Welcome CareFusion Insider Event

HIMSS 2013
Agenda

Opening Remarks
Tim Vanderveen, PharmD, MS, Vice President of the Center for Safety and Clinical Excellence

The Future of Closed Loop Medication Administration: Auto-Pump Programming to Improve Medication Safety
Bobbie Carroll, RN, MHA, Senior Director of Patient Safety and Informatics, Children’s Hospitals and Clinics of Minnesota

Sarah Giga, Clinical Applications Systems Manager, Children’s Hospitals and Clinics of Minnesota
Speakers

Bobbie Carroll, RN, MHA
Bobbie is the Senior Director of Patient Safety and Informatics at Children’s Hospitals and Clinics of Minnesota where she has worked for the past 10 years. She is a registered nurse with a special interest in the adaptation of information technology to health care. She has been a vital contributor to the implementation of the electronic medical record at Children’s and has recently taken on the additional role of Director of Safety. Bobbie provides leadership in strategic development of technology to support patient safety, clinical practice, and process while assuring consistency with professional standards.

Sarah Giga
Sarah is the Clinical Application Integration Manager at Children’s Hospitals and Clinics of Minnesota where she has worked for the past 14 years. Sarah provides leadership for the clinical application development team and successfully advanced the development of the electronic medical record and integration of a variety of technology solutions to assure a seamless end user experience. Sarah has been integral in supporting development efforts between vendors to navigate technical specification to assure true integration while offering solution that support safe clinical care.
Taking Infusion Safety to a New Level

Tim Vanderveen
Vice President
Center for Safety and Clinical Excellence
CareFusion Corporation
Infusion Therapy is Very Complex
Objectives: To determine actual type, frequency and severity of medication errors associated with IV pumps.

Findings: 426 medications being infused (8 hour assessment)
- 285 (67%) had one or more error
- 389 errors in 426 infusions
- 37 were rate errors (3 programming errors)
- 1 serious/life-threatening error

Conclusion: Complexity of IV therapy requires an integrated approach

Husch et al. QHC.BMJ.journals.com 12 April, 2005
University of Wisconsin Pediatric ICU Study

- 30 Bed Pediatric ICU
- Compare CPOE Orders to Smart Pump Programming
- 296 drug infusions and 231 fluid infusions observed
- 24% of drug infusions and 42% of fluid infusions had discrepancies
- Anti-infectives, concentrated electrolytes and anticoagulants had highest frequency of discrepancies

Continuous Infusions
Bolus Doses
Piggybacks
Intermittents (Total dose/infusion time)
Chemotherapy
IV Fluids/Blood Products
PCA/Monitoring
In the First Decade, Smart Infusion Pumps have:

- Fostered development of drug dose limits
- Configured pumps to match applications
- Uncovered high degree of variation in infusion practices
- Documented many “good catches”
- Identified human factors issues/opportunities
- Provided a “treasure trove” of infusion data
- Promoted wireless connectivity/server applications
- Been limited to drug/therapy/patient type
Smart Infusion Pumps have not:

- Typically assigned to specific patients
- Been aware of intended therapy
- Prevented drug mix-ups, incorrect library selection
- Been populated with many hard limits
- Eliminated variability/choice in concentration, dosing units
- Recorded identity of caregiver/ reason for overrides of limits
- Populated infusion records
- Maximized value of barcode medication administration systems
- Overcome lack of compliance with use/alerts
Infusing Patients Safely: A Future Vision

- **All infusion pumps will be connected to a hospital wireless network**
- **Image recognition (bar code, RFID tags) will be required to identify the IV drug/concentration being infused**
- **Infusion pump programming will be automatically compared to the physician’s order to insure appropriate dose**
- **All IV infusion data will be automatically recorded in each patient’s electronic health record**
- **Critical lab values and missing lab values that impact IV infusions will be immediately communicated to the appropriate caregiver**
- **All patients receiving high risk IV medications will be continuously monitored with appropriate vital sign monitoring**
- **Critical infusion (and physiological) alarms associated with high risk IV infusions will be immediately presented to the appropriate caregiver**
Thank you
The Future of Closed Loop Medication Administration:

Auto-Pump Programming to Improve Medication Safety

March 4, 2013

Bobbie Carroll, RN, MHA – Sr. Director of Patient Safety & Informatics
Sarah Giga - ITS Clinical Integration Manager

Children’s Hospitals and Clinics of Minnesota
Objectives

• Describe best practices as the first pediatric facility to implement an integrated closed loop medication administration solution for infusions and IV medications in pediatric patients.

• Share experiences with the implementation of the new solution enabling preprogramming of intravenous (IV) medication orders from the electronic health record (EHR) system to the Alaris® System through interoperability of these technologies.

• Discuss measurable objectives of the new system to enhance medication safety, improve compliance and increase clinical efficiency.
Largest pediatric health system in the region

- 347 beds
- 4,134 employees; 1,700 professional staff
- $589M+ annual revenue
- Non-profit, independent pediatric health system
By the numbers

- Largest pediatric provider of: neonatal, cancer, diabetes, cardiac care
- 12,218 inpatient admissions
- 20,453 surgical cases
- 88,674 emergency room visits
- 148,973 outpatient clinic visits
- 70,690 rehabilitation visits
- 1,507,786 inpatient pharmacy doses dispensed
- 60,985 interpreted visits (in 46 languages)

Note: Numbers reflect 2011 volumes.
# Children’s MN EMR status

## US EMR Adoption Model™

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cumulative Capabilities</th>
<th>2011 Final</th>
<th>2012 Q1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP</td>
<td>1.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Physician documentation (structured templates), full CDSS (variance &amp; compliance), full R-PACS</td>
<td>5.2%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Closed loop medication administration</td>
<td>8.4%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>CPOE, Clinical Decision Support (clinical protocols)</td>
<td>13.2%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology</td>
<td>44.9%</td>
<td>43.9%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable</td>
<td>12.4%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Ancillaries - Lab, Rad, Pharmacy - All Installed</td>
<td>5.7%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Stage 0</td>
<td>All Three Ancillaries Not Installed</td>
<td>9.0%</td>
<td>8.4%</td>
</tr>
</tbody>
</table>

Data from HIMSS Analytics™ Database © 2012

N = 5,337  N = 5,318
Reducing medication errors

Children's implemented several process improvement initiatives and technologies to reduce adverse drug events over the past several years.

- Smart pump infusion system designed to achieve safety benefits through Guardrails® software utilization
- Computerized provider order entry (CPOE) designed to minimize transcription and legibility errors, plus offer standardized evidence based order sets
Medication-related history

CareFusion smart pumps implemented with Guardrails (5/2005)

CareFusion Auto-ID at the pump (8/2007)

BCMA, Auto-pump programming, Infusion management (PICU pilot) (3/2012)

Cerner nursing documentation – iView, eMAR, I&O, PowerForms, PAL (9/2006)

Cerner CPOE (5/2009)

Cerner iAware for Critical Care (3/2010)

ePrescribe (10/2010)

EasyScript (9/2005)

Cerner CPOE (5/2009)

BCMA, APP, IM - Inpatient (2012)

BCMA, APP, IM – ED, Clinics, Surgery (2013)
But still.....

49% of all reported adverse drug events (ADEs) in 2008-2009 were related to administration

~ 21%: Contributing factor to many of the other reports

Right Patient
- 2 patient identifiers

24 wrong patients, or 4%

Right Medication
- RN review order

167 wrong medications, or 29%

Right Route

Right Dose

127 wrong doses, or 22%

Right Frequency

58 wrong time or interval, or 10%

Right Documentation
- MAR
- Pt/family Ed

~ 21%: Contributing factor to many of the other reports

N = 579 reported Administration errors that reached the patient in 2008-2009
Why now? – Patient Safety

- **Med Safety Value Stream/Leadership Goals**
  - Decrease harm of adverse events
  - 37% of all medication errors happen at administration of medication (Data reported: Lucian Leape, et al., JAMA, Volume 274, 1995)
  - Implement technology to support this effort

- **Create a safety net around high volume and high risk medications**
  - Eliminate manual programming at the pump to reduce errors

- **Improve medication administration and data documentation**
  - Document when administering medication
  - Real time documentation for providers
Development Partnership
Solution Partnership for Auto Pump Programming and Infusion Management

- Joint effort to develop integration between Cerner EMR and Carefusion Alaris pump
  - Children’s representing all pediatric Cerner/Carefusion sites
  - Change agent for innovative solutions
    - Position Children’s for being a national leader in improving the health of children by reducing error risks for medications
  - Significant work effort for all 3 participants
Project Definitions – in scope deliverables

• **Bar Coded Medication Administration (BCMA) - pills, shots, drops.** Scan patient and medications at the bedside
  ▪ Care Admin only
  ▪ Using bedside cart with blue tooth scanner

• **Auto pump programming - transmits order information to the pump for auto programming**
  ▪ Populates all required fields
  ▪ Verification steps at the pump

• **Infusion Management - transmits infusion data back to EMR from the pump**
  ▪ Dose, rate and volume data
  ▪ Data is “accepted” in iAware (similar to physiologic monitors)
  ▪ Provides an view to manage infusions at the nurse unit or facility level, used by pharmacy, perhaps charge RN
## Project Scope:
### Functionality by unit type

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>BCMA</th>
<th>Auto Pump programming</th>
<th>Infusion Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Care Unit</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Medical/Surgical Unit</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Emergency Department</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Surgical Services</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Ideal End State - IV Medication Flow

1. Scan the patient
2. Verify correct patient
3. Scan medication
4. Verify correct med, time, dose, route
5. Document medication
6. Scan channel
7. Verify correct programming of pump
8. Review results in viewer (iAware) and send to EMR***

6-rights plus:
- Auto program the pump with order detail
- Auto download infusion volumes into EMR***

*** critical care units only
Initial project timeline

134 days from project kick-off to pilot go-live!!

- Auto pump programming & infusion mgmt project kick off: 11/7
- "Pump fest" testing medications from Cerner to CareFusion: 1/17
- Upgrade all CareFusion pumps from 8000 to 8015: 1/24
- "Pump fest" round 2: 1/31
- Organizational Kick-off: 2/9
- Cerner & CareFusion connectivity testing: 12/19
- PICU-M pilot go-live: 3/20
- Conversion of Spacelabs data to iBus: 2/28
- Upgrade all CareFusion pumps from 8000 to 8015: 1/24
- 24x7 on-site Informatics support & Unit super users: 4/13 – 5/3
- Super User education: 3/15
- "Pump fest" round 2: 1/31
- 24x7 on-site support All teams & vendors: 3/20 – 3/23
- 24x7 on-site Informatics support & 24x7 Unit super users: 4/13 – 5/3
Roll out approach

• Pilot unit - PICU
  - Introduce technology and workflows into the clinical setting
  - Validate technology and integration points
  - Develop standard work for association and disassociation of devices
  - Confirm education approach and effectiveness
  - Achieve successful pilot criteria

• Unit by Unit rollout
  - Schedule based on campus, unit similarities, staff size, functionality deployed
Resource & requirements

- **Unit Super users and Clinical Educators**
  - Partner with project team and support staff education
  - Provide ongoing support to staff post roll-out

- **Patient Care Managers**
  - Support unit readiness, go-live activities and problem solve
  - Partner with nursing and pharmacy leadership to assure “every patient, every med, all the time” expectations for staff

- **Project Team**
  - Comprised of Informatics, Clinical Education Specialists, Pharmacy, ITS/Clinical Applications analysts, Bio-Med
  - Provide implementation direction and support during roll-out
Education approach

- **eLearning/Video**
  - Highlight the conceptual process

- **Hands on experience**
  - Train the trainer approach for Clinical Educators, PCM, and Unit super users

- **Go-live**
  - Real time staff training at the bedside
  - Staff will complete a “skills sign off” when they have completed the standard workflow
Patient room set-up

- Allows for access to pumps, modules and lines
Clinical Lessons Learned

• **Education**
  - Providers and order sentences
  - Pharmacists

• **Practice differences**
  - Different from unit to unit
  - Different based on patient population

• **Pharmacy process**
  - Manufacturer bar codes
  - Re-packaging materials (foil packages)
  - Identified missing medications in the CareFusion drug library
  - Label placement on syringes and bags
  - Syringe volume
Nursing Lessons Learned

• Work space, resistance to moving PC
  − Scanning the wrong module – reaching

• Patient armbands at night
  − Temptation to cheat with extra armband on the PC
  − Parent offering to proxy

• Inconsistent nursing practices
  − Bolus documentation, flush process/documentation

• Clinical significance of rounding
  − 100mg vs. 99.9998mg
  − “My documentation is not going to be as clean”

• Guiding Principle
  − Make all changes on the Medication Administration Wizard (MAW) rather than the pump, let the MAW program the pump
Technology behind the process

- **Wireless scanners**
  - Attached on all bedside and patient care devices

- **Bar code labels on everything**
  - Patients, medications, CareFusion pumps
  - New printers, software to support

- **Wireless connectivity for the pumps**
  - Historically needed wireless intermittently, for Guardrails data sets and CQI data
  - Now need it **ALL** the time

- **CareFusion back-end**
  - Pumps to Systems Manager to Alaris Connectivity Gateway
Technology behind the process

• **Cerner iBus**
  - Cerner’s engine for device connectivity
  - Currently connected: Spacelabs, vents, CareFusion pumps
  - Temporary storage of all of the data, to be signed into EMR

• **Cerner iAware**
  - Previously used dashboards in critical care units
  - Nurses now use it for documentation of IV medications
Technology Lessons Learned

- **Testing**
  - All medications/fluids
  - Ordering method

- **BCMA Scanners**
  - Position, ease of access
  - Volume of beeps, allow staff to turn off audible beeps (barcode on cart)
  - Added a “reset” barcode to each cart so nurse can fix their own scanner

- **Pump/module labeling**
  - Quality assurance around serial number and barcode
  - Quality of the barcode
  - Width of the scanning beam to avoid scanning wrong module (vertical scanning)
Rollout status

- **Minneapolis facility**
  - Inpatient units complete

- **St Paul facility**
  - Rollouts 1/21/2013 – 5/2013

<table>
<thead>
<tr>
<th></th>
<th>Live inpatient beds</th>
<th>Remaining inpatient beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCMA</td>
<td>215</td>
<td>159</td>
</tr>
<tr>
<td>Auto Pump Programming</td>
<td>215</td>
<td>159</td>
</tr>
<tr>
<td>Infusion Management</td>
<td>106</td>
<td>62</td>
</tr>
</tbody>
</table>
Ongoing support

• **Challenges with diagnosing issues**
  - Many parts/pieces to the technology, challenging to diagnose and resolve issues in a timely manner

• **Increased urgency for support**
  - Technology has now become part of patient care vs. just documentation
  - More on-site presence by our Nursing Informaticists on all live units
Reporting…. Cannot be an afterthought

• The value of data
  – Compliance of patient and medication scanning rates
  – Actual analysis and data on “alerts of potential harm”
    ▪ 6 rights details
      o Wrong patient
      o Wrong medication
      o Wrong dose, form, route, time
  – Demonstrates the value of technology through safety measures
  – Demonstrates the ROI
# Measurements and Metrics

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation of Patient Identification verification</td>
<td>Picker/Truthpoint</td>
<td>Picker/Truthpoint</td>
</tr>
<tr>
<td>Timing of medication administered vs med due* +/- 30 minutes</td>
<td>Cerner</td>
<td>Cerner</td>
</tr>
<tr>
<td>Overriding the barcode scanning process, patient or medication</td>
<td>Cerner</td>
<td></td>
</tr>
<tr>
<td>Harm Rate (1-4s) Wrong patient, med/solution, dose, route, time</td>
<td>SLR data</td>
<td>Cerner - # errors/- discern alerts</td>
</tr>
<tr>
<td>Incorrect floor stock IV solutions per 100,000 IV doses dispensed*</td>
<td>SLR data</td>
<td>Cerner</td>
</tr>
<tr>
<td>Narcotic waste documentation missing from MAR</td>
<td>Audit</td>
<td>Cerner</td>
</tr>
<tr>
<td>Workflow or Time Savings</td>
<td>Audit</td>
<td>Cerner/Carefusion</td>
</tr>
<tr>
<td>- Number of clicks to program infusion pumps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Number of clicks to review &amp; sign documentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guardrail Compliance - number of overrides</td>
<td>Carefusion</td>
<td>Carefusion</td>
</tr>
<tr>
<td>Programming changes within guardrails that do not match provider order</td>
<td></td>
<td>Cerner/Carefusion</td>
</tr>
<tr>
<td>Number of bags returned to pharmacy - Cost savings based on dispensing infusions</td>
<td>Pharmacy</td>
<td>Pharmacy</td>
</tr>
</tbody>
</table>
Understanding the data

**Known exceptions/challenges**

- Volume and complexity of data is challenging
- Need to combine infusion data from CareFusion with ADT information from Cerner to produce data by unit
- Need to understand exclusions and workflows that impact data
  - PCA infusions excluded from all metrics (functionality not available yet)
  - Code situations – BCMA/APP not used
## BCMA compliance data

Nurse level data posted on the unit weekly at go-live, then monthly

<table>
<thead>
<tr>
<th></th>
<th>BCMA Usage %</th>
<th>Patient Armband Scan %</th>
<th>Medication Scan %</th>
<th>Total Administration Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU-M</td>
<td>93.8%</td>
<td>91.7%</td>
<td>91.8%</td>
<td>12,100</td>
</tr>
<tr>
<td>NICU-M</td>
<td>93.7%</td>
<td>92.6%</td>
<td>92.1%</td>
<td>10,112</td>
</tr>
<tr>
<td>CVCC-M</td>
<td>91.9%</td>
<td>89.7%</td>
<td>90.2%</td>
<td>9,398</td>
</tr>
<tr>
<td>ICC-M</td>
<td>91.1%</td>
<td>90.2%</td>
<td>89.7%</td>
<td>4,326</td>
</tr>
<tr>
<td>6th Floor-M</td>
<td>90.7%</td>
<td>89.9%</td>
<td>88.1%</td>
<td>8,930</td>
</tr>
<tr>
<td>7th Floor-M</td>
<td>89.6%</td>
<td>88.3%</td>
<td>87.4%</td>
<td>13,298</td>
</tr>
</tbody>
</table>

- Following the ideal workflow is the safest for our patients!
- Organizational goal = 90%
6-rights alerts
wrong floor stock – unit level

September data
Wrong floor stock 7th floor
total solutions 1096 24 errors

<table>
<thead>
<tr>
<th>Solution</th>
<th>No order in system</th>
</tr>
</thead>
<tbody>
<tr>
<td>dextrose 5% in lactated ringers</td>
<td>1</td>
</tr>
<tr>
<td>dextrose 5% w/ 0.45% NaCl + KCl 10 mEq/L</td>
<td>11</td>
</tr>
<tr>
<td>dextrose 5% w/ 0.9% NaCl + KCl 20 mEq/L</td>
<td>2</td>
</tr>
<tr>
<td>dextrose 5% with 0.9% NaCl</td>
<td>1</td>
</tr>
<tr>
<td>sodium chloride 0.9%</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solution</th>
<th>Inactive Order found</th>
</tr>
</thead>
<tbody>
<tr>
<td>dextrose 5% w/ 0.45% NaCl + KCl 20 mEq/L</td>
<td>1</td>
</tr>
<tr>
<td>dextrose 5% w/ 0.45% NaCl + KCl 30 mEq/L</td>
<td>1</td>
</tr>
<tr>
<td>dextrose 5% with 0.45% NaCl</td>
<td>4</td>
</tr>
</tbody>
</table>
# Auto Pump Programming - unit compliance data

<table>
<thead>
<tr>
<th>January 2013</th>
<th>Auto Pump Programming %</th>
<th>IV Administration Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU-M</td>
<td>68.1%</td>
<td>3,736</td>
</tr>
<tr>
<td>NICU-M</td>
<td>86.1%</td>
<td>2,977</td>
</tr>
<tr>
<td>CVCC-M</td>
<td>60.7%</td>
<td>2,290</td>
</tr>
<tr>
<td>ICC-M</td>
<td>72.2%</td>
<td>259</td>
</tr>
<tr>
<td>6th Floor-M</td>
<td>76.7%</td>
<td>1,817</td>
</tr>
<tr>
<td>7th Floor-M</td>
<td>78.1%</td>
<td>3,579</td>
</tr>
</tbody>
</table>

- **Initial Organizational Goal = 80%**
- Compliance % excludes medications that shouldn’t be auto-pump programmed (e.g. PCA, pushed meds)
Auto Pump Programming – nurse compliance data

Will begin posting on the unit monthly

Following the ideal workflow is the safest for our patients!

<table>
<thead>
<tr>
<th>January 2013</th>
<th>Auto Pump Programming %</th>
<th>IV Administration Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU-M</td>
<td>63.2%</td>
<td>4,022</td>
</tr>
<tr>
<td>CEXXXXXXXX</td>
<td>100.0%</td>
<td>2</td>
</tr>
<tr>
<td>CEXXXXXXX</td>
<td>88.0%</td>
<td>25</td>
</tr>
<tr>
<td>CEXXXXXXXX</td>
<td>80.6%</td>
<td>31</td>
</tr>
<tr>
<td>CEXXXXXXXX</td>
<td>69.0%</td>
<td>58</td>
</tr>
<tr>
<td>CEXXXXXXXX</td>
<td></td>
<td>No IV administrations found for this user</td>
</tr>
</tbody>
</table>
Technology improves Guardrail usage

<table>
<thead>
<tr>
<th>Unit</th>
<th>Increase in Guardrails utilization (1 month prior vs. 1 month post implementation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU-M</td>
<td>13%</td>
</tr>
<tr>
<td>6th Floor</td>
<td>19%</td>
</tr>
<tr>
<td>7th Floor</td>
<td>27%</td>
</tr>
<tr>
<td>CVCC</td>
<td>7%</td>
</tr>
<tr>
<td>ICC</td>
<td>1%</td>
</tr>
<tr>
<td>NICU-M</td>
<td>11%</td>
</tr>
</tbody>
</table>

Safety Gains:
• Each unit has shown an increase in the percentage of infusions protected by Guardrails
Adoption rates can differ by unit!

<table>
<thead>
<tr>
<th>Unit = ICC-M (Go-live = 9/17)</th>
<th>Increase in Guardrails utilization (compared to pre-technology rates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>1%</td>
</tr>
<tr>
<td>November</td>
<td>14%</td>
</tr>
<tr>
<td>December</td>
<td>18%</td>
</tr>
</tbody>
</table>
Are the improvements sustainable?

<table>
<thead>
<tr>
<th>Unit = PICU-M</th>
<th>Increase in Guardrails utilization (compared to pre-technology rates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>13%</td>
</tr>
<tr>
<td>May</td>
<td>13%</td>
</tr>
<tr>
<td>June</td>
<td>16%</td>
</tr>
<tr>
<td>July</td>
<td>12%</td>
</tr>
<tr>
<td>August</td>
<td>12%</td>
</tr>
<tr>
<td>September</td>
<td>8%</td>
</tr>
<tr>
<td>October</td>
<td>11%</td>
</tr>
<tr>
<td>November</td>
<td>12%</td>
</tr>
<tr>
<td>December</td>
<td>11%</td>
</tr>
</tbody>
</table>

Guardrail utilization improvements remain consistent 9 months post-implementation!
## Programming method of Guardrail protected infusions

<table>
<thead>
<tr>
<th>PICU-M</th>
<th>Manual programming</th>
<th>Auto-ID</th>
<th>Auto Pump programming</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 2012 (pre-implementation)</td>
<td>44%</td>
<td>56%</td>
<td>N/A</td>
</tr>
<tr>
<td>April 2012</td>
<td>16%</td>
<td>7%</td>
<td>76%</td>
</tr>
<tr>
<td>November 2012</td>
<td>16%</td>
<td>2%</td>
<td>82%</td>
</tr>
<tr>
<td>December 2012</td>
<td>11%</td>
<td>1%</td>
<td>88%</td>
</tr>
</tbody>
</table>

### Safety Gains:
- Manual programming significantly reduced!
- Auto pump programming adopted at higher rate than Auto-ID
- Auto pump programming adoption continues to improve with time and technology improvements
Programming method of Guardrail protected infusions

<table>
<thead>
<tr>
<th>Unit</th>
<th>Pre-implementation (February 2012)</th>
<th>Post-Implementation (December 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICU-M</td>
<td>44%</td>
<td>56%</td>
</tr>
<tr>
<td>6th Floor</td>
<td>41%</td>
<td>59%</td>
</tr>
<tr>
<td>7th Floor</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>CVCC-M</td>
<td>37%</td>
<td>63%</td>
</tr>
<tr>
<td>ICC</td>
<td>63%</td>
<td>38%</td>
</tr>
<tr>
<td>NICU-M</td>
<td>39%</td>
<td>61%</td>
</tr>
</tbody>
</table>

Safety Gains:
• Manual programming significantly reduced across all units
• Auto pump programming adopted at high rate across all units
The journey continues….

- Rollouts:
  - St Paul inpatient units
  - Other areas that administer medications (Surgery, ED)
- Reporting
  - Providing auto pump programming compliance data to staff
  - Incorporating Guardrail alert data
  - Focused attention on workflow exclusions and high risk medication workflows
- Ongoing development with vendor partners
Questions?

Bobbie Carroll – bobbie.carroll@childrensminn.org

Sarah Giga – sarah.giga@childrensminn.org
Thank you for attending the CareFusion Insider Event

Please take a moment to complete your survey