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Bringing Wisdom to Smart Pump Technology

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Manufacturers of infusion therapy products extol the virtues of smart pumps to bring enhanced safety to infusion therapy. In spite of the claims, there is scarcity of evidence to explain how organizations have used the intelligence of these pumps to inform their practices and improve infusion safety. In 2010, the Children's Hospital of Eastern Ontario (CHEO) introduced a wireless syringe pump with smart pump technology. This presentation will explain the interdisciplinary collaborative process that was established to track, monitor and use pump data to make improvements both in drug library settings as well as support direct practice improvements.

Building a Foundation with Clinical Experts

A clinical practice expert from each inpatient unit (ER, PICU, NICU, Hematology / Oncology, General Pediatrics / Surgery) and the Pharmacist responsible for the drug library went through all drugs in the syringe pump library to validate the library, ensuring it would work for end-users.

In addition, a Pharmacist reviewed 6 months of physician orders to complete real life validation of the syringe pump library settings.

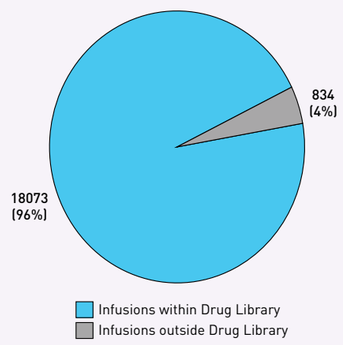
Building Tools and Processes

Tools/processes developed to ensure success of the syringe pump safety software:

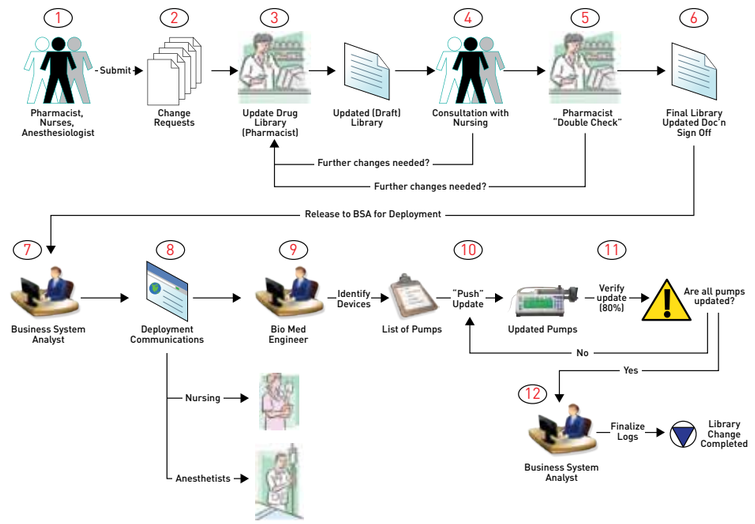
1. CHEO Parenteral Manual.
2. Standard drug concentration established for all IV drugs.
3. Policy on administering IV direct medications.
4. IV dilution calculator for intermittent drugs (Excel® program allowing the nurse to input the patient's dose. The program will then instruct the nurse on the dilution to obtain the standard drug concentration). This is a CHEO program developed by the lead author.
5. Standard drug concentration program for continuous infusions.
6. Changing pharmacy CIVA program to accommodate administration of IV direct medications, SDC and buretrol free.

Drug Program Compliance, January – May 2011

Total infusions within selected criteria: 18,907



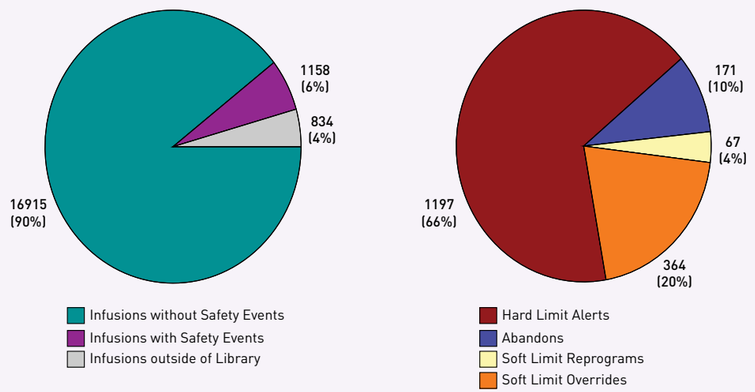
I.V. Pump Library Update Workflow



PharmGuard® Software Report for Medfusion® 4000 Pump Safety Event Summary, January – May 2011

Total PharmGuard® infusions within selected criteria: 18,073

Total safety event count within selected criteria: 1,799



Conclusion

Interprofessional collaboration and processes have resulted in a high compliance with the drug library (95.59%) and a low incidence of safety events (6.12%).

When coupled with interprofessional collaboration, a rigorous monitoring system ensures smart pumps deliver on their promise to contribute to patient safety related to infusion therapy.

Drug Library Maintenance

Weekly download, assessment and investigation as needed of pump data.

- Hard and soft limits
- Overrides
- Compliance
- Need for library changes

Ongoing review of physician orders to continuously validate the library. Issues are discussed with members of the interprofessional team.

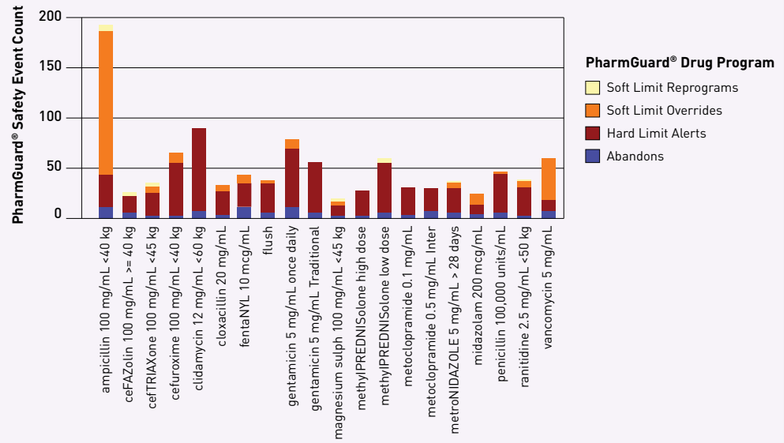
Example of a drug library change based on safety events and the reporting capabilities of the syringe pump:

Methylprednisolone

- Originally programmed in the syringe pump as Methylprednisolone low dose OR Methylprednislone high dose
- Could not fit concentration into drug name (limit of syringe pump display)
- Nurse needed to enter concentration – not typical programming step
- Only drug in library where nurse needed to enter concentration
- Many safety events related to Methylprednisolone

PharmGuard® Software Report: Top 20 Medications with Safety Events, January – May 2011

Total PharmGuard® infusions within selected criteria: 10,329



- Methylprednisolone was the top 12th and 13th drug with safety events
- Pharmacy prepares Methylprednisolone as 2.5 or 10 mg/mL
- Drug utilization review for the past 2 years was done. Methylprednisolone 10 mg/mL was only used once for high dose. Therefore, majority of time, Methylprednisolone is used as low dose
- In consultation with nursing, Methylprednisolone was changed to Methylprednisolone 2.5 mg/mL (with low dose limits) Methylprednisolone 10 mg/mL (with low dose as soft upper limit and high dose as hard upper limit)
- Since this change, Methylprednisolone is no longer a top 20 drug with safety events