



Perioperative Glycemic Control in Post-Cardiac Surgery Patients

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Insulin Use – At home vs In-hospital

Background:

A number of studies have demonstrated that inpatient hyperglycemia is associated with increased morbidity and mortality in non-critically ill hospitalized patients (1). On admission to University of Ottawa Heart Institute (UOHI), the mean HbA1c is 8.9% and in hospital hyperglycemia persists. In patients undergoing coronary artery bypass grafting (CABG), a preexisting diagnosis of diabetes has been identified as a risk factor for postoperative sternal wound infections, delirium, renal dysfunction, respiratory insufficiency and prolonged hospital stays (2,3). Tight glycemic control (GC) via insulin infusion protocols (IIP) improves outcomes in post-operative cardiac surgery patients. Upon discontinuation of insulin infusion, glycemic control worsens increasing the risk of post-op infection and length of stay.

Objectives:

Primary Outcomes:

- 1) To evaluate glycemic management strategies post cardiac surgery following discontinuation of IIP
- 2) To measure post operative infection rates

Secondary Outcome:

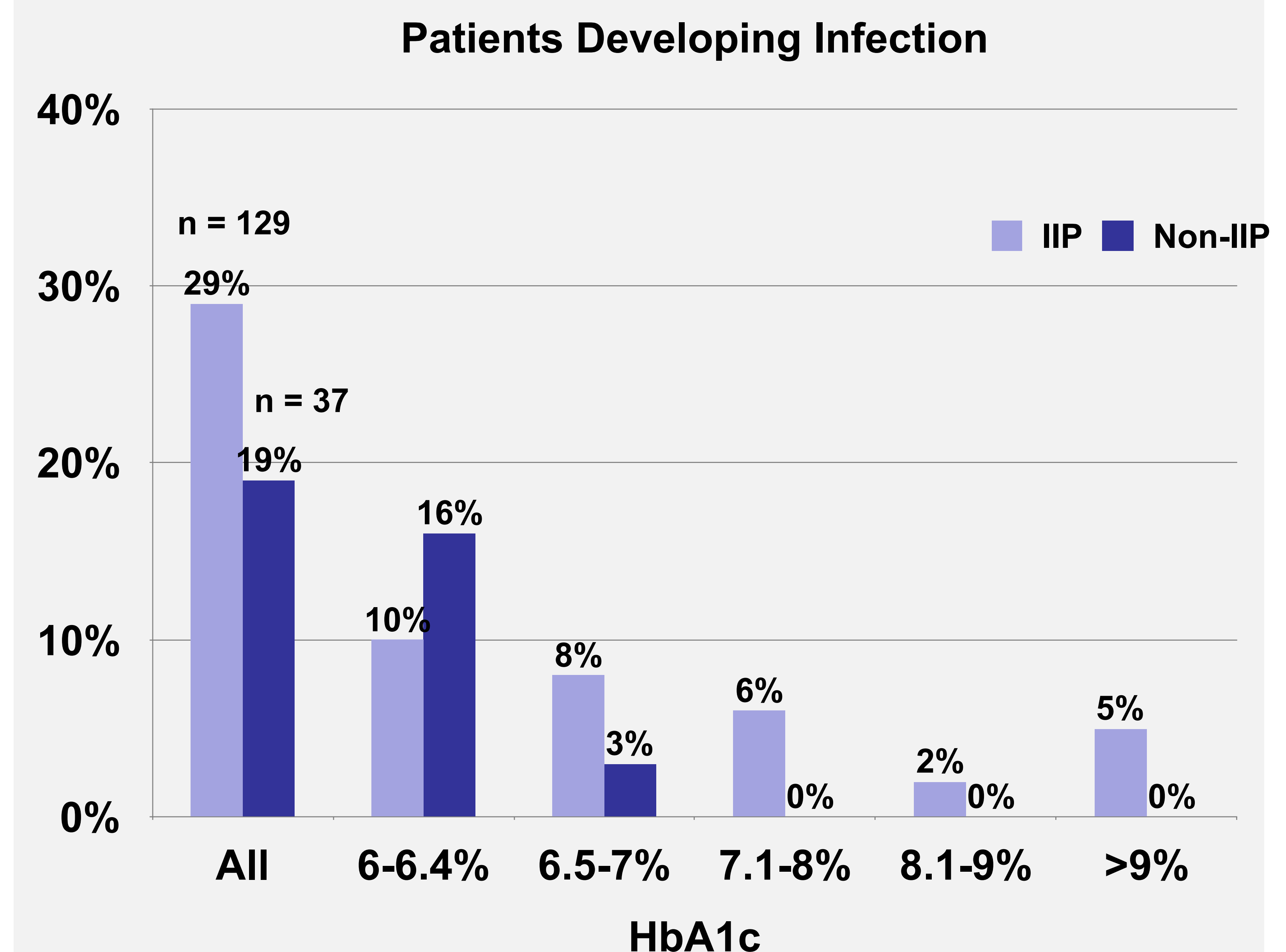
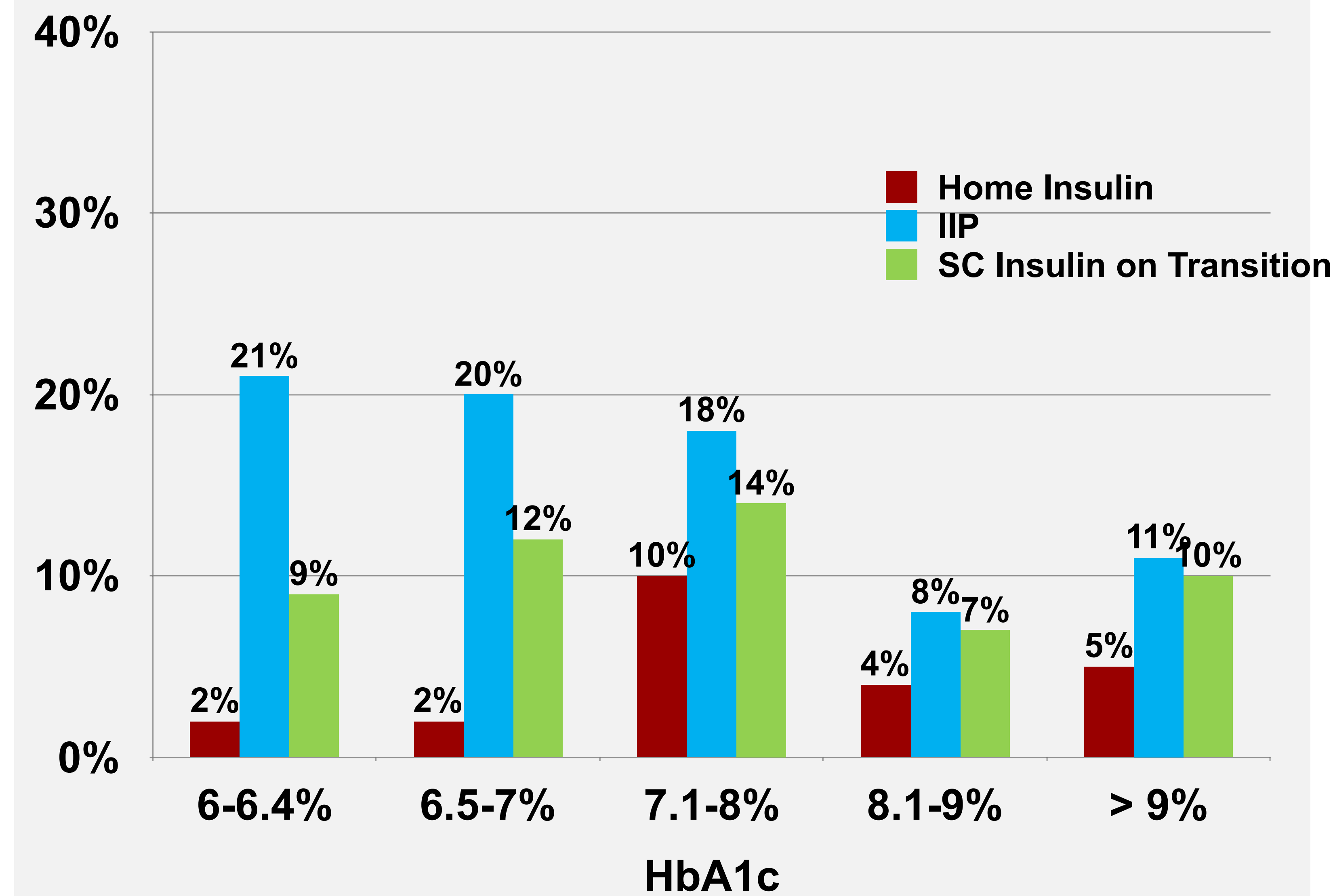
- 3) To create a standardized protocol to facilitate transition from IIP to subcutaneous (SC) insulin administration post cardiac surgery

Method:

We conducted a retrospective chart audit on patients admitted to the UOHI between June – August 2015 that met the **inclusion criteria** of undergoing open heart surgery & HbA1c \geq 6% pre-operatively. Glycemic control was evaluated while on insulin infusion protocol and for the 7 days following discontinuation of IIP. Post-op infection rate was measured at 90 days post surgery.

Results:

	N	%
# of patients who had surgery (Jun–Aug 2015)	355	-
Patients who met inclusion criteria	166	46.8%
Average age	68.2	-
Gender		
• Male	121	73%
• Female	45	27%
BMI	30.7	-
Procedure		
• CABG	98	59%
• CABG + other	35	21%
• Other	33	20%
% of patients on home insulin regimen	37	22.3%
% of patients on IIP	129	77.7%



Discussion:

Almost one third (27%) of cohort patients developed infection post-operatively. IIP patients with HbA1c of less than 6.5% were twice as likely to develop post-op infection compared to patients with HbA1c of more than 9%.

Interestingly, non-IIP infections were mainly seen in patients with HbA1c of 7% or less.

These findings suggest that a standardized approach for intra-operative IIP initiation needs to be established and **all patients** requiring IIP should be prescribed SC insulin upon transfer to the ward.

Hence, a multi-disciplinary taskforce developed a protocol to transition patients from IV insulin to SC insulin as follows:

Transition from IV Insulin to Subcutaneous Insulin (for Type 2 Diabetes ONLY):

At the time of transfer, if patient has had IV insulin infusion at a rate \geq 1 units/hr for each of the previous 4 hours then:

Calculate Total Daily Dose (TDD):

Last 4 hours of insulin infused _____ units x 6 = _____ TDD

Prescribe 50% of TDD for subcutaneous administration of long acting basal analogue insulin 1 -2 hrs before IV Insulin is discontinued.

(TDD _____ divided by 2 = _____ units of SC basal dose

S/C Glargine _____ units at _____ hours, then once daily **OR**
S/C Detemir _____ units at _____ hours, then once daily

AND correction scale TID, rapid acting analogue insulin on HEA 239; *Physicians Orders-Subcutaneous Insulin Administration Using Disposable Pen Device*

For patients on IV insulin that don't meet the above criteria:

Prescribe correction scale TID **ONLY**, rapid acting analogue insulin on HEA239.

Oral hypoglycemic agents to be reassessed once tolerating full fluids/diabetes diet.

Conclusion:

Perioperative hyperglycemia is an independent risk factor for developing many complications. The low percentages of IIP patients being initiated on SC insulin correlates with increased risk of infection post-operatively. This study supports the notion of creating a protocol to safely transition patients from IIP to SC insulin. The next steps would be to establish intra-operative IIP protocol and to implement a standardized approach to safely transition patients from IIP to SC insulin.

References:

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