U of L Endocrine Diabetes Inpatient Hyperglycemia Guidelines For Non-critical Illness:

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Disclaimers:

1. Please note these are **suggested guidelines** and clinical judgment always takes precedence.
2. **Dynamic Factors such as nutrition, NPO status, should be considered.** Communication with nursing is very helpful.
3. Review daily BG (Blood Glucose) data and modify protocol for BG values<70-100 mg/dL and >200 mg/dL.
4. Please be familiar with formulary insulins & Hospital HTP (hypoglycemia treatment protocol).
5. For any questions or concerns, please consult the Inpatient Endocrine/Diabetes service since **no size fits all**!!
6. Inpatient diabetes education and nutrition (MNT) consult should be utilized whenever appropriate and as early as possible.
7. Consult Diabetes/Endocrine on call for the following patients: on insulin pump therapy, U500 Concentrated R Insulin, Brittle Type 1 Diabetes, Fluctuating IV or oral steroid therapy, pregnant diabetics, Cystic Fibrosis Related Diabetes & New Onset Diabetes after Transplant.
8. Upon discharge, transition to previous schedule depends on current glycemic requirements &HbA1c.

Recommended glycemic targets:

Fasting/pre-meal: < 140 mg/dl

Random: < 180 mg/dl

For multiple co-morbidities, limited life expectancy, high risk for hypoglycemia: ~ 200 mg/dL

Implementing Scheduled Insulin Therapy:

Newly recognized hyperglycemia at current hospitalization:

- If initial BG >140 mg/dl, begin finger stick blood glucose monitoring for 24-48 hours & obtain HbA1c

Previously diagnosed Diabetics:

- Recommend holding oral agents during hospitalization.
- HbA1C (if none < 2 months)
- If finger stick blood glucose above glycemic targets after 24-48 hours then start **basal bolus dosing as calculated below.**

Calculating insulin doses:

1. **The total daily dose needs to be calculated, using patient weight, as shown in the table below.**
2. **This total dose in units will be split into 50% basal and 50% bolus (total bolus then further divided amongst the 3 daily meals)**
3. **Then choose from the correctional insulin scales below based on total daily dose (TDD)**

Total daily dose (TDD) calculation for basal bolus insulin

Clinical characteristics	**Total Daily Dose**	
Lean, elderly(>70y), advanced CKD or liver disease, undernourished	0.2-0.3 units/kg	
Normal BMI	0.3-0.4 units/kg	
Type 1 Diabetes Mellitus (T1DM) or Late onset autoimmune Diabetes of adults (LADA)	0.3-0.4 units/kg	
Obese/overweight	0.4 units/kg	BG 140-200 mg/dL
	0.5 units/kg	BG >200 mg/dL
High dose steroids or other markers of significant insulin resistance.	0.6 units/kg (Consider consult)	

Correctional Insulin (Lispro, Aspart or Glulisine) with meals (NPO: every 4 hours)

Total Daily Dose (units)	**Suggested Correctional Scale**
≤ 40 units	Very low (scale)
41-80	low
81-120	Moderate
≥120 or on high dose steroids	High

For patients that are NPO:

Basal Insulin: 50%-100% of dose (determined by A1C and BG)
Correctional Insulin: every 4hours (every 6 hours for patients with ESRD or at risk for hypoglycemia).

Enteral Nutrition (EN) or Tube feeds (TF)

Continuous EN:

- Basal Insulin (see appendix for medication detail) bid with Regular (R)Insulin every 6 hours (Basal 40%, Bolus 60%) + correction
  OR
- NPH every 6 or 12 hours with R every 6 hours.

Cycled /overnight EN:

- NPH with Regular(R)at start of tube feed and Regular(R) every 6 hours

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Glucocorticoids:

Previous diabetic on insulin

- Increase total daily dose by 20-40%,
- Increase correction scale to next level
- Adjust daily insulin based on prior 24 hr requirement.
- If steroids tapered decrease insulin by 25% for every 10 mg taper of prednisone.
  (May also use NPH table)

Nondiabetic:

- Upon steroid initiation check bedside finger stick blood glucose bid for 24-48 hrs.
- If BG >140 intervene with correctional low dose insulin.
- If BG >180 will need scheduled insulin (60% prandial, 40% basal refer to basal bolus calculations).

For <u>AM only prednisone</u>, consider this NPH table:

Prednisone dose	NPH dose (administered AM with steroids)
≥40 mg	0.4 units /kg
30 mg	0.3 units /kg
20 mg	0.2 units /kg
10 mg	0.1 units /kg

Glargine or levemir may be used if on dexamethasone or bid prednisone

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References:

- **Management of Hyperglycemia in hospitalized patients in non-critical care setting: An Endocrine Society Clinical Practice Guidelines J Clin Endocrinol Metab January 2012 97:16-38**
- **Randomized study of basal bolus insulin therapy in inpatient management of T2DM: Umpierrez et al, Diabetes Care 30:2181–2186, 2007**
- **Insulin therapy and glycemic control in hospitalized patients with diabetes during enteral nutrition therapy: a randomized controlled clinical trial: Korytkowski M, Salata R, Koerbel G et al Diabetes Care 32:594, 2009.**
- **Example Protocol: Stepwise Approach to Managing Inpatient Hyperglycemia from the Society of Hospital Medicine www.hospitalmedicine.org/ResourceRoomRedesign/html/12Clinical_Tools/01_Insulin_Orders.cfm**

Appendix:

- **Basal—Formulary (Glargine (Lantus), Detemir (levemir), NPH)**
- **Prandial (nutritional)—when eating meals.**
- **RAI-A--- (for bolus/ Prandial /correctional) rapid acting insulin analog (formulary agent humolog (lispro), novolog (aspart) or apidra (glulisine))**