Evaluation of calcitonin utilization in a tertiary healthcare setting

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OBJECTIVES / PURPOSE
• Evaluate the prescribing patterns of calcitonin use
• Conduct a cost-savings analysis on potential benefits of order standardization
• Create a hospital-wide order set to govern future prescribing

INTRODUCTION
• Calcitonin costs have increased dramatically in recent years, warranting a review of its prescribing patterns
  ➢ Currently, one vial costs $2,138.49
• Calcitonin is a highly efficacious method for the acute treatment of hypercalcemia, while waiting for bisphosphonates to take effect (within 2-4 days after administration)1
• The serum calcium lowering effects of calcitonin are typically observed within 4 hours of administration, but use is limited due to tachyphylaxis after 48-72 hours1,2
• Calcitonin is commonly used inappropriately for the treatment of osteoporosis vertebral compression fractures (OVCF) and osteoporosis3,4
• Enforcing prescribing restrictions would result in considerable cost-savings for the hospital and patients without negatively impacting treatment efficacy

METHODS
• Retrospective analysis for a 2.5 year period (01/01/2014 to 06/30/2016), was conducted for all patients with calcitonin orders
• Patients who received at least one dose were subdivided by means of the following indications:
  ➢ Hypercalcemia
  ➢ OVCF
  ➢ Osteoporosis
• Literature and guidelines were analyzed to determine appropriateness of indications and prescribing patterns
• Information was used to conduct a cost-savings analysis

RESULTS

<table>
<thead>
<tr>
<th>Indication</th>
<th>Literature/Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypercalcemia</td>
<td>Recommended for first 2-4 days for patients with corrected calcium levels of 12 mg/dL or greater</td>
</tr>
<tr>
<td>OVCF</td>
<td>Common analgesics should be used first-line for OVCF pain. Head-to-head study showed non-inferiority when compared to pamidronate3</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>Not recommended by FDA due to malignancy risk and lack of efficacy4</td>
</tr>
</tbody>
</table>

Number of Calcitonin Orders | 68
Patients Who Received Medication | 32 (47%)

Orders Approved by Indication

<table>
<thead>
<tr>
<th>Indication</th>
<th>48 Hours or Less</th>
<th>&gt;48 to 72 Hours</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypercalcemia</td>
<td>19</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>OVCF</td>
<td>7</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Cost-Savings Analysis Results

<table>
<thead>
<tr>
<th>Duration</th>
<th>Savings Analysis Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>48-hour restriction</td>
<td>$39,480/year</td>
</tr>
<tr>
<td>72-hour restriction</td>
<td>$32,760/year</td>
</tr>
</tbody>
</table>

DISCLOSURES

The authors of this presentation have the following to disclose: no conflict of interest, no financial or indirect interest in the subject matter of this presentation.

CONCLUSION
• A hypercalcemia order set was developed to implement prescribing restrictions and encourage responsible calcitonin use
• Current literature and restrictions from other surveyed hospitals were used in the development of this order set, which limits calcitonin use to 72 hours and restricts it to severe cases of hypercalcemia

Proposed Order Set Information:
Severe hypercalcemia (ionized calcium >2.5 mmol/L, Corrected calcium >14 mg/dL)

Saline Hydration
• 0.9% NS: 200 mL/hr
  ➢ Maintain urine output at 100-150 mL/hr

Zoledronic Acid
• 4 mg in 100 mL NS
  ➢ Administer IV over 15 minutes
  ➢ Creatinine must be ≤ 4.5 mg/dL
  ➢ May re-dose if serum calcium remains ≥ 12 mg/dL after 7 days
  ➢ Do not use if history of osteonecrosis of the jaw

Calcitonin
• Dose
  ➢ 4 IU/kg every 12 hrs
  ➢ MAX: 8 IU/kg every 6 hrs
  ➢ Pharmacy may round to nearest vial size
  ➢ Duration:
    ➢ MAX: 72 hrs
    ➢ Obtain new serum Ca 6 hrs after administration
    ➢ May increase dose if serum Ca has not decreased by ≥ 1 mg/dL

Laboratory
• Ionized Ca STAT, and every 6 hrs for first 24 hrs
  ➢ Ionized Ca every AM, after initial 24 hrs

Telemetry
• Initiate if serum Ca > 12 mg/dL
  ➢ May discontinue if serum Ca falls below 12 mg/dL

Activity
• Progressive, weight-bearing ambulation

REFERENCES