Let's Talk Informatics

Medication Management Transformation

Alison MacDonald
Dr. Laura Copeland
Russ Swaga
Kim McGuire

March 28,2019

Bethune Ballroom, Halifax, Nova Scotia

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.

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

Objectives

At the conclusion of this presentation, 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.

Objectives (Cont'd)

- List the key components of a Closed Loop Medication Management System

- Define the opportunities for streamlining workflow and gaining efficiencies through the use of advanced medication management technology

- Evaluate potential benefits for implementing advanced medication management systems and technology

- Understand the opportunities and challenges of implementing a fully automated medication management system

Conflict of Interest Declaration

- We 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.

Closed Loop Medication Management Components

Best Practice –
Closed Loop Medication Management

Prescribing / Ordering

Preparation

Distribution

CPOE Medication ordered

Pharmacy based therapeutic checking & order verification

Medication orders update the eMAR

Unit-dose, bar-coded medications ordered from distributor or bulk medications packaged via robotics

Pre-mixed IV solutions purchased and prepared

Medication dispensed to cabinets and carts on patient care unit

Closing the Loop

Administration

eMAR is updated & CQI reporting is performed & acted upon

Smart pumps perform 5 rights checking of IV routed medications & transmit CQI data

Using bedside computing, nurse leverages bar-coding to verify '5 rights' & administers medications

Nurse validates orders from eMAR & collects patient's medications

Error Rates in the Traditional Paper Based Model

The implementation of enhanced technology supports the reduction of medication errors at each phase of the medication cycle. The landmark research that describes the common stages of errors that technology can positively impact the occurrence rates :

- Phase 1: Prescribing – 39% of medication errors
- Phase 2: Transcribing – 12% of medication errors
- Phase 3: Dispensing – 11% of medication errors
- Phase 4: Administration – 38% of medication errors

Reference: Leape, L. et al., JAMA, Volume 274, 1995
Williams, Cynthia T. (2004). Inside a closed-loop medication strategy – Medication management targets stages in which errors occur, step by step. Nursing Management, 35, pg. 8
Small, R., Kubej, J. (2007, February 25 – March 1). Closed-Loop Medication Management: The Big Payback. Retrieved from http://www.himss.org/files/HIMSSorg/content/files/annual_proceedings07_edu051.pdf

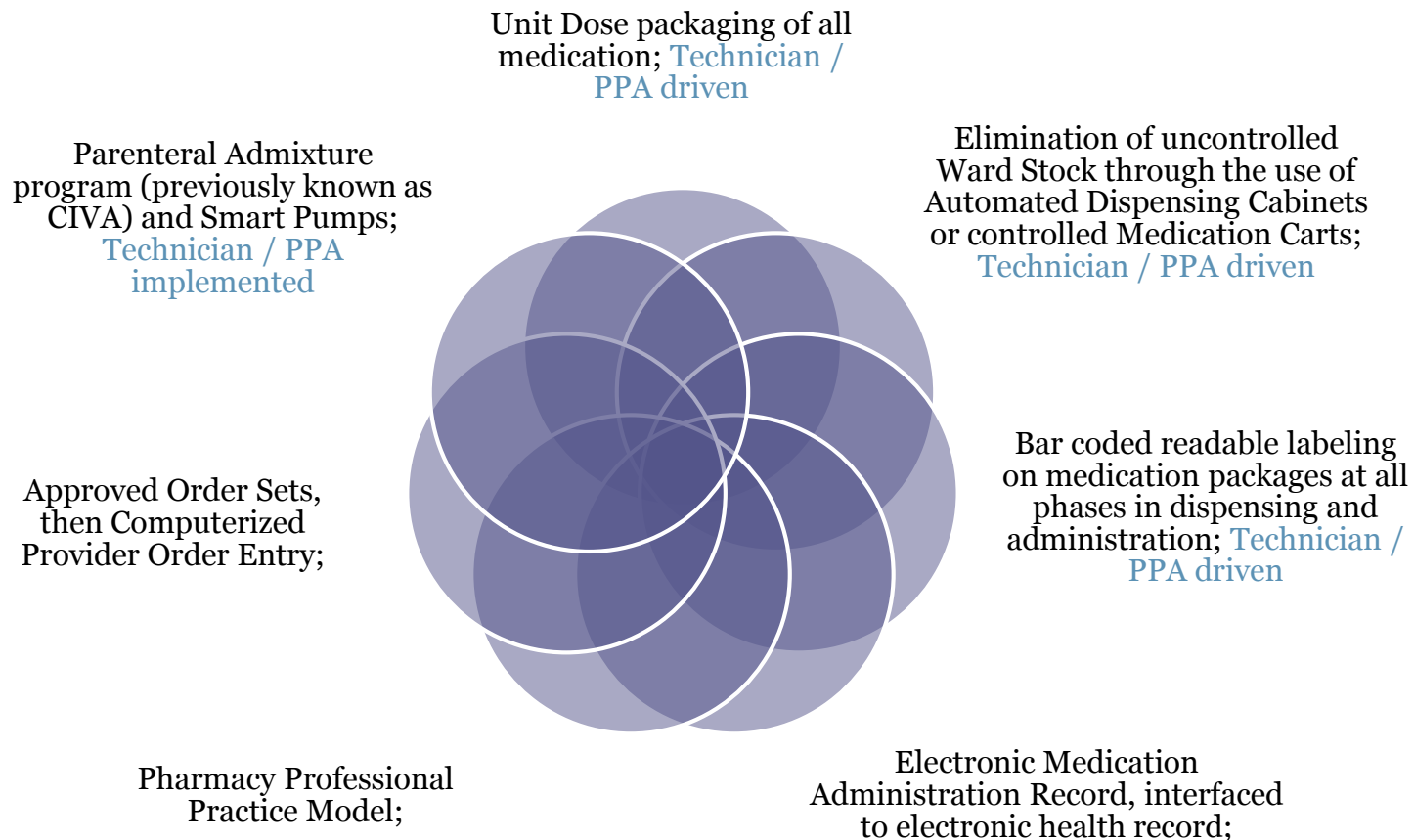# Advanced Clinical Systems Enable Clinical Benefits

A new, shared HIS with advanced clinical systems including CPOE, clinical decision support, and closed loop medication management (i.e., HIMSS Stage 6) will result in clinical benefits leading to better and safer patient care

Cumulative Capabilities	HIMSS Stage	Impact	Benefits
▪ Complete Electronic Medical Record ▪ External HIE; Data Analytics, Governance, Disaster Recovery, Privacy and Security	7	▪ Sharing patient charts electronically across the continuum of care	⬆ Patient information and coordination across the continuum of care
▪ Technology Enabled Medication, Blood Products, and Human Milk Administration; Risk Reporting; Full CDS	6	▪ Reduced errors in administering medication	⬇ Medication administration errors
▪ Physician Documentation Using Structured Templates ▪ Intrusion / Device Protection	5	▪ Improved outcomes and advanced clinical workflows	⬆ Clinical workflow efficiency ⬆ Clinical workflow alerts ⬆ Research data
▪ Computerized Physician Order Entry (CPOE) with Clinical Decision Support (CDS) ▪ Nursing & Allied Health Documentation (90%) ▪ Basic Business Continuity	4	▪ Reduced errors in ordering	⬆ Adherence to best practice ⬇ Medication ordering errors
▪ Nursing and Allied Health Documentation (50%) ▪ e-Medication Administration Record (eMAR) ▪ Role-Based Security	3	▪ Improved access to images ▪ Improved safety of medications ▪ Increased nursing efficiency	⬆ Access to images ⬆ Access to nursing documentation ⬆ Nursing efficiency (eMAR)
▪ Clinical Data Repository ▪ Internal Interoperability ▪ Basic Security	2	▪ Centralized access to results, orders, and conflict checking	⬆ Access to clinical information
▪ Ancillaries - Lab, Pharmacy, and Radiology / Cardiology Information Systems; PACS; Digital Non-DICOM Image Management	1	▪ Improved departmental efficiency	⬆ Efficiency of departments
▪ All Three Ancillaries Not Installed	0	▪ Paper-based workflows	None

Technician

Medication Transformation Building Blocks

Once the foundational elements in the pharmacy systems are in place the next challenge will be the development, implementation and adoption of advanced clinical systems such as electronic documentation, including the electronic medication administration record (eMAR) and Computerized Provider / Physician Order Entry (CPOE)

Unit Dose packaging of all medication; Technician / PPA driven

Parenteral Admixture program (previously known as CIVA) and Smart Pumps; Technician / PPA implemented

Elimination of uncontrolled Ward Stock through the use of Automated Dispensing Cabinets or controlled Medication Carts; Technician / PPA driven

Approved Order Sets, then Computerized Provider Order Entry;

Bar coded readable labeling on medication packages at all phases in dispensing and administration; Technician / PPA driven

Pharmacy Professional Practice Model;

Electronic Medication Administration Record, interfaced to electronic health record;

High-Level Work Steps for Pharmacy Inventory and Distribution Redesign

	High-level steps to consider as part of the pharmacy packaging, inventory, and barcoding redesign. More detailed steps should be developed as part of project planning. Early planning and development of pharmacy programs is critical to success.
Unit dose packaging	▪ Identify manufacturer supplied items that come pre-packaged in unit dose format with a readable barcode ▪ Identify oral solid doses to be packaged ▪ Identify bulk products to be unit dosed packed ▪ Identify strategy for liquids
Barcoding	▪ Determine barcode readiness ▪ Compatibility with current ADUs and scanning devices ▪ Requirements of packaging devices ▪ Compatibility with existing or planned bedside medication scanning devices ▪ Initial barcoding in pharmacy and new process for receiving medications
Update patient specific label to include barcode	▪ Label size ▪ Consider redundancy for label damage
Inventory Management	▪ Review inventory and eliminate any duplicate or unnecessary products ▪ Determine requirements for vendor system if adopting
Considerable resources will be required for design and build	▪ Drug utilization review to determine current formulary ▪ Combine formularies and address any decisions for shared database ▪ Shared global settings determined within working groups ▪ Shared functionality such as ASO's/Renew functions, Directions, Unit of Measure, Order Types, Workload Category, etc

Opportunities for Streamlining Workflow

Six Stages of Medication Management

- Purchasing
  - Purchasing UD format when available
  - Leveraging standardized order sets to purchase efficiently
- Packaging and Barcoding
  - Ability to centralize packaging – efficiencies in purchasing equipment
  - Segregation of product to ensure barcode is readable in a ud format
- Medication Reconciliation and Ordering
  - Optimize the role of the pharmacy practice assistant in the ED and pre-admit clinics to maximize the accurate home med capture – ensuring good information for the physician on admission

Opportunities for Streamlining Workflow

Six Stages of Medication Management (cont'd)

- Verification
  - Moves to pharmacist – allowing focus on distribution and automation responsibilities
- Distribution
  - Expertise in automated dispensing cabinets, efficient stock turnaround, analytics for purchasing and reporting
- Administration / Documentation
  - Have electronic access to the eMAR to assist in quality and error reporting
  - Opportunities for unique roles and job satisfaction

Physician

Physician Workflow - Paper

- Illegible
- Transcription error
- No clinical decisions support
- Reaching to Epocrates to look up info on drugs and using my calculator to calculate doses
- Medication reconciliation- at its best a paper print out of BPMH the first day of admission for check boxes and a hand written discharge medication list

Physician Workflow – Electronic Order Entry

Benefits:
- Legible
- No transcription error
- Supported with practice guidelines and alerts
- eMAR demonstrates real-time administration
- Alerts for re-ordering / re-evaluating

Physician Workflow - Electronic Order Entry

Challenges:
- Find the medication in the computer
  - Without help, this would be an arduous task

- Needed to overcome challenges and realize benefits:
- Common drug use strings (dose, route, frequency)
- Aliases (generic and brand names)
- Convenience orders (combining scheduled and PRN dosing, dosing sets, pre-built titrations, tapers, protocols)
- Order sets (practice guidance, evidence links, clinical decision support)
- Alerts (allergies, duplicate, drug interactions, high price drug with alternative)
- Ability to customize (favorite orders, favorite sets)

Physician Workflow – Electronic Medication Reconciliation

Benefits:
- Ability to directly relate home medication to inpatient medication
- Ease of reconciling BPMH into desired inpatient medications without transcription errors or omissions
- Ability to see home medications for decision making at all transitions in the inpatient journey
- eMAR available to view usage of PRNs and determine appropriateness of prescribing at discharge
- Easier to produce a Start, Stop Continue list for the patient on discharge

Physician Workflow –
Electronic Medication Reconciliation

Challenges:

- BPMH MUST be in the computer prior to admission-interdisciplinary dependency
- If BPMH doesn't start the ordering of inpatient medications, then outgoing reconciliation is a challenge
- Cheating during the discharge process occurs when physicians don't want to address the home meds, but rather cancel them all and order the inpatient medication as all new meds.

Pharmacist

Order Verification

Although some Pharmacist Order Entry will likely still occur (phone/verbal orders), the primary role of the Pharmacist in the medication ordering process will be verifying incoming orders placed by clinicians (Physicians/Nurses/Allied Health). This will include:

- Ensuring that the physical pharmacy product assigned either automatically by the System or manually by the Technician, is the correct product for the order
- Ensuring that the order details have been entered correctly (correct Dose, Route, Frequency, Drug Form, Duration, PRN Reason, etc.) and make sense for the order, and for the patient
- Review the Clinical Alerts received by the Clinician during Order Entry

Order Verification

- Most importantly, the Pharmacist can focus on the clinical appropriateness of the order, having a more holistic view of the patient's record within an application that displays not only other medications on the profile, but also Related Results (CrCl, Lab Results, Dictated Clinical Notes, etc.)
- Common Verification Actions include:
  - Accept - everything is fine with the order
  - Reject - the order is under review pending further clarification with the Physician
  - Modify - one or more order details is not correct; the pharmacist may modify details pursuant to a clarification with the physician or within their own scope of practice
  - Cancel / Discontinue (or Void) - the order is clearly inappropriate for the patient

Clinical Services

In a Closed Loop environment, Pharmacists have more freedom to focus on Clinically-based duties, with more information at their fingertips and better tools to view and communicate with other clinicians.

Role of the Pharmacist in electronic Medication Reconciliation:

- Can facilitate a robust BPMH either via direct documentation or via supervision of others (e.g. Regulated Pharmacy Techs)
- Can "Plan" an Admission, Transfer, or Discharge Meds Rec by making selections and saving them in a planned state for the Physician to initiate at a later time

Clinical Services

Rx Clinical Interventions

- During the aforementioned order verification process, the Pharmacist can complete and attach electronic intervention forms communicating their concerns for a particular medication order (e.g.. Dose too high, inappropriate antimicrobial therapy, etc.)

Pharmacist Consults and Pharmacist Clinical Documentation

- Providers can initiate a 'Consult to Pharmacist' electronically, indicating the reason (e.g. Warfarin monitoring); Pharmacists receive the consult electronically, complete the assessment, notify the originating provider via electronic messaging, and the results of the consult are displayed in real time for all clinicians to view

Nurse

Benefits of eMAR / BMV

The implementation of eMAR/BMV specifically addresses the following types of errors:

- Unauthorized (not prescribed) drug
- Wrong drug form
- Wrong dose
- Wrong route
- Extra dose
- Omission

Small, R., Kubej, J. (2007, February 25 – March 1). Closed-Loop Medication Management: The Big Payback. Retrieved from
http://www.himss.org/files/HIMSSorg/content/files/annual_proceedings07_edu051.pdf
Helmons, P.J., et al. (2009). Effect of bar-code-assisted medication administration on medication administration errors and accuracy in multiple patient care areas. Retrieved from
http://www.hari.pitt.edu/Portals/0/Helmons%20et%20al.full.pdf

Benefits of eMAR / BMV

"We have had over 500 scan errors for medications not on patient's chart from June 2014 to February 2015:

- Between the same time period we have ranged from 200 to 300 scan errors where a different account was scanned
- These example demonstrate how the eMAR/BMV scanning continues to support and advance patient safety for us at Ontario Shores"

Sanaz Riahi, Director of Professional Practice and Clinical Information, Ontario Shores Centre for Mental health Sciences

- BMV highlights errors previously unrecorded

Small, R., Kubej, J. (2007, February 25 – March 1). Closed-Loop Medication Management: The Big Payback. Retrieved from http://www.himss.org/files/HIMSSorg/content/files/annual_proceedings07_edu051.pdf
Helmons, P.J., et al. (2009). Effect of bar-code-assisted medication administration on medication administration errors and accuracy in multiple patient care areas. Retrieved from http://www.hari.pitt.edu/Portals/0/Helmons%20et%20al.full.pdf

Opportunities for Improvement

Key Process Points for optimal future state:

- The acquisition of medications is a high risk process
- Medications are acquired and administered for **one patient at a time**
- Only medications that are due/PRN are acquired
- **Each nurse requires a point of care device** (workstation on wheels) with access to the eMAR at the bedside
- Medications should not be acquired for more than one patient at the ADU
- Packages remain sealed until point of care administration **(no pre-pouring)**
- Medications are distributed to a secure room on the unit

Opportunities for Improvement (cont'd)

Scanning at the bedside is not always optimal due to:

- Old building infrastructure
- Software has not kept up with developments of POC technology
- Armbands not always kept on in certain patient populations
- Preparation of drugs that are not unit dosed (bulk liquids; insulins; paediatrics)

Need to rethink co signature; independent double check; medication administration times

Risks and Success Factors

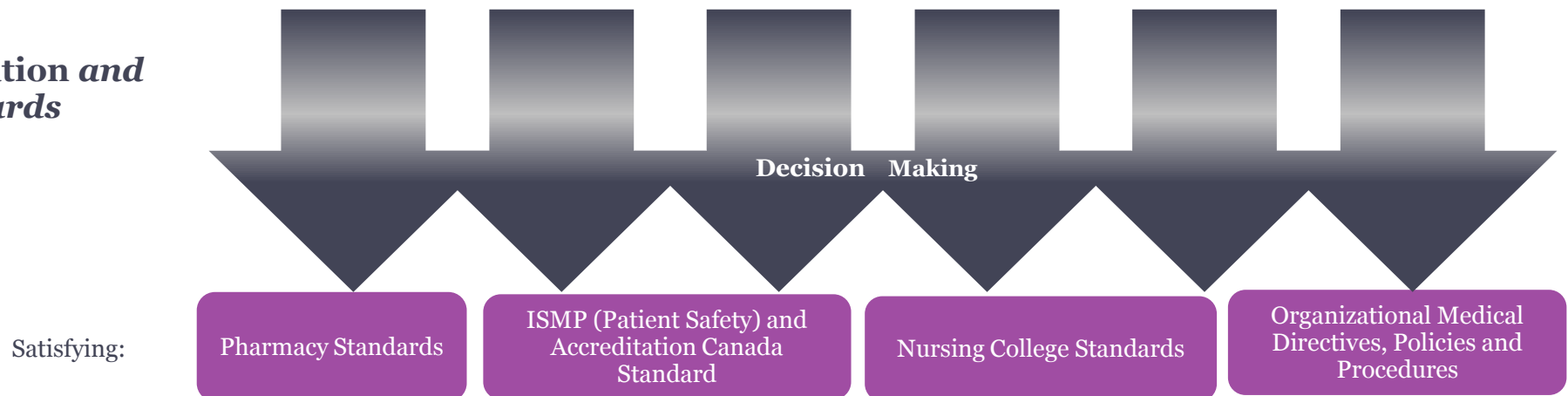# Top 4 Risks/Barriers to Successful Implementation

Risk	Risk Description	Mitigation Strategy
Med Management	▪ Require 100% unit dosed bar coded product to support Electronic Medication Administration and Point of Care Medication Verification (eMAR/BMV). ▪ Patient identification process for eMAR/BMV including a standard hospital-wide barcode format. ▪ Require revised Inventory segregation process to include barcoding. ▪ Require verification of orders to support eMAR.	▪ Invest in the remaining required packaging / barcoding equipment and resources to support. ▪ Re-design inventory process for Materials Management Pharmacy (MM PHA) to segregate inventory until barcoding confirmed. ▪ Resources for Pharmacist verification across all sites to match ordering patterns.
Standards Adoption	▪ Staff and leaders require a strong understanding of the new workflows to adopt standardization of medication administration and system capabilities.	▪ Begin education around safe medication administration practices including scan rates. ▪ Complete a Clinical Readiness Assessments and overall HIS strategy that looks at optimal timelines and implementation of each component of closed loop medication management system
Resources	▪ Active and regular participation at working groups and design sessions will be essential.	▪ Execute Resource Plan ▪ Ensure Resources are released from current duties in time to design/build and test the new workflows and the new system
Systems	▪ Stable wireless throughout the facility is a key success factor for clinical adoption	▪ Complete a full wireless assessment in all patient care areas

Key Planning Components:
Medication Management and eMAR/BMV Decisions

Standardization of many elements is required across all facilities

Medication Management

- Complete readiness roadmap and strategy for moving to a full closed loop medication management model including both eMAR/BMV and CPOE
- Design process for nursing to obtain medications and travel to point of care for patient identification and administration to complete barcode verification
- Determine process for verification of orders during non-pharmacist hours to manage the eMAR

eMAR/BMV

- Determine bar coding format & barcode all medications.
- Determine device requirements.
- Review documentation of independent double check, narcotics and controlled drugs, insulin, reason/result and range doses.
- Review process for self meds, patients own meds and LOA.
- Review policies related to early/late medication administration.
- Review downtime process to ensure safe access to required electronic information (last administered medication and next scheduled dose).
- Review transfers of care

Legislation *and* Standards

Decision   Making

Satisfying:

| Pharmacy Standards | ISMP (Patient Safety) and Accreditation Canada Standard | Nursing College Standards | Organizational Medical Directives, Policies and Procedures |

Critical Success Factors for Successful Medication Management Project

- Critical success factor to any transformation project is strong and engaged Senior Leadership Support
- Success requires clinician leadership from a Physician and Nursing perspective; typically not lead by Pharmacy
- Organizations re-iterate importance of governance and support from a leadership perspective as well as vision and tactical plan to implement Advanced Clinical Application's as a whole
- Project Manager that can tie it all together – strong collaborative approach between Pharmacy, Clinicians, Admin/Finance, and IT

Critical Success Factors for Successful Medication Management Project

- Subject Matter Experts (SME's) that understand Pharmacy and HCIS Best Practices
- SME's that understand complete Clinical workflow
- SME's that understand complete Materials Management & Distribution workflow
- Great communication and strong Clinical Change Management
- Need Nursing and Pharmacy involved before you decide on model and purchase equipment
- Resist automating a bad process or sticking with status quo
- Understanding current state – shared formulary / drug database or site specific formularies and drugs

Questions?

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!