Implementing a Pharmacy Consult Model for Multimodal Insulin Therapy

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BACKGROUND

Hyperglycemia has been associated with increased thrombosis, increased pain sensation, decreased wound healing and decreased immune response. For these reasons and others, the American Diabetes Association recommends that non-critically ill hospitalized patients be treated with multimodal insulin therapy to prevent blood glucose levels from rising above 180mg/dL.

OBJECTIVE

In order to address this recommendation, the Pharmacy Department developed a multimodal insulin therapy service for inpatients who have had two blood glucose levels >180mg/dL within any 12 hour period. The goal of the service was to attain a daily blood glucose average < 180 mg/dL by day three of the pharmacy consult.

METHODS

MULTIMODAL INSULIN PROTOCOL (MMIP)

**MMIP DAILY DOSE ADJUSTMENTS**

<table>
<thead>
<tr>
<th>Glucose-POC Average Past 24hrs</th>
<th>Insulin Use Past 24hrs</th>
<th>Decision</th>
<th>BASE Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120 mg/dL</td>
<td>New-TDD&lt; TDD</td>
<td>DECREASE New TDD by 20%</td>
<td>Lower New-TDD</td>
</tr>
<tr>
<td>121 to 140 mg/dL</td>
<td>New-TDD &lt; TDD</td>
<td>USE New-TDD</td>
<td>Equivalent New-TDD</td>
</tr>
<tr>
<td>141 to 180 mg/dL</td>
<td>No Change</td>
<td>USE Same Regimen</td>
<td>Do not use New-TDD</td>
</tr>
<tr>
<td>181 to 250 mg/dL</td>
<td>New-TDD &gt; TDD</td>
<td>INCREASE New-TDD by 30%</td>
<td>Higher New-TDD</td>
</tr>
<tr>
<td>250 to 350 mg/dL</td>
<td>New-TDD &gt; TDD</td>
<td>INCREASE New-TDD by 15%</td>
<td>Higher New-TDD</td>
</tr>
<tr>
<td>&gt;350 mg/dL</td>
<td>New-TDD &gt; TDD</td>
<td>INCREASE New-TDD by 10%</td>
<td>Higher New-TDD</td>
</tr>
</tbody>
</table>

**INCLUSION CRITERIA**

- Non-ICU patients
  - Medical Units
  - Surgical Units
- Patients with moderate risk
  - BG >180mg/dL x2 within 12 hours
  - Glucose-POC (point of care glucometer tests)
  - Laboratory blood glucose level
- Length of treatment > 3 days
  - Where Day 0 (first partial day of treatment) is not included.
  - Date calculated from pharmacy consult order.
  - Date calculated from initial physician hypoglycemia management order.

**MMIP KEY TENANTS**

- Dosing
  - Basal = ½ TDD
  - Nutritional = Basal/3 given with meals
  - Correctional Scales: HIGH >80 units TDD, MED 40 – 80 units TDD, LOW<40 units TDD

**RESULTS**

A weight-based insulin dosing protocol was developed for calculating and adjusting nutritional and basal insulin needs. All pharmacists passed an MMIP competency assessment prior to beginning the program. Over a 90 day period, pharmacists managed 158 patients with a length of treatment ≥ 3 days. Pharmacy consults were acquired through follow-up phone calls or direct physician computer order entry. Hypoglycemia Alerts, previously being sent only to physicians, were routed to the pharmacy department as well. These alerts notified the pharmacist that a patient had met criteria to start the MMIP. The goal of a blood glucose daily average <180mg/dL by day three of treatment was accomplished by the second month of the service.

**CONCLUSIONS**

The MMIP implemented by our Pharmacy Department provided a valuable tool offering pharmacists an opportunity to safely and effectively manage hyperglycemic patients. When the daily average blood glucose level was used for assessment, pharmacy managed patients attained similar blood glucose end points as physician dosed patients. Accomplishing our goal of a daily blood glucose average <180mg/dL by day three of the consult shows that the entire pharmacy team was able to proficiently utilize the multimodal insulin protocol.

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