Implementation Of Alaris Guardrails® For The Prevention Of Infusion Related Medication Errors

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Introduction
- In recent years, there have been many technological advances in IV Medication Safety – Guardrails® Software
- IV Drug Information Library prevents dose-related IV medication errors
- CQI Software
- Records “Near Miss” IV medication error events
- Studies indicate that there are 1.1 potentially life-threatening and 1.5 probably significant IV medication errors prevented per every 1,000 patient days with smart pumps

Purpose
- The primary objective of this project was to implement Guardrails® at TJUH to prevent infusion related errors
- Secondary objectives included:
  - Assess compliance with use of Guardrails®
  - Apply IV Medication Harm Index to TJUH institutional data from Alaris Guardrails Software
  - Determine frequency and potential clinical severity of “Near Miss” IV medication errors

Methodology
- Developed data sets
  - Identified all continuous infusion medications
  - Obtained feedback on dosing limits from physicians, pharmacists, nurses, standardized doses already in place, and references
  - Placed medication into appropriate profile(s) (critical care, med/surg, ICN, etc.)
  - Tall man lettering to enhance medication safety
  - i.e. Dopamine vs. Dobutamine
- Obtained Pharmacy & Therapeutics (P&T) committee approval
  - Presented to respective multidisciplinary subcommittees and P&T committee
  - Nurses tested “user friendliness” of pumps prior to implementation
- Implemented Guardrails®
  - Uploaded Guardrails® software with data set into approximately 1,000 pumps
  - Assessed compliance
    - Performed audit to assess whether Guardrails® software is being used in appropriate situations (hospital policy requires use of Guardrails® when the drug is in the drug library)
    - Obtained CQI data
      - Downloaded data from 154 IV pumps which detailed alerts and overrides
      - Phase One
      - Clinical interpretive analysis (“cleansing”) of data downloaded from CQI software
      - Phase Two
      - Application of IV Medication Harm Index (clinical severity rating scale)

Results
- Compliance Audit
  - Initial audit conducted two weeks post-implementation
  - 91% of pumps were in correct profile
  - 60% of applicable infusions were using Guardrails®
  - The majority of instances in which Guardrails® was not used involved parental nutrition and electrolyte riders
- CQI data downloaded from a sample of 154 IV pumps
  - Total of 1,534 events
  - Data reviewed by Critical Care/Medical Clinical Nurse Specialists and Pharmacy Clinical Experts
  - Idiosyncratic clinical practice applications removed
  - Bolusing of propofol, fentanyl, midazolam
  - Vasoactive Drug Titration
  - Weight-based furosemide dosing issues
  - Total of 80 actual “Near Miss” events identified

IV Medication Harm Index (Clinical Severity Rating Scale)

<table>
<thead>
<tr>
<th>Level of Care</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Medical, Surgical, Other</td>
<td>1</td>
</tr>
<tr>
<td>Adult ICU/Telemetry</td>
<td>ICU and telemetry beds</td>
<td>2</td>
</tr>
<tr>
<td>PICU or NICU</td>
<td>Peds ICU or Neonatal ICU</td>
<td>3</td>
</tr>
</tbody>
</table>

Detectability: Likely (1) Unlikely (2)

IV Medication Harm Index Scale
Summated Score Range = 3.5-14

Medications with Highest Harm Score

<table>
<thead>
<tr>
<th>Drug</th>
<th>Mean Harm Score</th>
<th>Standard Deviation (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl</td>
<td>13</td>
<td>0</td>
<td>13-13</td>
</tr>
<tr>
<td>Heparin</td>
<td>12.4</td>
<td>0.55</td>
<td>12-13</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>11.5</td>
<td>2.12</td>
<td>10-13</td>
</tr>
<tr>
<td>Insulin</td>
<td>10.29</td>
<td>1.75</td>
<td>6-12</td>
</tr>
<tr>
<td>Potassium Chloride</td>
<td>9.29</td>
<td>2.2</td>
<td>6-13</td>
</tr>
<tr>
<td>Dopamine</td>
<td>8</td>
<td>1.41</td>
<td>7-9</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>8</td>
<td>1.41</td>
<td>7-9</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>7.8</td>
<td>1.1</td>
<td>7-9</td>
</tr>
<tr>
<td>Nesiritide</td>
<td>7</td>
<td>0</td>
<td>7-7</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>6</td>
<td>1.41</td>
<td>5-7</td>
</tr>
</tbody>
</table>

Medications with Highest Frequency Score

<table>
<thead>
<tr>
<th>Drug</th>
<th>Frequency Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin</td>
<td>23.75% (19/80)</td>
</tr>
<tr>
<td>Potassium Chloride</td>
<td>21.25% (17/80)</td>
</tr>
<tr>
<td>Heparin</td>
<td>6.25% (5/80)</td>
</tr>
<tr>
<td>Phenylephrine</td>
<td>6.25% (5/80)</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>6.25% (5/80)</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>3.75% (3/80)</td>
</tr>
<tr>
<td>Nesiritide</td>
<td>3.75% (3/80)</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>3.75% (3/80)</td>
</tr>
</tbody>
</table>

Conclusion
- The use of smart pumps can greatly reduce the incidence of infusion related medication errors
- Systematic data provides opportunity for evidence-based educational interventions and practice applications
- Confirmation of high risk drugs as identified by The Joint Commission
- Verification of necessity for double checks of heparin and insulin

Disclosures
- The authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have direct or indirect interest in the subject matter of this presentation:
  - E. Fitzpatrick – Nothing to Disclose
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  - B. Ravenstahl – Nothing to Disclose
  - P. Varghese – Nothing to Disclose
  - C. Senholzi – Nothing to Disclose
  - J. Sullivan – Nothing to Disclose

References