Preparing for Integration of Your Electronic Health Record with Your Smart Infusion Pumps

March 6, 2017
AAMI Foundation

**Vision:** To drive the safe adoption and safe use of healthcare technology

**National Coalition for Infusion Therapy Safety**

**Quick Guides**

**Optimizing Patient Outcomes**

**Improving the Safe Use of Multiple IV Infusions**

[http://www.aami.org/thefoundation](http://www.aami.org/thefoundation)

2 more coming soon!  How to Improve Compliance With Smart Pump Drug Libraries and…..Reducing Non-Actionable Smart Pump Alarms
A Special Thanks
Thank You to Our Premiere Industry Partners

Without the generous support of our industry partners, we would not be able to produce the many tools and deliverables created by the coalition to help you improve infusion therapy safety. The AAMI Foundation is managing all costs for the series. The seminar does not contain commercial content.
LinkedIn Questions

Join our group

Please post questions on the
AAMI Foundation’s LinkedIn page.

OR

Type a question into the question box on the webinar dashboard.
Polling Questions
Speaker Introductions

Tina M. Suess, MHA, BSN, RN-BC, CPHIMS
Manager Medication Safety Integration,
Lancaster General
Smart Pump Integration
• Located in south central Pennsylvania
• Beds: 689
• Inpatient discharges: 35,282
• Emergency Visits: 116,500
• Ambulatory Visits: 1,2 Million
• Employees: More than 7,600
• Physicians: More than 900
Medication Safety and Infusion Pump Journey

- BCMA Live
- Mother's milk scanning
- Hospira Smart Pumps w/ drug library
- Cerner Bridge-Hospira Smart Pump auto-programming
- Epic-Hospira Auto-programming - all elements of med order; bi-directional pump integration
- Epic-Hospira Auto-programming of drug ID
- Epic-Hospira Pump Rate Verify-all pump actions interface to Epic
- PCA Integration - bidirectional interface
Learning From Smart Pump Data

<table>
<thead>
<tr>
<th>Medication/Concentration</th>
<th>Frequency</th>
<th>Total Alerts</th>
<th>Lower Total</th>
<th>Upper Total</th>
<th>Lower Total</th>
<th>Lower Override</th>
<th>Lower Edit</th>
<th>Upper Total</th>
<th>Upper Override</th>
<th>Upper Edit</th>
<th>Confirmed</th>
<th>Changed</th>
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<tbody>
<tr>
<td>Infliximab 400 mg/290 mL</td>
<td>6</td>
<td>1</td>
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<td>0</td>
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<td>0.0%</td>
<td>1</td>
<td>100%</td>
<td>0.0%</td>
<td>6</td>
<td>100%</td>
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<tr>
<td>Infliximab 500 mg/300 mL</td>
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<td>1</td>
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<td>0</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>1</td>
<td>100%</td>
<td>0.0%</td>
<td>4</td>
<td>100%</td>
</tr>
<tr>
<td>Infliximab 300 mg/260 mL</td>
<td>3</td>
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<td>0</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Infliximab 350 mg/305 mL</td>
<td>1</td>
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<td>0</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Infliximab 900 mg/940 mL</td>
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<td>0</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Insulin 100 units/100 mL</td>
<td>1267</td>
<td>55</td>
<td>0</td>
<td>12</td>
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<td>0.0%</td>
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<td>43</td>
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<td>1263</td>
<td>99.68%</td>
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<td>Iron Sucrose 300 mg/165 mL</td>
<td>24</td>
<td>5</td>
<td>0</td>
<td>0</td>
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<td>0.0%</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>24</td>
<td>100%</td>
</tr>
<tr>
<td>Iron Sucrose 200 mg/160 mL</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>7</td>
<td>100%</td>
</tr>
<tr>
<td>Iron Sucrose 100 mg/155 mL</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1</td>
<td>100%</td>
</tr>
</tbody>
</table>
### Smart Pump Integration

<table>
<thead>
<tr>
<th>Problem</th>
<th>Number reported</th>
<th>Addressed by smart pump drug libraries?</th>
<th>Addressed by pump integration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong concentration</td>
<td>29</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Wrong entry of more than one parameter</td>
<td>19</td>
<td>Yes, if it triggers an alert</td>
<td>Yes</td>
</tr>
<tr>
<td>Secondary (piggyback) infusion setup error</td>
<td>15</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Wrong weight</td>
<td>8</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Wrong rate</td>
<td>8</td>
<td>Yes, if it triggers an alert</td>
<td>Yes</td>
</tr>
<tr>
<td>Pump is not turned on</td>
<td>6</td>
<td>No</td>
<td>No*</td>
</tr>
<tr>
<td>Wrong drug</td>
<td>6</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Set is not connected to patient</td>
<td>4</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Wrong dose</td>
<td>1</td>
<td>Yes, if it triggers an alert</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Integrated pumps use Integrating the Healthcare Enterprise’s Point-of-Care Infusion Verification (IHE PIV) messaging, which, while not enabling a pump to be turned on automatically, includes the capability for the pump server to return an error message to the BPOC system indicating that the pump is not turned on.
Goals & Opportunities

• Goals
  • Safety – Reduce/eliminate IV medication errors
  • Efficiency
  • Meaningful data capture
    • Link between patient, order, and pump
• Opportunities (Realizations)
  • Manual pump programming…17 steps
  • Nurse can “document” one thing… but program pump differently
  • Drug Library Compliance
    • No connection to the order
    • Rule violation
    • Can still have an error when using the drug library
  • Inconsistency
  • Eliminate the human variability with infusion administration
Bidirectional – Two Pathways

- From EMR to the Pump (Autoprogramming)
  - Elements of the IV Order “autopopulate” the pump
    - Drug
    - Concentration
    - Dose/Rate
    - Volume to be infused
    - Patient Weight

- From Pump to EMR (Pump Rate Verify)
  - Documentation of events that have happened on pump
  - Volume (what pump has actually pumped)
  - What is the role of this in infusion safety?
### Pump Programming Steps

<table>
<thead>
<tr>
<th>Manual Process (17 steps)</th>
<th>Auto-programming (7 steps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Scan patient</td>
<td>• Select CCA</td>
</tr>
<tr>
<td>• Scan medication and complete required fields</td>
<td>• Scan patient</td>
</tr>
<tr>
<td>• Manually document in eMAR/BCMA</td>
<td>• Scan medication and complete required fields</td>
</tr>
<tr>
<td>Program pump:</td>
<td>• Scan pump channel</td>
</tr>
<tr>
<td>• Select CCA</td>
<td>• Press start</td>
</tr>
<tr>
<td>• Select line</td>
<td>• Select ‘Yes’ to confirm</td>
</tr>
<tr>
<td>• Press drug list</td>
<td>• Press ‘OK’ to document in eMAR/BCMA</td>
</tr>
<tr>
<td>• Scroll to find medication</td>
<td></td>
</tr>
<tr>
<td>• Press standard program</td>
<td></td>
</tr>
<tr>
<td>• Select dosing units</td>
<td></td>
</tr>
<tr>
<td>• Enter concentration (3 steps)</td>
<td></td>
</tr>
<tr>
<td>• Enter weight</td>
<td></td>
</tr>
<tr>
<td>• Enter dose</td>
<td></td>
</tr>
<tr>
<td>• Enter volume to be infused</td>
<td></td>
</tr>
<tr>
<td>• Press start</td>
<td></td>
</tr>
<tr>
<td>• Select ‘Yes’ to confirm</td>
<td></td>
</tr>
</tbody>
</table>
Workflow

CPOE – Pharmacist verifies order
Order transmitted to MAR

Infusion data available in EMR for clinician review and documentation

5 Rights - Clinician scans bar code of patient and med
System settings dictate if clinician is presented with EMR interoperability pathway

Clinician scans pump channel barcode

Infusion parameters (drug, concentration, dose, VTBI, weight) populate on pump

Wireless upload of infusion parameters to pump; electronically matching drug library

Pump settings compared to order

Clinician verifies populated settings and starts infusion

Infusion data available in EMR for clinician review and documentation
• Ability to accurately charge for IV Infusions
  • Med Admin Fee – Charge for the oversight of the infusion
    • ED to Inpatient
    • Observation Patients
    • Significant gap in our ability to charge based on missing or inaccurate stop times
• Pump Integration ensures accurate documentation of pump stop time
  • Eliminates backcharting
  • Safety platform is the foundation
    • May 2016 = ED autoprogramming compliance averaged 30-40%
    • 80%
Compliance to Auto-programming

*Lancaster General proprietary image removed.*
*Please see presentation recording to view this chart.*
Moving the Potential Error Away from the Bedside

- Pump Edits – Occur when the pump programming violates a rule set for a specific medication and the pump is reprogrammed after the alert

*Lancaster General proprietary image removed.*
*Please see presentation recording to view this chart.*
Exciting Times

- Learning
  - Order
  - Patient
  - Pump
<table>
<thead>
<tr>
<th>Time</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/03/2014 20:12:52</td>
<td>Line: B, Beginning Auto-Programming, Type=Dose Rate-Volume program</td>
</tr>
<tr>
<td>10/03/2014 20:12:58</td>
<td>Line: B, Attempted start: CCA: Critical Care, Drug: Amiodarone-bolus, 150 mg / 103 mL</td>
</tr>
<tr>
<td>10/03/2014 20:13:01</td>
<td>Line: B, Delayed Start: 00:00 hr.min, Patient Wt: 0 Kg</td>
</tr>
<tr>
<td>10/03/2014 20:13:01</td>
<td>Line: B, Step: 1, Duration: 00:10 hr.min, Dose: 618 mL/hr</td>
</tr>
<tr>
<td>10/03/2014 20:13:01</td>
<td>Line: B, Step: 1, Rate: 618 mL/hr, VTBI: 103 mL</td>
</tr>
<tr>
<td>10/03/2014 20:13:19</td>
<td>Line: B, Attempted start: CCA: Critical Care, Drug: Amiodarone-bolus, 150 mg / 103 mL</td>
</tr>
<tr>
<td>10/03/2014 20:13:20</td>
<td>Line: B, Step: 1, Dose limit override: YES, Programmed dose: 200 &lt; limit: 617 mL/hr</td>
</tr>
<tr>
<td>10/03/2014 20:13:25</td>
<td>Line: B, Delayed Start: 00:00 hr.min, Patient Wt: 0 Kg</td>
</tr>
<tr>
<td>10/03/2014 20:13:25</td>
<td>Line: B, Step: 1, Duration: 00:30 hr.min, Dose: 200 mL/hr</td>
</tr>
<tr>
<td>10/03/2014 20:13:25</td>
<td>Line: B, Step: 1, Rate: 200 mL/hr, VTBI: 100 mL</td>
</tr>
</tbody>
</table>
Correlating Pump to Clinical Effects

• Nursing perception

• Variation in documentation

• Variation in workflow
  • How tubing was primed

• 17% occurrence of hypotension when all variables removed when bolus administered as ordered

• Should we change our duration/rate of administration of the bolus?
Never Too Soon To Start

• Build your team
  • Lots of moving parts
• Nursing must own
  • Scope may feel threatened
  • Changes workflow
  • Pump is now a computer
• Standardization
  • Concentration, Dosing Units
• When to use
  • New bag, New Order, Titrations
• Create an expert
Know What Your Vendors Can Do

• Functionality drives standardization... Standardization drives adoption
• Can your vendors autoprogram
  • New order with new bag
  • New order (rate change) without a new bag
  • Rate change over a running infusion (critical med titration)
• What are their roadmaps?
  • Other devices (PCA, Syringe, Epidural)
  • Complex orders
    • PCA
    • How will they handle multi-step infusion
• How are they making things better?
  • Compliance monitoring
  • Data mining
  • Efficiencies to the bedside nurse
  • Leveraging the technology to address other problems (dispensing, billing, etc)
Build it Well...Test it A LOT

- Smart Pump Library
- Drug Record – ERX
- Grouper Build
- Infusion Group
- MAR – MAR actions
- Interfaces
- Devices
- Pump Barcodes

- Must have organizational commitment
  - Testing
  - Mining data
  - Accountability
Not Just Another Device Interface

- Testing devices for all environments
- Test and understand
  - Drug library match – do rules vary?
    - Concentrations can be tricky
  - Information populated correctly
  - Bidirectional – pulling information in from the pump
- IV intake accurate
- Duration based testing
- Real life
  - Order sets
  - Piggyback with concurrent delivery
- Frequent
  - Change control
  - Upgrades
Exciting Times

- What can we learn
  - Unique link between pump, order and patient
- Vendor partnership
  - Pump Vendor, Epic and your organization
  - Push and Develop
  - Safety, Accuracy, and Efficiency
- What does the future look like
  - Additional Devices
  - Role of the Drug Library
  - How does the administration workflow continue to change
    - Role of the independent verification
Questions

Contact Information:

tmsuess@lghealth.org
Future/Ongoing Initiatives
Mark Your Calendars!

April 17th; 12pm to 1pm EST

http://www.aami.org/thefoundation

Stephanie D. Orr DNP, RN, CCRN
NeuroScience Intensive Care Unit
Rush University Medical Center
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Thank you for attending!

Slides and Recording:

http://www.aami.org/PatientSafety/content.aspx?ItemNumber=3694&navItemNumber=3084

Your Certificate of Participation is on the final slide
CERTIFICATE OF PARTICIPATION

Thank you for watching the one-hour AAMI Foundation Patient Safety Seminar Titled:  
Preparing for Integration of Your Electronic Health Record with Your Smart Infusion Pumps

Name:

Date watched:

Marilyn Neder Flack
Executive Director
AAMI Foundation