

Recommended algorithm for monitoring & management with intravenous insulin infusion in patients admitted to hospital during these times by Ministry of Health & Family Welfare, Government of India.

A. Indications for the use of intravenous insulin infusion

When blood glucose is persistently > 180 mg/dl (two or more values) under following situations:

1. Patients with nothing by mouth (NPO) status or those having erratic diet pattern (in time and content)
2. Diabetic Ketoacidosis (DKA)
3. Uncontrolled hyperglycemia despite MSII use
4. Severe hyperglycemia at onset (Pre-meal BG level ≥ 300 mg/dl and post-meal BG level ≥ 400 mg/dl) - despite use of subcutaneous insulin. (Ketone status should be checked before starting infusion)
5. Critically ill

B. Initiation of insulin infusion:

0.05-0.1 units/kg body weight/hour.

C. Infusion preparation:

50 units of regular insulin in 50 ml NS (1unit/ml)

D. Frequency of blood glucose monitoring:

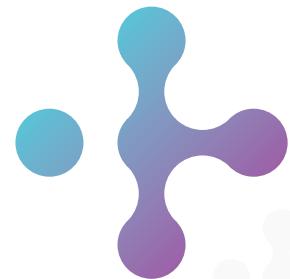
2 hourly. (Can be extended to 4 hourly, when requirement is low, stable blood glucose & values in target range)

E. Glycemic targets:

140 to 180 mg/dl for most individuals. (110-180 mg/dl in a scenario where this target can be achieved without causing significant hypoglycemia and relaxed to 200-220 mg/dl where even a target of 140-180 mg/dl is unsafe and associated with increased risk of hypoglycemia).

F. Further titration of insulin infusion rate:

Further titration of insulin infusion rates should be done based upon ambient blood glucose level, target blood glucose level and magnitude of blood glucose change in the previous hour.



A simple and popular formula: Infusion rate (units/hr) = BG level (mg/dl)/100 is good to calculate initial infusion rate. However, it should not be relied upon for titration because it does not account rate of BG change in the preceding hours.

G. Target rate of BG change:

Initially between 50-100 mg/dl/hour (50-75 mg/dl/hour may also be appropriate), (If the rate of blood glucose change is <50 mg/dl or >100 mg/dl, consider increasing and decreasing the infusion rates, respectively).

H. Coverage for meals:

For prandial coverage, increase the infusion rate by 2-4 units/hour over and above the basal rate just before taking the major meal and continue the increased rate for next 2 hours.

I. Monitoring of serum potassium:

Monitoring every 6 hours in patients with NPO status and every 12 hours in those who are accepting orally.

Suitable Insulin Regimes for Various Situations

Insulin Regimens	Situations
Basal bolus	3 doses of prandial regular insulin + 1 or 2 doses of NPH insulin. Suited for patients with moderate-severe hyperglycemia who have a regular diet pattern and experience prandial excursion with each meal
Basal plus	1 or 2 doses of prandial regular insulin + 1 or 2 doses of NPH insulin. Suited for patients with moderate-severe hyperglycemia who have a regular diet pattern and experience prandial excursion with 1 or 2 meals (like patients initiated on steroids in morning only)
Basal insulin with or without oral glucose lowering drugs	Suited for patients who have normal prandial excursions (<50 mg/dl), but require insulin therapy for control of basal hyperglycemia
Correctional insulin with or without basal insulin	Not recommended for routine use. Should only be used in patients with erratic diet patterns, preferably with basal
Monitoring	Monitor capillary blood glucose BBF, 2 hours ABF, BL, 2 hours AL, BD and 2 hours AD for patients on Basal Bolus Monitor patients on other insulin regimens with BBF, BL, BD and AD if 6 points monitoring is not feasible

- The discontinuation of insulin infusion (where necessary) should be for a minimum period of time to ensure better glycaemic control
- The timings and doses of insulin described in this document are with regard to use of Inj. Regular insulin as a bolus (or prandial) insulin and Inj. NPH insulin as a basal insulin. However, in a scenario where insulin analogs are used (rapid-acting analogs such as insulin aspart, insulin lispro, and insulin glulisine, and long-acting basal analogs such as insulin glargine, and insulin degludec) these specifications would change accordingly.

Abbreviations: ADN: After dinner; BBF: Before breakfast, BDN: Before dinner, BL: Before lunch, BG: Blood glucose; CBG: Capillary blood glucose; COVID-19: Coronavirus disease 2019; DKA: Diabetic ketoacidosis; FPG: Fasting plasma glucose; HbA1c: Hemoglobin A1c; IV: Intravenous; MSII: Multiple subcutaneous insulin injections; N: NPH insulin; NPH: Neutral Protamine Hagedorn; NPO: Nothing by mouth; NS: Normal saline; OAD: Oral antihyperglycemic drug; R: Regular insulin; RT: Ryles tube; TDD: Total daily dose

Clinical guidance on diagnosis and management of diabetes in COVID-19 patient management facility (version 2.0). Available at <https://www.mohfw.gov.in/pdf/ClinicalGuidanceonDiagnosisandManagementofDiabetesatCOVID19PatientManagementfacility.pdf>. Last accessed on 16th June 2021.

