Anticoagulant Project

Funded by the Ontario Ministry of Health and Long-Term Care

Acknowledgements

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Expert Panel

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Marita Tonkin, Hamilton Health Sciences Centre, Hamilton
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Kris Wichman, ISMP Canada
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Medication Safety Support Service (MSSS) Advisory Group

- Ontario Ministry of Health and Long-Term Care
- Ontario College of Pharmacists
- Canadian Society of Hospital Pharmacists - Ontario Branch
- College of Physicians and Surgeons of Ontario
- Ontario Medical Association
- Ontario Hospital Association
- Institute for Safe Medication Practices Canada
- Registered Nurses Association of Ontario
- College of Nurses of Ontario
- Ontario Pharmacists’ Association

Anticoagulation Strategies

Need to Anticoagulate.....

Need to Anticoagulate SAFELY.....

- Patient with a triple lumen central venous access device
- Received heparin flush in each lumen 3 times daily
- Post op day 5, aPTT > 180 seconds
- Outcome - Intracranial hemorrhage

Case #2 - ISMP Safety Alert, September 21, 2006

- Neonatal ward in Mid Western US hospital
- Heparin 10,000 units / mL improperly stocked in dispensing cabinet for 10 units / mL vial
- Products look similar
- Nurses flushed with incorrect product
- Outcome - 3 premature infant deaths

Questions:

- Is there a problem?
- Why so many choices?
- What is the current state of heparin storage in Ontario?
- What is contributing to the current usage patterns?
- How can we improve storage?
Heparin-Related Products

- Low Molecular Weight Heparins
  - Enoxaparin
  - Dalteparin
  - Tinzaparin
  - Nadroparin
- Fondaparinux

Heparin Uses

<table>
<thead>
<tr>
<th>Heparin Uses</th>
<th>Heparin IV</th>
<th>Heparin 1,000 units in 10 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE prophylaxis</td>
<td>Heparin SC or LMWH SC</td>
<td>Heparin 5,000 units SC or LMWH 2,500 to 5,000 anti Xa units SC</td>
</tr>
<tr>
<td>VTE treatment</td>
<td>Heparin bolus plus infusion</td>
<td>Heparin 5,000 units IV followed by 1,000 units per hour (approx)</td>
</tr>
<tr>
<td>LMWH SC</td>
<td>LMWH 15,000 units SC (approx)</td>
<td></td>
</tr>
</tbody>
</table>

Heparin Error Potential

Number of products \( \times \)
Number of concentrations \( \times \)
Number of uses / formats

Current Heparin Storage

Canadian Hospital Survey
- 29 question survey sent to 856 healthcare facilities across Canada
- Addressing a variety of anticoagulant topics including heparin storage
- Response:
  - 119 responses nation-wide
  - Representing 38,350 hospital beds
Current Heparin Storage

Utilization of Heparin 1,000 units / 10 mL (100 units/mL)

Pharmacy
Medicine
Surgery
Dialysis
Cardiology
Emergency
OR
ICU

Percent

Utilization of Heparin 10,000 units / 10 mL (1,000 units/mL)

Percent

Utilization of Heparin 10,000 units / 1 mL

Utilization of Heparin 50,000 units / 5 mL (10,000 units/mL)

Percent

Anticoagulant Safety Survey
Number of Responses by Site Size (n=97)
Current Heparin Storage

Summary

- High dose / concentration products prevalent
- Stocked with lower dose products (flushes)
- Few interventions made

Intervention

The Goal

- Ensure appropriate use of heparin
- Develop safety strategies to minimize selection errors

Recommendations

- Complete an audit of heparin storage throughout hospital
- Ensure appropriate use of heparin
- Reduce the number of potential high-risk situations in patient care areas

ISMP Canada

Resource Kit Development

- Expert advisory panel formed
  - Develop process to achieve goals
  - Identifying / creating tools to facilitate
    - Analysis
    - Product choices
    - Information sharing

Recommendation 1: Heparin Audit

Systematic Process for Heparin Review

1. Existing Heparin Storage
   - All patient care areas
2. Remove infrequently used products
**Recommendation 2: Appropriate Use**

2. Determine appropriate heparin usage
   - Standardize by indication

Considerations:
- VTE prophylaxis re evidence-based guidelines
- Increase use
- Consider LMWH use
- Peripheral intravenous line flush
- Decrease use

**Recommendation 3: Reduce Heparin Risk**

- Remove formats of high dose heparin products from stock in patient care areas:
  - 50,000 units/5 mL
  - 50,000 units/2 mL
- Review and reduce, where possible, availability of the following products in patient care areas:
  - 10,000 units/1 mL
  - 10,000 units/10 mL
- Develop strategy to minimize number of concentrations in patient care areas
  - Stocking both heparin flushes and SC/IV doses

**Recommendation 3: Reduced Heparin Risk**

- Determine proposed heparin utilization
  - Limit number of products by patient area
- Determine proposed heparin storage
  - Utilize separation, labelling and other techniques to differentiate products

**Audit and Assessment Tool**

- Step by step approach
- Documentation (pre and post)
- Impact analysis

**Cost Analysis**

**Costs – Single dose**

<table>
<thead>
<tr>
<th>Heparin Format</th>
<th>Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin 5,000 unit pre-filled syringe (Healthmark)</td>
<td>$2.00</td>
</tr>
<tr>
<td>Heparin 5,000 / 0.2 mL amp</td>
<td>$1.29</td>
</tr>
<tr>
<td>Heparin 10,000 units / 1 mL vial</td>
<td>$1.34</td>
</tr>
<tr>
<td>Heparin 50,000 units / 2 mL vial</td>
<td>$0.92</td>
</tr>
<tr>
<td>Heparin 50,000 units / 5 mL vial</td>
<td>$0.38</td>
</tr>
<tr>
<td>Heparin 500 unit pre-filled syringe (Healthmark)</td>
<td>$0.87</td>
</tr>
<tr>
<td>Heparin 1,000 units / 10 mL</td>
<td>$1.90</td>
</tr>
</tbody>
</table>

*Based on average contract prices

**Estimated annual costs for VTE prophylaxis**

<table>
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<th>Heparin Format</th>
<th>Cost*</th>
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</thead>
<tbody>
<tr>
<td>Heparin 5,000 unit pre-filled syringe (Healthmark)</td>
<td>$93,659</td>
</tr>
<tr>
<td>Heparin 5,000 / 0.2 mL amp</td>
<td>$60,410</td>
</tr>
<tr>
<td>Heparin 10,000 units / 1 mL vial</td>
<td>$62,752</td>
</tr>
<tr>
<td>Heparin 50,000 units / 2 mL vial</td>
<td>$43,083</td>
</tr>
<tr>
<td>Heparin 50,000 units / 5 mL vial</td>
<td>$17,795</td>
</tr>
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*Assuming average VTE prophylaxis rates in a 400 bed acute care facility
LMWH Storage

- Currently either multidose vials or pre-filled syringes
- Multidose vials pose a safety threat
  - May be more concentrated
  - Represents large drug quantity per vial
- No cost differential for pre-filled syringes

Heparin Safety Strategies Experience

Pilot Site: Royal Victoria Hospital of Barrie

Judy Chong

Implementation

General Strategies

- Safe Medication Practices committee endorses removal of high concentration heparin products
  - Review of products, indications and order sets
  - Educate and collaboratively remove high concentration heparin from stock
  - Minimize stock of heparin products
    - Individual patient prescriptions where possible

Royal Victoria Hospital Experience

- Protocol driven practices using pathways
- Use of LMWH
- Use of 5,000 unit pre-filled syringes
- Use of sodium citrate for renal patients

Implementation

Royal Victoria Hospital Experience

- Successes
  - Greater awareness in organization of safety issues with high concentration heparin
  - Collaboration of medical, nursing and pharmacy staff
  - Support of patient care areas to standardized protocols and pre-loaded syringes

- Challenges
  - Time for consultation process
  - Storage space on units
  - Additional costs for pre-filled syringes
  - Unique renal unit needs
Implementation

Royal Victoria Hospital Experience

- Next Steps
  - Continue to work with patient care areas to remove stock heparin
  - Provide products on a patient specific basis
  - Continue to work with pathways to review protocols
  - Evaluate usage

Questions?