Improving Safety Practices
Anticoagulation Therapy

Katie Cinnamon, PharmD, BCPS
Clinical Pharmacist
Genesis Medical Center - Davenport

Objectives

• Review background information on medication errors and Joint Commission National Patient Safety Goal Elements of Performance specifically related to anticoagulants
Objectives

• Describe specific interventions implemented to improve anticoagulation management at Genesis
• Identify metrics that will assist in performance improvement efforts

Anticoagulation Medication Errors
To Err Is Human

• Nearly 100,000 in-hospital deaths from medical errors occur annually

• 7,000 are attributed to errors involving medications


Anticoagulation Medication Errors

• U.S. Pharmacopeia (USP) MEDMARX® program
  • January 1, 2001 - December 31, 2006
  • 59,316 medication errors related to anticoagulants were reported
Anticoagulation Medication Errors

• Phases Where Errors Originated
  • Administration – 36.2%
  • Transcribing & Documenting – 27.1%
  • Prescribing – 16.9%
  • Dispensing – 16.5%
  • Monitoring – 3.2%

Anticoagulation Medication Errors

• *Heparin* and *warfarin* were listed under the top 10 drug products involved in medication errors by USP in 2003

• Antithrombotic agents were categorized as “High-Alert Medications” by the Institute for Safe Medication Practices (ISMP) in 2008
Anticoagulation Medication Errors

• In 2007, Joint Commission (JC) published the 2008 National Patient Safety Goals (NPSGs) and included a goal related to anticoagulation therapy

Joint Commission National Patient Safety Goal .03.05.01

http://www.jointcommission.org/standards_information/npsgs.aspx
Joint Commission National Patient Safety Goals (NPSG)

• NPSG.03.05.01 – *To reduce the likelihood of patient harm associated with the use of anticoagulant therapy.*

• Rationale
  • Anticoagulants are more likely to cause harm
  • Potential to positively impact patient safety

Joint Commission National Patient Safety Goals (NPSG)

• Elements of Performance
  • Use only unit-dose products, prefilled syringes, or premixed infusion bags when available
  • Use approved protocols for the initiation and maintenance of anticoagulant therapy
  • Before starting a patient on warfarin, assess the patient’s baseline coagulation status
Joint Commission National Patient Safety Goals (NPSG)

- For all patients receiving warfarin therapy, use an INR to adjust therapy
- Document baseline and current INR results in the medical record
- Use authoritative resources to manage potential food and drug interactions for patients receiving warfarin

Joint Commission National Patient Safety Goals (NPSG)

- When heparin is administered by continuous IV infusion, use programmable pumps
- A written policy addresses baseline and ongoing laboratory tests that are required for anticoagulants
Joint Commission National Patient Safety Goals (NPSG)

- Provide education regarding anticoagulant therapy to prescribers, staff, patients, and families
  - The importance of follow-up monitoring
  - Compliance
  - Drug-food interactions
  - The potential for adverse drug reactions and interactions

Joint Commission National Patient Safety Goals (NPSG)

- Evaluate, take action to improve safety practices, and measure effectiveness of those actions
Interventions Implemented to Decrease Medication Errors

*Genesis Pharmacy Department*

Methods Created to Reduce Anticoagulant Medication Errors

- 2009 – Pocket cards distributed to physicians and pharmacists
  - Warfarin Initiation Guidelines
  - Recommendations for Managing Elevated INRs or Bleeding in Patients on Warfarin
Methods Created to Reduce Anticoagulant Medication Errors

- **January 2010** – Anticoagulation monitoring by clinical pharmacists at all Genesis hospitals
  - Daily Warfarin Clinical Monitoring Report
  - Review of treatment-dose enoxaparin, heparin, fondaparinux, dabigatran, and rivaroxaban

Methods Created to Reduce Anticoagulant Medication Errors

- **May 2010** – Alerts created for heparin and enoxaparin for pharmacists during medication order entry
Methods Created to Reduce Anticoagulant Medication Errors

• **May 2010** – Alerts created for heparin and enoxaparin for pharmacists during medication order entry

![Anticoagulant - INR Information](image)

Methods Created to Reduce Anticoagulant Medication Errors

• **October 2010** – Alert created for warfarin for pharmacists during medication order entry

![Warfarin - INR Information](image)
Methods Created to Reduce Anticoagulant Medication Errors

- **October 2010** – Alert created for warfarin for pharmacists during medication order entry

- **Fall 2010 and 2011** – Presentation given on anticoagulation therapy to nursing staff at the “4th Annual Recognizing the Specialty of Medical Surgical Nursing Conference”

- Anticoagulation poster presented at Nursing Skills Labs and Nursing Orientation
Methods Created to Reduce Anticoagulant Medication Errors

• **February 2011** – Pharmacists completed online education module and competency exam relating to anticoagulation therapy
• **2011** – Select pharmacists completed an extended experiential training program

Performance Improvement Metrics

*Genesis Medical Center - Davenport*
Medication Errors

- Anticoagulants
  - Warfarin
  - Enoxaparin
  - Heparin
- Reviewed medication errors occurring and doses dispensed from July 2008-June 2011
- **Medication Error Rate** = 
  \# Errors/10,000 Doses

Medication Errors Associated with Enoxaparin
Medication Errors Associated with **Heparin**

![Heparin Medication Error Rate Graph]

Medication Errors Associated with **Warfarin**

![Warfarin Medication Error Rate Graph]
Medication Errors Associated with Anticoagulants
Enoxaparin, Heparin, and Warfarin

Discussion

- Enoxaparin, heparin, and warfarin error rates have increased slightly over the time period
  - Increased awareness/education?
  - Increased reporting of errors?
Discussion

• The Overall Anticoagulant error rate and the Enoxaparin error rate appear smaller than error rates for Heparin and Warfarin
  • Higher volume of Enoxaparin dispensed

Medication Error Type, Phase, and Severity
Medication Errors associated with Anticoagulants
July 2008 – June 2011

<table>
<thead>
<tr>
<th>Medication Error Type</th>
<th>Lovenox</th>
<th>Heparin</th>
<th>Warfarin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong Dose/Quantity</td>
<td>17</td>
<td>40</td>
<td>26</td>
<td>83</td>
</tr>
<tr>
<td>Omission/Ordered, Not Admin</td>
<td>18</td>
<td>14</td>
<td>28</td>
<td>60</td>
</tr>
<tr>
<td>Not Ordered</td>
<td>3</td>
<td>11</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>Discontinued but Given</td>
<td>11</td>
<td>7</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>Wrong Time</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Wrong Drug</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Wrong Med Dosage Form</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Deteriorated/Expired Product</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Wrong Patient</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>All</td>
<td>66</td>
<td>80</td>
<td>72</td>
<td>218</td>
</tr>
</tbody>
</table>

Medication Errors associated with Anticoagulants
July 2008 – June 2011

<table>
<thead>
<tr>
<th>Medication Error Phase</th>
<th>Lovenox</th>
<th>Heparin</th>
<th>Warfarin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administering</td>
<td>12</td>
<td>54</td>
<td>17</td>
<td>83</td>
</tr>
<tr>
<td>Transcribing/Documenting</td>
<td>26</td>
<td>8</td>
<td>32</td>
<td>66</td>
</tr>
<tr>
<td>Prescribing</td>
<td>19</td>
<td>9</td>
<td>16</td>
<td>44</td>
</tr>
<tr>
<td>Dispensing</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Monitoring</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>All</td>
<td>66</td>
<td>80</td>
<td>72</td>
<td>218</td>
</tr>
</tbody>
</table>

Medication Error Severity
July 2008 – June 2011

<table>
<thead>
<tr>
<th>Medication Error Severity</th>
<th>Lovenox</th>
<th>Heparin</th>
<th>Warfarin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-Event, no harm</td>
<td>43</td>
<td>55</td>
<td>36</td>
<td>134</td>
</tr>
<tr>
<td>D-Event require monitor/intervene to</td>
<td>21</td>
<td>22</td>
<td>35</td>
<td>78</td>
</tr>
<tr>
<td>eliminate possible harm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Event causing temporary harm &amp;</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>66</td>
<td>80</td>
<td>72</td>
<td>219</td>
</tr>
</tbody>
</table>
Medication Errors associated with Anticoagulants

Severity of Medication Error by Anticoagulant over time:

<table>
<thead>
<tr>
<th></th>
<th>Stage 1 Jul08-Jun09</th>
<th>Stage 2 Jul09-Jun10</th>
<th>Stage 3 Jul10-Jun11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lovenox</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total #</td>
<td>17</td>
<td>23</td>
<td>26</td>
</tr>
<tr>
<td>% &gt; D</td>
<td>35.3%</td>
<td>34.8%</td>
<td>34.6%</td>
</tr>
<tr>
<td>Heparin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total #</td>
<td>20</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>% &gt; D</td>
<td>45.0%</td>
<td>34.6%</td>
<td>20.6%</td>
</tr>
<tr>
<td>Warfarin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total #</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>% &gt; D</td>
<td>54.2%</td>
<td>62.5%</td>
<td>33.3%</td>
</tr>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total #</td>
<td>61</td>
<td>73</td>
<td>84</td>
</tr>
<tr>
<td>% &gt; D</td>
<td>45.9%</td>
<td>43.8%</td>
<td>28.6%</td>
</tr>
</tbody>
</table>

Limitations of Study Data

- Inconsistency in the calculation of “medication errors”
- Voluntary reporting system
- Increased awareness and reporting
References


