Intravenous (IV) to Subcutaneous (SQ) Insulin Transition Algorithm - Adult - Inpatient

Step 1: Does patient meet the following inclusion criteria for use of the algorithm?
- Maintained on IV insulin infusion for ≥ 24 hours; AND
- Controlled blood glucose (≤ 3 blood glucose ≥ 180 mg/dL in the past 8 hours)

Yes: Go to step 2
No: Continue IV insulin

Step 2: Does patient meet the following exclusion criteria for use of the algorithm?
- Requiring vasopressors
- Acute MI with cardiogenic shock
- Unresolved Diabetic Ketoacidosis (DKA)
- Acute changes in renal function (an increase in serum creatinine of ≥ 0.3 mg/dL in the last 48 hours)
- High dose steroid use (≥ 40 mg of prednisone or equivalent daily) or undergoing a steroid taper
- Receiving total parenteral nutrition (TPN)
- Receiving tube feeding and not at goal

No: go to step 3
Yes: Continue insulin infusion; Consult DMS for transition guidance

Step 3: Does the patient need scheduled SQ insulin?
- Type 1 diabetes or Type 2 diabetes requiring insulin
- Patients with a mean insulin infusion rate of ≥ 1 unit/hr

Yes to either or both: Go to step 4
No: Patients with no history of diabetes or with diabetes managed without insulin AND With a mean infusion rate of < 1 unit/hr

Order SQ correction insulin & discontinue

Step 4: Calculate the total daily dose (TDD) of insulin

Dosing may be guided by previous home insulin dose in patients with well-controlled diabetes (A1c < 8%)

Step 4a: Determine the average rate (units/hour) of insulin infusion over the previous 8 hours

Multiply this average rate by 24 hours to calculate the total average daily insulin dose

Step 4b: Multiply daily average calculated in step 4a by 0.8 to account for a conversion safety factor

TDD (units/day) = average insulin infusion rate (units/hour) X 24 hours X conversion safety factor (0.8)

Do NOT exceed a TDD of 120 units/day or > 1 unit/kg/day (actual body weight) unless patient was stable on dose prior to admission. If TDD is > 120 units/day or > 1 unit/kg/day consider a Diabetes Management Service consult

Step 5: Evaluate the patient’s current nutritional intake

Full Nutrition
- Patient is eating > 50% of meals or receiving > 50% of continuous goal tube feeds

OR

Minimal Nutrition
- Patient is NPO, eating ≤ 50% of meals or is on a clear liquid diet

Step 6: Calculate dose of SQ insulin for patients receiving full nutrition

Patient Eating Meals
- Give 40-50% of TDD as glargine insulin 4 hours prior to discontinuation of the IV insulin infusion and give 50-60% of TDD as rapid-acting insulin in 3 divided doses with meals

Patient on Continuous Tube Feeds (TF)
- Give 30-40% of TDD as glargine insulin 4 hours prior to discontinuation of IV insulin and give 60-70% of TDD as regular insulin in 4 divided doses every 6 hours
- Not all patients on TF will require glargine insulin:
  - No prior history of diabetes
  - No medications or insulin for diabetes

Give these patients 100% of TDD as regular insulin in 4 divided doses every 6 hours. Give first dose 30 minutes prior to discontinuation of IV insulin

Step 6a: Order correction insulin for PRN hyperglycemia

Step 6b: Calculate dose of SQ insulin for patients receiving minimal nutrition

Step 6a: Give 100% of TDD as glargine insulin 4 hours prior to discontinuation of the IV insulin infusion

Step 6b: Order correction insulin for PRN hyperglycemia
Example Calculations for Transition of IV to SQ Insulin

**Example Calculation: Patient eating > 50% of meals**

Patient ZZ is receiving full nutrition and has an average insulin infusion rate of 2 units/hr over the previous 8 hours

1. 2 units/hr X 24 hours = 48 units total average daily dose
2. 48 units X 0.8 (safety factor) = ~38 units TDD insulin
3. 38 X 0.5 (50%) = 19 units of glargine insulin given 4 hours prior to discontinuation of insulin infusion
   38 X 0.5 (50%) = 19 units; 19 units ÷ 3 meals = ~ 6 units of rapid-acting insulin given with each meal
4. Order correction insulin for hyperglycemia

**Example Calculation: Patient receiving > 50% of goal tube feeds**

Patient YY is receiving 30 ml/hr of tube feeds. The goal tube feed rate for YY is 45 ml/hr. The average rate of insulin infusion over the previous 8 hours was 3 units/hr. YY has a history of Type 2 diabetes requiring insulin.

1. 3 units/hr X 24 hours = 72 units total average daily dose
2. 72 units X 0.8 (safety factor) = ~58 units TDD insulin
3. 58 X 0.4 (40%) = ~23 units of glargine insulin given 4 hours prior to discontinuation of insulin infusion
   58 X 0.6 (60%) = ~35 units; 35 units ÷ 4 doses = ~ 9 units of regular insulin given every 6 hours
4. Order correction insulin for hyperglycemia

*Not all patients on TF will require glargine insulin: (No prior history of diabetes, no medications or insulin for diabetes)
Give these patients 100% of TDD as regular insulin in 4 divided doses every 6 hours. Give first dose 30 minutes prior to discontinuation of IV insulin

**Example Calculation: Patient is NPO (Minimal Nutrition)**

Patient XX is NPO and has an average insulin infusion rate of 1.5 units/hr over the previous 8 hours

1. 1.5 units/hr X 24 hours = 36 units total average daily dose
2. 36 units X 0.8 (safety factor) = ~29 units TDD insulin
3. 29 units x 100 % = 29 units of glargine insulin given 4 hours prior to discontinuation of insulin infusion.
4. Order correction insulin for hyperglycemia
References: