The Importance of Addressing Hyperglycemia in the Inpatient Setting: The Why’s and How’s

Learning Objectives

- State currently recommended glycemic treatment targets for patients in critical care and noncritical care settings
- List components of published standardized insulin order sets
- Apply best practices for managing inpatient glycemic control based on current evidence
Inpatient Hyperglycemia

Glycemic Control in Hospitals in the United States

49,191,313 POC-BG measurements (12,176,299 ICU and 37,015,014 non-ICU values) were obtained from 3,484,795 inpatients (653,359 in the ICU and 2,831,436 in non-ICU areas)

### Hyperglycemia During Hospitalization and Poor Outcomes in Numerous Settings: A Few Examples

<table>
<thead>
<tr>
<th>Citation</th>
<th>Patient Population</th>
<th>Significant Hyperglycemia-Related Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total parenteral nutrition (TPN)</td>
<td>↑ Mortality risk, pneumonia risk, acute renal failure</td>
</tr>
<tr>
<td>2</td>
<td>Noncardiac surgery</td>
<td>↑ Mortality risk, surgery-specific risk</td>
</tr>
<tr>
<td>3</td>
<td>Aneurysmal subarachnoid hemorrhage</td>
<td>↑ Mortality risk Impaired prognosis</td>
</tr>
<tr>
<td>4</td>
<td>Critically injured trauma patients</td>
<td>↑ LOS, mortality risk, ventilator time, infection</td>
</tr>
<tr>
<td>5</td>
<td>Chronic obstructive pulmonary disease (COPD)</td>
<td>↑ LOS, mortality risk, adverse outcomes</td>
</tr>
<tr>
<td>6</td>
<td>Community acquired pneumonia</td>
<td>↑ LOS, mortality risk, complications</td>
</tr>
</tbody>
</table>


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### Diagnosis & Recognition of Hyperglycemia and Diabetes in the Hospital setting

**Admission**

Assess all patients for a history of diabetes

- Obtain laboratory BG testing on admission

**Pathways**

- **No history of diabetes**
  - BG < 140 mg/dl
  - Initiate POC BG monitoring according to clinical status

- **No history of diabetes**
  - BG > 140 mg/dl
  - Start POC BG monitoring x 24-48h
  - Check A1C
  - A1C ≥ 6.5%

- **History of diabetes**
  - BG monitoring

**POC BG** = Point of care blood glucose testing

Current Recommendations for Hospitalized Patients

• All critically ill patients in intensive care unit settings
  – BG level 140–180 mg/dL
  – Pre-meal: < 140 mg/dL
  – Intravenous insulin preferred

• Non-critically ill patients
  – Random: < 180 mg/dL
  – Scheduled SC insulin preferred
  – Sliding-scale insulin discouraged

• Hypoglycemia
  – Reassess the regimen if BG level is < 100 mg/dL
  – Modify the regimen if BG level is < 70 mg/dL


Insulin for Inpatient Hyperglycemia
Case Study: Severe Hyperglycemia on Admission in a Patient with Diabetes

- 59 yr obese male patient with prior history of T2DM controlled on oral medications admitted to the critical care unit with sepsis
- On presentation
  - BG = 329 mg/dL
  - BP = 108/56 mm/Hg
  - HR = 95 bpm
  - Respiration = 18 breaths per minute
- Patient weight = 220 lb; height = 5’10”; BMI = 31.6

How would you manage this patient?

BG, blood glucose; BMI, body mass index; BP, blood pressure; HR, heart rate; T2DM, type 2 diabetes mellitus.

Insulin is the Most Appropriate Agent for the Majority of Hospitalized Patients

- Most potent agent with which to lower blood glucose
- Rapidly effective
- Easily titratable (up or down)
- Relatively no contraindications

Successful IV Insulin Protocol

• **Reaches and maintains** BG successfully within a pre-specified target range.
• Includes a **clear algorithm** for making temporary corrective changes in the IV insulin rate, as patient requirements change.
• Incorporates the ‘**rate of change**’ in BG, not just the absolute values.
• Incorporates the current **IV insulin rate**.
• Minimizes **hypoglycemia**; provides specific directions for its treatment when it occurs.
• Provides specific guidelines for timing and selection of doses for the **transition to SQ insulin**.

Does your institution have an IV insulin protocol in place?


Safe Use of IV Insulin Therapy

• Insulin infusion concentrations and protocols should be standardized within a hospital.
• All MDs/RNs should be trained with competence and assessed regularly.
• Accurate bedside blood glucose monitoring done hourly (and if stable, every 2 hours).
• Potassium should be monitored and given if necessary.

Transition From IV Insulin to SC Insulin

• IV insulin should be transitioned to SC basal bolus insulin therapy
  – When patient begins to eat and BG levels are stable
• Because of short half life of IV insulin, SC basal insulin should be administered at least 2-3 hours prior to discontinuing the drip
  – If short-acting insulin also administered, IV insulin may be able to be stopped sooner, e.g., after 1 hour


Converting from IV to Subcutaneous Insulin

• Endocrine Society Guidelines conservatively recommend the following:
  – Establishing the 24-hour insulin requirement by averaging the IV insulin dose required over the previous 6 to 8 hour
  – Using a fraction of that (ie, 75-80%) as the Total Daily Dose (TDD) of subcutaneous insulin
    • Giving half of that as basal and dividing the other half among short- or rapid-acting insulin before meals
• Clinical trial support using 80% of the TDD to achieve 80-140 mg/dL

**Case Study Example – Moving to Stepdown Unit**

- Patient is stable, will be moved out of the CCU and will begin scheduled meals
- The average dose of intravenous insulin was 1.5 units/hour over the past 8 hours
- The total daily dose (TDD) is ~40 units
  - 80% of 40 = 32 units

**Basal insulin** = 50% of TDD = ~16 units (Glargine/Detemir)

**Nutritional** = 50% of TDD = ~5 units per meal (x 3 meals)
  (Lispro/Glulisine/Aspart)

Doses are then titrated against actual glucose levels

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**Subcutaneous Insulin Administration**

Subcutaneous Correction Insulin Algorithms

- Does NOT replace scheduled insulin
  - Rather it corrects for changing needs
- Based on the insulin sensitivity of the patient
  - Inferred from total daily insulin requirement
  - Inferred from weight/BMI
- Utilize same rapid-acting analog as nutritional insulin
  - Need rapid onset and short duration of action


Supplemental Insulin Scale

<table>
<thead>
<tr>
<th>BG (mg/dl)</th>
<th>Insulin-sensitive</th>
<th>Usual</th>
<th>Insulin-resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 141–180</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>181–220</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>221–260</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>261–300</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>301–350</td>
<td>10</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>351–400</td>
<td>12</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>&gt; 400</td>
<td>14</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

- The numbers in each column indicate the number of units of regular or rapid-acting insulin analogs per dose.
- "Supplemental" dose is to be added to the scheduled insulin dose. Give half of supplemental insulin dose at bedtime.
- If a patient is able and expected to eat all or most of his/her meals, supplemental insulin will be administered before each meal following the "usual" column dose.
- Start at insulin-sensitive column in patients who are not eating, elderly patients, and those with impaired renal function.
- Start at insulin-resistant column in patients receiving corticosteroids and those treated with more than 80 U/d before admission.

Pitfalls of Sliding-Scale Insulin

- Is reactive, rather than proactive
- Does not establish an accurate insulin dose requirement
- May result in wide glycemic fluctuations
- Often mismatched with changes in patients insulin sensitivity
- Does not meet physiologic needs
- Can lead to ‘insulin stacking’
  - When several boluses are given in a short period of time, insulin action overlaps which may cause hypoglycemia

Basal-Bolus Insulin is Superior to Sliding Scale Insulin for Treatment for Inpatient Hyperglycemia

<table>
<thead>
<tr>
<th>Days of Therapy</th>
<th>Mean BG (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Admit)</td>
<td>240</td>
</tr>
<tr>
<td>1</td>
<td>210</td>
</tr>
<tr>
<td>2</td>
<td>180</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
</tr>
<tr>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td>5</td>
<td>140</td>
</tr>
<tr>
<td>6</td>
<td>160</td>
</tr>
<tr>
<td>7</td>
<td>180</td>
</tr>
<tr>
<td>8</td>
<td>200</td>
</tr>
<tr>
<td>9</td>
<td>220</td>
</tr>
<tr>
<td>10 (Discharge)</td>
<td>240</td>
</tr>
</tbody>
</table>

*P < .01; †P < .05. Error bars denote standard deviation.
Insulin glargine + glulisine: 0.4 units/kg for BG 140-200 mg/dL; 0.5 units/kg for BG 201-400 mg/dL (1/2 daily dose given as basal insulin).
SSI = regular insulin 4 times daily for BG > 140 mg/dL.

No differences in the rate of hypoglycemia or hospital LOS.

Basal Bolus vs Sliding Scale in the RABBIT 2 Surgery Study

**Achievement of Glucose Goals**

<table>
<thead>
<tr>
<th>Percent of Patients with BG &lt; 140 mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled Basal Bolus</td>
</tr>
<tr>
<td>Sliding Scale</td>
</tr>
</tbody>
</table>

**Outcomes and Hypoglycemia**

<table>
<thead>
<tr>
<th>Hospital Complications*</th>
<th>BG &lt; 70 mg/dL</th>
<th>BG &lt; 40 mg/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal Bolus</td>
<td>8.6%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Sliding Scale</td>
<td>24.3%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

* Composite of postoperative complications including wound infection, pneumonia, bacteremia, and respiratory and acute renal failure.

**Pharmacological Treatment of Hyperglycemia in Non-ICU Setting**

- **Antihyperglycemic Therapy**
  - **SC Insulin**
    - Recommended for most medical-surgical patients
  - **Continuous IV Infusion**
    - Selected medical-surgical patients
  - **OADs**
    - Not Generally Recommended
**Non-Insulin Therapies in the Hospital**

- Sulfonylureas may lead to hypoglycemia if nutrition interrupted
- Metformin contraindicated in setting of decreased renal blood flow, surgery, and with use of iodinated contrast dye
- Thiazolidinediones are not rapidly effective. They are associated with edema and congestive heart failure
- Incretin-based therapies (GLP-1 receptor agonists, DPP-4 inhibitors) have a greater effect on postprandial glucose – so would be effective mainly in eating patients. The former are associated with nausea.

*There is no extensive published experience with non-insulin agents in the hospital*

**Pharmacologic Therapy in Non-ICU Setting: General Principles**

- Usually patients treated with insulin at home require scheduled SQ insulin therapy in the hospital
- Avoid prolonged use of sliding scale insulin (SSI) as sole method for glycemic management in hyperglycemic patients with diabetes
- Scheduled SQ insulin consists of basal or intermediate acting insulin in combination with rapid acting insulin analogs or Regular insulin administered before meals in patients who are eating
- Include correction insulin as a component of scheduled SQ insulin for treatment of BG above desired range
Medical Nutrition Therapy

- MNT should be a component of the glycemic management program for all hospitalized patients DM and hyperglycemia
- Consistent amount of carbohydrates at each meal can be useful in coordinating doses of rapid-acting insulin to carbohydrate ingestion

Avoiding Hypoglycemia
Striking the Right Balance

Hyperglycemia

Hypoglycemia

Point of Care Blood Glucose Testing Reduces Prevalence of Hypoglycemia

Case control study; Severe hypoglycemia (<40 mg/dL) is associated with an increased risk of mortality (OR, 2.28; 95% CI, 1.41-3.70; P=.0008).

Hypoglycemia was a predictor of higher mortality in patients not treated with insulin, but not in patients treated with insulin.

Essential Part of Any Insulin Use: A Hypoglycemia Protocol

- **Clear Definition of Hypoglycemia**
  - Glucose level (ADA) < 70 mg/dL
- **Nursing Order to Treat Without Delay**
  - Stop insulin infusion (if patient is on one)
  - Oral glucose (if patient is able to take oral)
  - IV dextrose or glucagon (if patient is unable to take oral)
  - Repeat blood glucose monitoring 15 min after treatment for hypoglycemia and repeat treatment if BG not up to target
  - Directions for when and how to restart insulin
- **Documentation!**
- **Look for the cause of hypoglycemia and determine if other treatment changes are needed**

ADA. Diabetes Care. 2009;31(suppl1):S1–S110.
**Suggested Nurse-Initiated Strategies for Treating Hypoglycemia**

- **Blood Glucose <70 mg/dL**
  - Alert and able to eat and drink: Administer 15–20 g of rapid-acting carbohydrate
  - Alert and awake patient who is NPO or unable to swallow: Administer 20 ml dextrose 50% solution IV and start iv dextrose 5% in water at 100 ml/h
  - Patient with an altered level of consciousness: IV access: administer 25 ml dextrose 50% (1/2 amp) and start IV dextrose 5% in water at 100 ml/h
  - No IV access: give glucagon 1 mg im. Limit, two times.

Recheck BG and repeat treatment every 15 min until glucose level is at least 4.4 mmol/liter (80 mg/dl).

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**Scenarios Prompting Increased Monitoring and Possible Decreases in Insulin Dose**

- Patient is switched to NPO status
- Reduction in food intake
- Discontinuation of enteral feeding or TPN
- Discontinuation or reduction in IV dextrose
- Timing of premeal insulin if meal disrupted due to medical procedures or patient transport
- Reduction in corticosteroid administration

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Umpierrez et al. 2012 ADA Scientific Meeting, Oral Presentation (P010), June 2012

Transition to Outpatient Status

• Begin discharge planning early
• Stabilize blood glucose prior to discharge
• Obtain A1C for discharge planning if the result is not available from the previous 2 to 3 months
  – A1C can now be used as a means to make the diagnosis of diabetes
Transition to Outpatient Status

- Provide instruction
  - Medication use / Injection technique if using insulin
  - Basics on diet plan
  - Glucose monitoring
  - Hypoglycemia prevention and treatment
- Refer patient to a certified diabetes educator
- Clarify insurance reimbursement to ensure availability of medications at discharge
- Schedule a follow-up visit with clinician and provide emergency number to call if problems


Relationship Between Inpatient and Outpatient Diabetes Management

Care received in the outpatient setting can affect need for hospitalization

- **Inpatient**
  - Compliance with glycemic goals depends on physicians, nursing and hospital staff

- **Outpatient**
  - Compliance with glycemic goals depends on the patient

Lessons learned in the hospital can impact patient self-care behavior at home
Failure to Resume Anti-Hyperglycemic Therapy at Discharge Affect Outcomes

8751 Medicare beneficiaries w/ DM and AMI admitted on anti-hyperglycemic therapy

7581 discharged ON anti-hyperglycemic therapy

1170 discharged OFF anti-hyperglycemic therapy

Mortality at 1 year

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>1.47</td>
<td>1.29</td>
</tr>
<tr>
<td>(1.32-1.64)</td>
<td>(1.15-1.45)</td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Patients discharged OFF vs discharged ON anti-hyperglycemic therapy

Cox Proportional Hazards Ratio

Survival Skills” to Be Taught Before Discharge

- How and when to take medication/insulin
  - What to expect from the medication
- How/when to test BG (SMBG)
  - What are target glucose levels
- Basics on meal planning
- How to treat hypoglycemia

- Sick-day management plan
- Date/time of follow-up visits
  - Including diabetes education
- When and who to call on the healthcare team
  - What community resources are available

Case Study: Severe Hyperglycemia on Admission in a Patient with Diabetes

• 59 yr obese male patient with prior history of T2DM controlled on oral medications admitted to the critical care unit with sepsis

• On presentation
  – BG = 329 mg/dL
  – BP = 108/56 mm/Hg
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  – Respiration = 18 breaths per minute

• Patient weight = 220 lb; height = 5’ 10”; BMI = 31.6

**BG, blood glucose; BMI, body mass index; BP, blood pressure; HR, heart rate; T2DM, type 2 diabetes mellitus.**

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Case Study: Resolution

• Patient prepares for discharge

• HgbA1c is 8.8%

• Patient was already on 3 oral agents prior to hospital stay.

• Discharge plan:
  – Discuss with the patient the need for basal insulin in addition to his oral agents
  – Educator to provide hands-on instruction on administration techniques
  – Provide education to caregiver/family if possible
  – Comprehensive outpatient education should be scheduled
Implementing Change

Successful Strategies for *Quality Improvement* of Inpatient Glycemic Control

- Administrative support
- Multidisciplinary steering committee to drive the development of initiatives
- Champion(s)
- Assessment of current processes, quality of care, and barriers to practice change
- Development and implementation of interventions

System-Wide Support

- Administrative support for an interdisciplinary steering committee targeting a systems approach to improve care of inpatients with hyperglycemia and diabetes
- Establish a uniform method of collecting and evaluating Point of Care testing data and insulin use information as a way of monitoring safety/efficacy of the glycemic control program
- Use of accurate devices for glucose measurement at the bedside, with ongoing staff competency assessments


Joint Commission Diabetes Certification Standards

- The most successful inpatient diabetes programs have the following essential characteristics:
  - Specific staff education requirements
  - Blood glucose monitoring protocols
  - Treatment plans for hyperglycemia and hypoglycemia
  - Collect data on incidences of hypoglycemia
  - Patient education on diabetes management
  - An identified program champion or team

Implementation of a Glycemic Control Program in the Hospital

• Administrative support
• Interdisciplinary steering committee
• Systems approach


Assessing Inpatient Glycemic Control: What Are the Next Steps?

• Standards/Consensus Needed as to
  – which measures to report?
  – definitions of targets for hyperglycemia treatment
  – definition of hypoglycemia
  – determine how data should be gathered (from chart review or from laboratory information systems)
  – which type of sample (blood or point of care)?

A Targeted Glycemic Management Program on Provider Response to Inpatient Hyperglycemia – One Example

Team composition: 1 diabetes nurse-educator, 2 nurse-practitioners, a pharmacist, and a dietitian

Each day, 1 team member reviewed BG level ≥300 mg/dL during previous 24 hrs to determine cause of, and whether appropriate action for, hyperglycemia by primary team taken

If action not taken, TGM service contacted team to discuss need for intensified glycemic management

Templated note placed in patient’s medical records, reinforcing availability of existing guidelines, protocols, order sets for inpatient glycemic management


Key Points

• Hyperglycemia in the hospital is associated with adverse clinical outcomes, especially in patients without a known history of diabetes.
• Managing hyperglycemia in this setting presents many challenges to clinicians.
• National guidelines suggest reasonable glycemic targets and strategies in both critically ill and non-critically ill hospitalized. The avoidance of hypoglycemia is key.
• Insulin is a ‘high-risk’ medication in all settings and standardized protocols will enable its safe utilization.
• Smooth transitions of care are extremely important in hyperglycemic patients.
Resources

American Association of Clinical Endocrinologists Inpatient Glycemic Resource Center
http://www.aace.com/resources/igcrc/

Institute for Safe Medication Practices
http://www.ismp.org/default.asp

American Society of Hospital Pharmacists: Safe Use of Insulin in Hospitals
http://www.ashop.org/s_ashp/docs/files_Safe_Use_of_Insulin.pdf

Society for Hospital Medicine Resource Center
http://www.hospitalmedicine.org/ResourceRoomRedesign/GlycemicControl.cfm

Questions?
Additional Guidance/Examples of Intervention

Role of the Pharmacist

- Physical/local champions
- Active member of glucose control team
- Political lobbying within institution
- Protocol selection/development
- Formulary decisions
- Education
- Implementation of protocols
- Work with local IS teams
- Bedside advocate
- Safety initiatives
- Quality assessment/improvement leader

Example of a Basal Bolus Insulin Regimen for the Management of Non-Critically Ill Patients with T2DM: 

**Basal Insulin Orders**

- Discontinue oral diabetes drugs and non-insulin injectable diabetes medications upon hospital admission
- Starting insulin: calculate the total daily dose as follows:
  - 0.2 to 0.3 U/kg of body weight in patients: aged ≥ 70 yr and/or glomerular filtration rate less than 60 ml/min.
  - 0.4 U/kg of body weight per day for patients not meeting the criteria above who have BG concentrations of 140–200 mg/dl.
  - 0.5 U/kg of body weight per day for patients not meeting the criteria above when BG concentration is 201–400 mg/dl.

**Example of a Basal Bolus Insulin Regimen for the Management of Non-Critically Ill Patients with T2DM:**

**Basal Insulin Orders (cont)**

- Distribute total calculated dose as approximately 50% basal insulin and 50% nutritional insulin
- Give basal insulin once or twice daily, at the same time each day
- Give rapid-acting (prandial) insulin in three equally divided doses before each meal. Hold prandial insulin if patient is not able to eat
- Adjust insulin dose(s) according to the results of bedside BG measurements
Summary of Inpatient Diabetes Order Sets

- **Diet**
  - For patients eating discrete meals, recommendation to order a consistent carbohydrate diet

- **Point-of-care glucose testing**
  - Recommended orders to check bedside blood glucose before meals, at bedtime if eating, or every 6 hours if not eating (nothing by mouth)
  - Optional orders to check bedside blood glucose 2 hours after meals to assess adequacy of nutritional insulin, 2 hours after stopping tube feeding to rule out hypoglycemia, and at 3 am to rule out nighttime hypoglycemia

- **Hemoglobin A1c testing**
  - Recommended for all patients if no value available during the past month
  - Guidelines on when results may be inaccurate (for example, recent blood transfusion)


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Summary of Inpatient Diabetes Order Sets

- **Basal insulin**
  - Recommended insulin analog every night (at a consistent time, usually before bedtime) for patients taking it before admission, NPH insulin every morning/every night (at bedtime) for all other patients
  - Estimated daily dose of basal insulin 0.25 to 0.35 U/kg or home dose if eating (half dose if not)

- **Nutritional insulin**
  - Recommended rapid-acting insulin for patients eating discrete meals, regular insulin for patients receiving continuous enteral nutrition
  - Estimated daily dose of nutritional insulin 0.25 to 0.35 U/kg or home dose if known

- **Supplemental insulin**
  - Low-dose scale provided, with guidance on when to use a higher-dose scale (with reference to the diabetes management protocol for medium- and high-dose scales)
  - Same type and time as nutritional insulin; regular insulin if nothing by mouth
  - Bedtime scale: give 5 U of supplemental insulin if bedside blood glucose >350 mg/dL only

Summary of Inpatient Diabetes Order Sets

- **Hypoglycemia orders**
  - Nurse treat per protocol, treat if bedside blood glucose <60 mg/dL; notify resident
  - Juice, intravenously administered dextrose, or intramuscularly administered glucagon depending on ability to take oral nutrition and intravenous access
  - Recheck bedside blood glucose in 15 minutes and repeat as necessary

- **Discharge orders**
  - Based on hemoglobin A1c: home regimen, titration of home regimen, or new insulin regimen (if last option, simple regimen with aggressive patient education and prompt follow-up)

- **Indications for endocrine consultation**
  - Labile blood glucose levels, poor glycemic control, prolonged period of nothing by mouth, question of type 1 or type 2 diabetes


Effect of a Targeted Glycemic Management Program

Provider Response to Inpatient Hyperglycemia – One Example

- Severe hyperglycemia identified in 29% of patients on general medicine inpatient units; appropriate action taken in 33% by primary team
- Most common causes:
  - Discontinuation of preadmission diabetes medications
  - Inadequate insulin dose adjustments
  - Initiation of corticosteroid therapy
  - Use of sliding scale insulin for >48 hours
- TGM service favorably influenced glycemic management practices and improved glycemic control