Let's Talk Informatics

Smart Pumps: Improving Patient Safety Through Technology

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Please be advised that we are currently in a controlled vendor environment for the
One Person One Record project.

Please refrain from questions or discussion related to the
One Person One Record project.

Informatics…

utilizes health information and health care technology to enable patients to receive best treatment and best outcome possible.

Clinical Informatics…

is the application of informatics and information technology to deliver health care.

AMIA. (2017, January 13). Retrieved from https://www.amia.org/applications-infomatics/clinical-informatics

Objectives

At the conclusion of this activity, participants will be able to...

- ▫ Identify what knowledge and skills health care providers will need to use information now and in the future.
- ▫ Prepare health care providers by introducing them to concepts and local experiences in Informatics.
- ▫ Acquire knowledge to remain current with new trends, terminology , studies, data and breaking news.
- ▫ Cooperate with a network of colleagues establishing connections and leaders that will provide assistance and advice for business issues, as well as for best-practice and knowledge sharing.

Session Objectives

- Define smart pump and dose error reduction system (DERS)

- Guiding principles of pump implementation

- Building a NSHA drug library

- Advantages of smart pumps

- Lessons learned

Conflict of Interest Declaration

- Adrienne and Alanna do not have an affiliation (financial or otherwise) with a pharmaceutical, medical device, health care informatics organization, or other for-profit funder of this program.

What is a Smart Pump?

- Electronic infusion device

- Reduces drug dose errors

  - Dose error reduction system (DERS)

  - Drug library

- Allows NSHA to create a drug library

- Primary purpose: avoid errors + support medication administration

Safer

Medication

Administration

th**R**ough

Technology

Technology Through the Years

IV Bag

Traditional Pump

SMART Pump

Drip Rate

Flow rate (mL/h) & volume

Dose rate & volume

Dose Error-Reduction System

- Software designed to catch errors

- Minimum and maximum limits

- Alerts when exceeded

Phelps, 2017

Limits

- **Soft limit:** common dosing range; may be overridden

- **Hard limit:** maximum dose allowed; cannot be overridden

- Limits reflect IV manuals and clinical/professional references

ISMP, 2009

Drug Library

- Medications, fluids and blood products

- Includes:
  - Doses
  - Volumes
  - Soft + hard limits

- Grouped by specific programs or clinical areas

Phelps, 2017

NSHA Libraries

- Ambulatory
- Antidote
- Blood
- Critical Care
- Critical Care SP
- CVICU
- IMCU
- Interventional Radiology
- Maternal

- Medical/Surgical
- Neonatal
- Oncology
- Oncology Supportive
- Pediatrics
- Pediatric High Acuity
- Perioperative
- Resuscitation
- Training

NSHA Smart Infusion Pump Guiding Principles

Principle 1

- The primary purpose of the pump is to enhance patient safety, by supporting medication administration and avoiding gross drug calculation errors.

Principle 2

- Standardize pump processes across NSHA. Standardization is a means of obtaining efficiency and safety.

NSHA Smart Infusion Pump Guiding Principles

Principle 3
- Medication pump programming for individual drug entities can vary throughout the organization.

Principle 4
- Clinical Care Area libraries will be standardized.

Principle 5
- The pump will not be used as a means to enforce prescribing practices; rather, it will be used to support evidence-based practice, gauge adherence, and make improvements.

NSHA Smart Infusion Pump Guiding Principles

Principle 6
- Efforts should be made to avoid pump updates at a frequency greater than every three months.

Principle 7
- Bolus doses should be programmed into the pump and given from an infusion bag, whenever possible.

Phelps, 2017

Building A Drug Library

- Clinical team worked to define the various libraries required by the province

- Drug Library Working Group formed to facilitate building the libraries

- Clinical Care Area Working Group formed for each of the libraries to be built

- Each group developed a list of all medications and fluids created with doses, volumes, rates, etc. based on NSHA IV Manual, BC Cancer, and IWK Pulse

- Groups met weekly from September 2018 – January 2019

Building A Drug Library

- Libraries were built in the smart pump software by the two lead pharmacists

- Each entry was double checked and uploaded to pumps

- Three rounds of validation for each library were held in May 2019

- Changes were made based on recommendations from the validation sessions and in consultation with clinical team

- Libraries sent for final approval to each owner

The Project Team

Clinicians
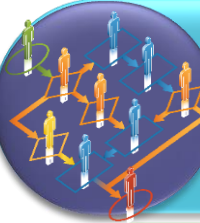Physicians, Nurses, Anesthetists, & Pharmacists

Bio-Medical Engineering
Bio-Med Managers and Technicians

Facilities Management & Support
Clinical Planners
Health Services Managers

Supply Chain Management
Materials Management Manager - Purchasing

Policy & Education
Clinical Nurse Educators
Inter-professional Practice Leads

Quality & Data Analytics
Decision Support Analysts & Managers
Clinical Quality Leaders

Workflow
Clinical Informatics Coordinator

Industrial Engineering
Overall Project Manager
Industrial Engineers

IMIT
IMIT Project Manager, DBA, System Analysts, Quality Analyst, Clinical Apps Manager

ICTS
Server, Network, Wireless, UAM, Database, SCCM
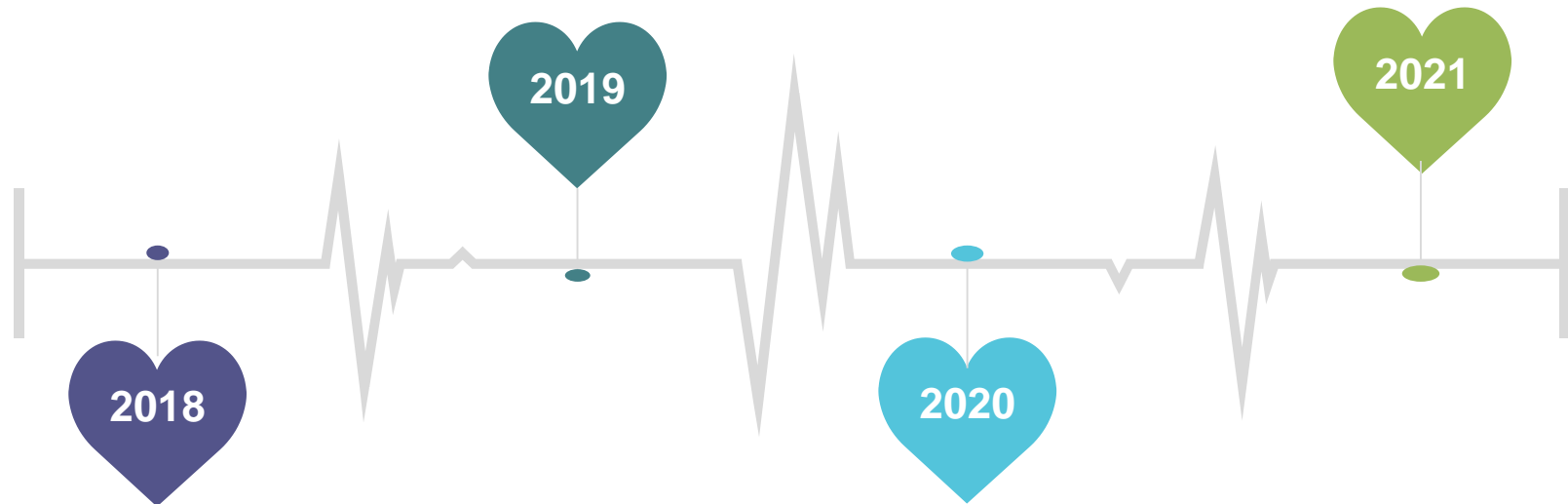
Vendor
Vendor Technical Leads

OCM & Communications
IMIT OCM Manager
Internal Communications Advisor

Major Project Milestones

Develop policies, workflows and procedures
Establish Test and Prod environments
Validation of pumps and drug libraries
Configuration and deployment of pumps
Soft Launch to CZ and WZ ORs (Syringe Pumps)

Finish Roll out to NZ Facilities: January – March
Roll out to EZ Facilities: March - June

2019

2021

2018

2020

Vendor Determined
Project Team and Working Groups Formed
Initial clinical and technical work begins

Complete Soft Launch – VRH Oncology (Volumetric Pumps)
Roll out to WZ Facilities: April – June
Roll out to CZ Facilities: September – December
Begin Roll out to NZ Facilities: November - December

Why Smart Pumps?

- Over **90%** of inpatients receive IV therapy

- Parenteral medication errors are **3x** more likely to cause harm or death

- **70-80%** of errors are associated with administration

Smart Pumps, designed with a dose error reduction system (DERS), will help clinicians make infusion therapy safer

Phelps, 2017

A Patient Case

A 19-year-old obese woman who had recently undergone C-section delivery of a baby presented in the emergency department (ED) with shortness of breath. Believing the patient had developed a pulmonary embolism, the physician prescribed an IV heparin bolus dose of 5,000 units followed by a heparin infusion at 1,000 units/hour. After administering the bolus dose, a nurse started the heparin infusion but misprogrammed the pump to run at 1,000 mL/hour, not 1,000 units/hour (20 mL/hour). By the time the error was discovered, the patient had received more than 17,000 units (5,000 units loading dose and about 12,000 units from the infusion) in less than an hour since arrival in the ED.
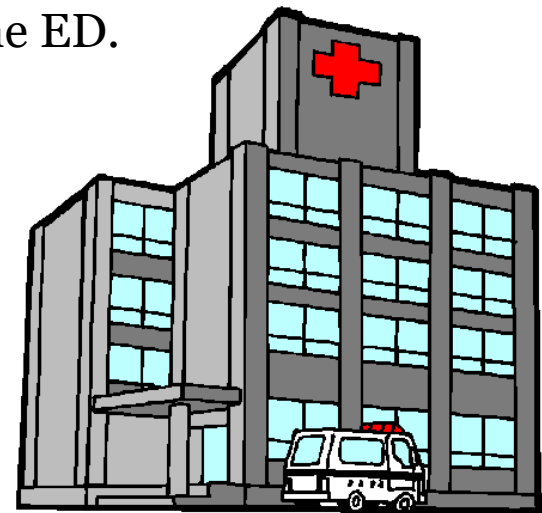
Advantages of Smart Pumps

- Best practice

- Recommended by both Accreditation Canada and Institute for Safer Medication Practices (ISMP)

- Wi-fi enabled

- Continuous Quality Improvement (CQI)

CQI Data

- Information about infusion practices
  - Overrides
  - Alarms
  - Use of drug X

- Can guide future:
  - Education
  - Drug library updates
  - Polices, etc.

Smart Pumps Are Not...

- Intended to replace the clinician

- They are only as smart as the clinician using them

- Technology = supplemental
to clinical judgement

Lessons Learned

Lessons Learned

NSHA is not yet one big happy family.

Lessons Learned

Resources required were underestimated and timelines were not reasonable.

Lessons Learned

There are pump limitations that we weren't aware of initially.

Lessons Learned

There are a number of potential practice changes for pump users.

Lessons Learned

The wi-fi connectivity is not optimal in some areas, making uploads to some pumps challenging.

Lessons Learned

Many more to come...

Looking Ahead

- Integration among technologies
  - Electronic Health Records (EHRs)
  - Computerized Physician Order Entry (CPOE)
  - Bar Code Medication Administration (BCMA)

- Ultimate goal to connect and monitor these technologies to provide real-time clinical decision support, documentations, surveillance, etc.

Questions?

smartpumps@nshealth.ca

Let's Talk Informatics has been certified for continuing education credits by;

▫ College of Family Physicians of Canada and the Nova Scotia Chapter for 1 Mainpro+ credit.

▫ Digital Health Canada for 1CE hour for each presentation attended. Attendees can track their continuing education hours through the HIMSS online tracking certification application, which is linked to their HIMSS account.

Thank you for attending this event.