous infusion protocols

END POINTS

Primary

- Percentage of blood glucose (BG) values within 70-180 mg/dL

Secondary

- Average overall BG
- Frequency of hypoglycemia
- Frequency of hyperglycemia

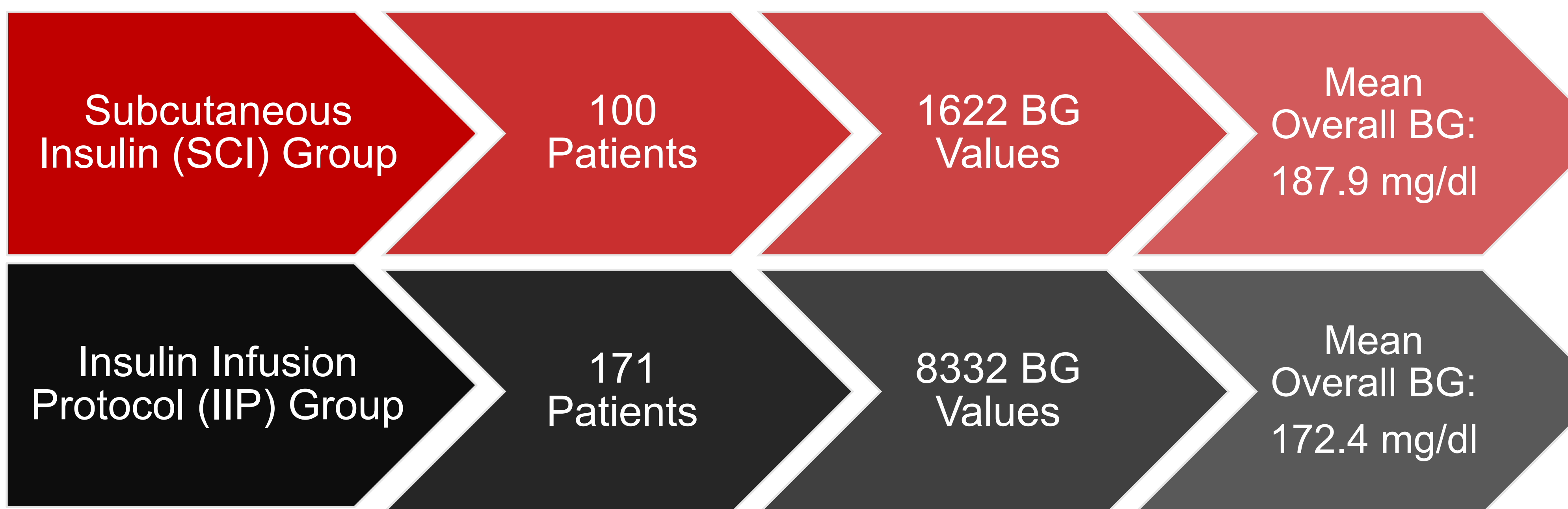
STUDY DESIGN

- Design: IRB-approved, retrospective, historical control⁵
- Time Frame: January 2020 – December 2020
- Setting: Adult intensive care unit
- Inclusion:
 - Age ≥ 18 years
 - Received insulin for > 24 hours
- Exclusion:
 - ICU length of stay < 48 hours
 - Patients admitted with hyperglycemic crisis
 - Patients admitted for hypoglycemia
 - Received insulin continuous infusion

RESULTS

Table 1: Baseline Demographics

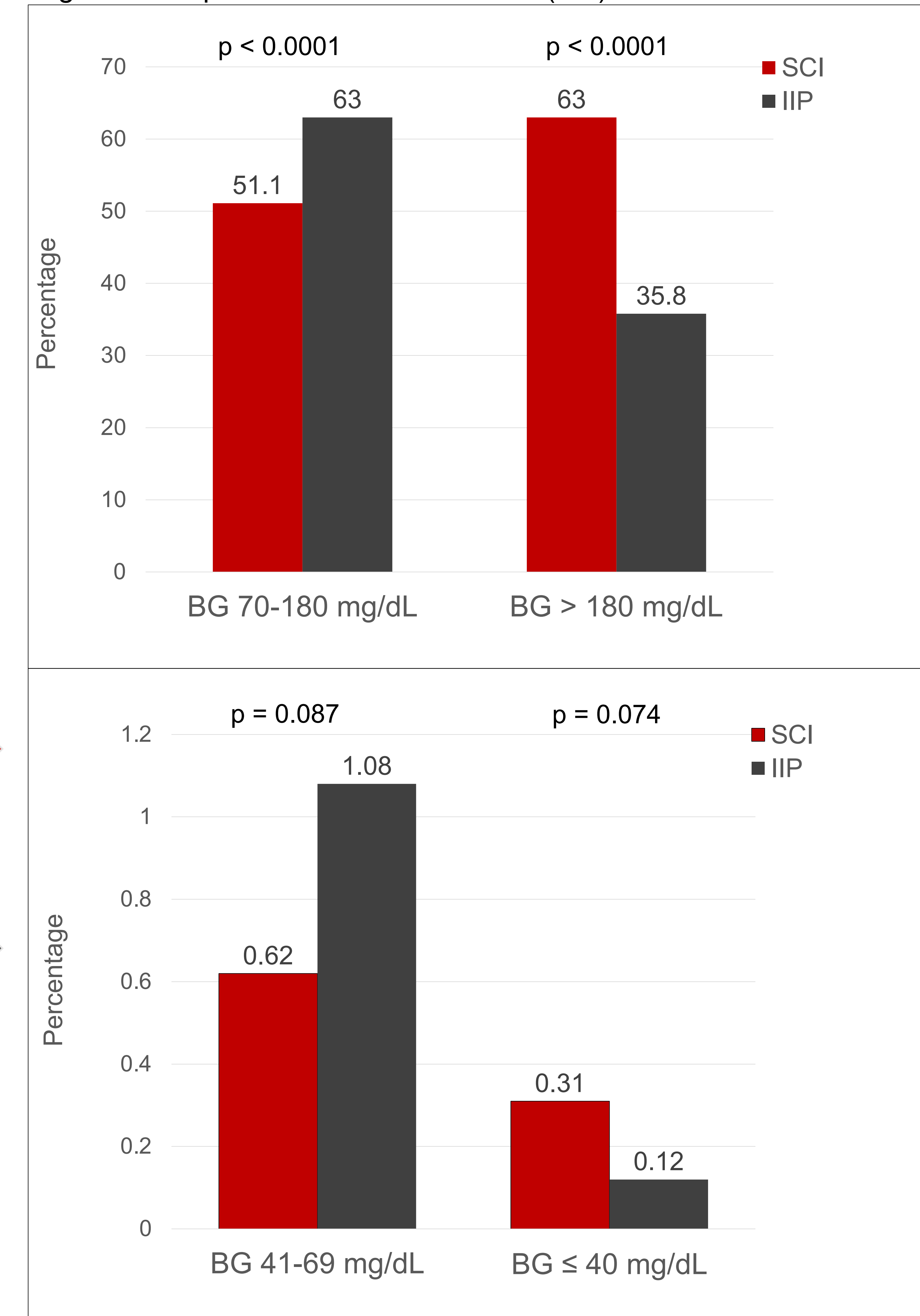
	Subcutaneous Insulin n = 100	Insulin Infusion Protocol (Historical Control) n = 171
Mean Age (Years)	64	70.3
Male Sex (%)	68 (68)	164 (95.9)
Race:		
African American	19 (19)	23 (13.4)
Caucasian	68 (68)	136 (79.5)
Other	13 (13)	12 (7.1)



CONCLUSIONS

- Use of a regular insulin infusion led to a greater number of blood glucose values within the goal range in a critically ill population compared to subcutaneously administered insulin
- Average overall blood glucose between the two groups was statistically significant (p = 0.002) and suggests using an IIP for better glycemic control
- Compared to a historical IIP, subcutaneous insulin resulted in greater glycemic variability with a 75% relative increase in hyperglycemia events and a nearly 3-fold increase in severe hypoglycemia events
- Use of regular insulin infusions may be beneficial in order to maintain goal blood glucose levels and prevent incidences of hyperglycemia

Figure 1: Proportions of Blood Glucose (BG) Values



REFERENCES

1. Finfer S, Chittock DR, Su SY, et al. Intensive versus conventional glucose control in critically ill patients. *N Engl J Med* 2009;360:1283-97
2. Clement S, Braithwaite SS, Magee MF, et al. Management of diabetes and hyperglycemia in hospitals.
3. Jacobi, Judith, et al. "Guidelines for the Use of an Insulin Infusion for the Management of Hyperglycemia in Critically Ill Patients." *Critical Care Medicine*, vol. 40, no. 12, 2012, pp. 3251-3276., doi:10.1097/ccm.0b013e3182653269
4. Donati, Abele, et al. "Glycaemic variability, infections and mortality in medical-surgical intensive care unit." *Critical Care and Resuscitation*, vol. 16, no.1, 2014, pp. 13-23.
5. Tran KK, Kibert JL 2nd, Telford ED, Franck AJ. Intravenous Insulin Infusion Protocol Compared With Subcutaneous Insulin for the Management of Hyperglycemia in Critically Ill Adults. *Ann Pharmacother*. 2019;53(9):894-898. doi:10.1177/1060028019841363