Implementation of a Cross-Continuum Closed Loop Medication System

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Island Health

Key Statistics

Population	767,000
Health Care Staff	19,600
Physician Partners	1,900
Acute Care/Rehab Beds	1,555
Residential Care Beds/ Assisted Living Units	6,426
Annual Budget	$2.2B

Health

- Quality Initiative
  - Electronic Health Record
  - Cross encounter, continuum, and geography
  - Clinical Documentation
  - Closed Loop Medication System (CLMS)
    - Computerized Provider Order Entry (CPOE) and Clinical Decision Support (CDS)
    - Bar Code Medication Administration (BCMA)
    - Electronic Medication Administration Record (eMAR)

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- **March 19, 2016** Island Health activated the first phase of our cross-continuum electronic health record (EHR) in partnership with Cerner.
  - 400-bed acute care hospital including ICU and ED
  - 150-bed residential care facility
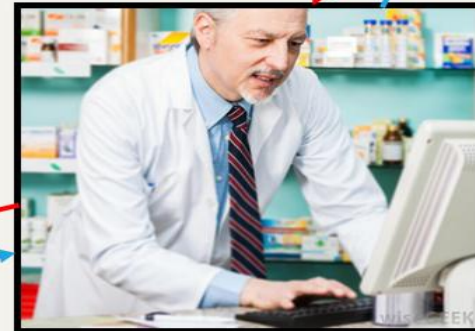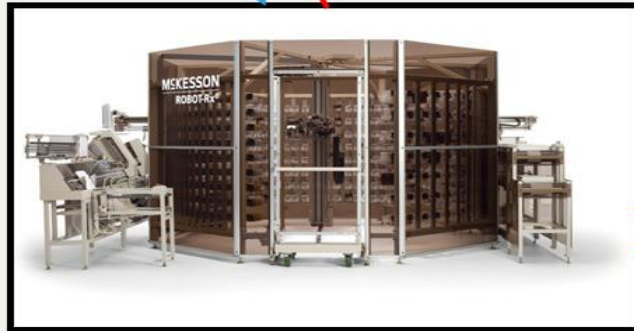 - Expansion of existing CLMS at an urgent care facility which went live with a CLMS in September 2013.

Bar Coded Medication Administration

Computerized Provider Order Entry

Closed Loop Medication Administration

Unit Dose Medication Distribution

Guiding Principles

- Make it easy to do the right thing and hard to do the wrong thing
  - Standardized order set content
  - Embedded clinical decision support and alerts
- Provide enough devices for clinicians to effectively and efficiently support their workflow
  - Enabling them to achieve real time order entry and documentation at the point of care

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Best Possible Medication History Using PharmaNet Integration

- Government-sponsored Province-wide computer network

- Links all B.C. pharmacies to a central set of data systems.

- Every prescription dispensed in B.C. is entered into PharmaNet.

- Health professionals access to help provide

  - Clinical decision support
  - Improved patient safety
  - Better care

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Electronic PharmaNet Integration

Electronic Medication Reconciliation

		Orders Prior to Reconciliation		Status	▶	📦	🟥			Orders After Reconciliation	Status
		Home Medications									
	📋	**ALPRAZolam (Xanax 0.25 mg oral tablet)** 1 tab, oral, TID, PRN: for anxiety		Documented	◉	○	○	📋		**ALPRAZolam (Xanax 0.25 mg oral tablet)** 1 tab, oral, TID, PRN: for anxiety < Notes for Patient >	Documented
	📋	**ascorbic acid (Vitamin C)** 500 mg, oral, BID		Documented	◉	○	○	📋		**ascorbic acid (Vitamin C)** 500 mg, oral, BID < Notes for Patient >	Documented
	📋	~~chlordiazePOXIDE-clidinium (chlordiazepoxide-clidinium 5 mg-2.5 mg oral ...~~ oral, DAILY, Take two every day, discontinue if you experience side-effects such ...		~~Discontinue~~	○	○	◉				
					◉	○	○	📦		**ethchlorvynol (Placidyl 200 mg oral capsule)** 200 mg, oral, ONCE, 30 tab < Notes for Patient >	Prescribed
					◉	○	○	📦		**ethchlorvynol (Placidyl 200 mg oral capsule)** See Instructions, To be taken once daily(1) at approx. the same time ... < Notes... >	Prescribed
	📋	**naloxone-oxyCODONE (Targin 5 mg-10 mg oral tablet, extended release)** To be taken twice(2) daily. ..		Documented	◉	○	○	📋		**naloxone-oxyCODONE (Targin 5 mg-10 mg oral tablet, extended release)** To be taken twice(2) daily. .. < Notes for Patient >	Documented
	📋	~~**Non Formulary (GLYBURIDE 5 MG TABLET HOECHST-ROUSSE)**~~		~~Discontinue~~	○	○	◉				
	📋 ⚕	**warfarin (warfarin 2.5 mg oral tablet)** 1 tab, oral, DAILY, 30 tab - *Still taking, not as prescribed*		Documented	◉	○	○	📋 ⚕		**warfarin (warfarin 2.5 mg oral tablet)** 1 tab, oral, DAILY, 30 tab - < Notes for Patient >	Documented
	📋	~~**warfarin (warfarin 2.5 mg oral tablet)**~~ 1 tab, oral, DAILY, 30 tab		~~Discontinue~~	○	○	◉				

Pathnet, Lawrence E
PHN:BC 9030146411   Encounter Number:92014277635
Gender:Male   MRN:19760792
Age:54 years   DOB:01-Jan-1961
Loc:UC-OHC   ** Allergies Not Recorded **

Reconciliation Status
✔ Meds History   ① Admission   ① Discharge

Computerized Provider Order Entry (CPOE)

- Provider = All those who have it within their scope and standards of practice to place orders.

- Orders are instructions to care providers about what they need to do

- Once placed, orders are routed to the appropriate people/places to carry out the orders

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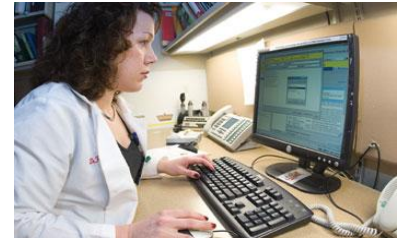
Order Catalogs

- All possible menu items/building blocks
- Based on Provincial Formularies

Order Sets

- The menus
- Groups of orders
- Covering common or critical Scenarios, Conditions, Workflows
- Incorporating Guidelines, Standards and reference material

CPOE Design and Development

50 CPOE Physician Champions with expertise in their program areas helped develop clinical content for their specialty/subspecialty order sets.

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CPOE Design and Development

- Multidisciplinary team reviews were online and in-person with a focus on Content and Usability in new EHR.

- In-person multidisciplinary group sessions were most helpful:

  - **125 clinical review sessions**

  - **585 clinicians** (Rx, Nursing, Medical Imaging, Lab, Quality, Dieticians, SMEs…)

  - **95 physicians** including Medication Safety and Antimicrobial Stewardship representation

Ordering Process Principles

- Encourage providers to use guideline-based clinical order sets where available and appropriate

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Pharmacist Medication Order Verification

- Current state – all medication orders, whenever possible, are verified by a pharmacist before they are given

- Exceptions:
    - After pharmacy hours
    - Urgent/emergent areas and situations

- Future state goal – 24/7 pharmacy systems for order verification

Unit Dose Medication Delivery

In order to implement a CLMS Island Health had to re-engineer the way medications are packaged and delivered to nursing units.

-22 million medications are mixed annually

-14 million are mixed by nurses

-8 million are mixed by pharmacy

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Unit Dose Medication Distribution UDMD

Oral Solids

Oral Liquids

Injectables

Patient-specific multi-dose packages Residential Care

UDMD Resources

Local clinical staff and leadership were critical to making UDMD successful.

Other enablers include:

- Executive Sponsors
- Smart Technology and Special Projects -Project Director and Project Analyst
- Pharmacy Services Director and Project Director
- Project delivery team (manager and analyst)
- Project research coordinator (metrics)
- Medication Safety Director and Leader
- Nursing Clinical Lead
- Nurse Subject Matter Experts
- Pharmacy Informatics team
- Site Pharmacists and Pharmacy Technicians
- Administrative support
- Some structural work was also required to retrofit new technology

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Device Deployment Principles

Right Device

- Determined by the user, location and current and future functionality, infrastructure (wired vs wireless)

Device Deployment Model

- Number of users
- Practice and Workflow patterns
- Patient and provider flow and acuity

Devices by the Numbers

Integrated Medication Carts:

- Wireless, mobile device integrated with Cerner PowerChart
- Deployed carts designed for both nurses and physicians
  - 218 integrated medication carts with a <u>bar code scanner</u>
  - 39 wireless physician carts with <u>Dragon dictation</u>
- Provide electronic health record information at the point of care

Positive Patient Identification (PPID)

- Interaction with Patient – verbal check
- Patient ID Band – visual check
- Patient ID Band bar code scan while in eMAR

BCMA

- BCMA is used as a second line of defense for a nurse's 8 rights of medication administration.

- Alerts for:
  - Wrong patient
  - Wrong drug
  - Wrong time
  - Wrong dose

BCMA Development Process

- Bar Coded Medication Administration began at Oceanside Health Centre in September 2013

- Nurse Informaticians, Pharmacy Informatics, IHealth leadership and Cerner met weekly to progress BCMA and plan workflows

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Electronic Medication Administration Record (eMAR)

eMAR Development Process

- Nurse Informaticians, Pharmacy Informatics, Cerner and IHealth Leadership met regularly to determine:

  - Default views

  - PRN response options

  - Usability

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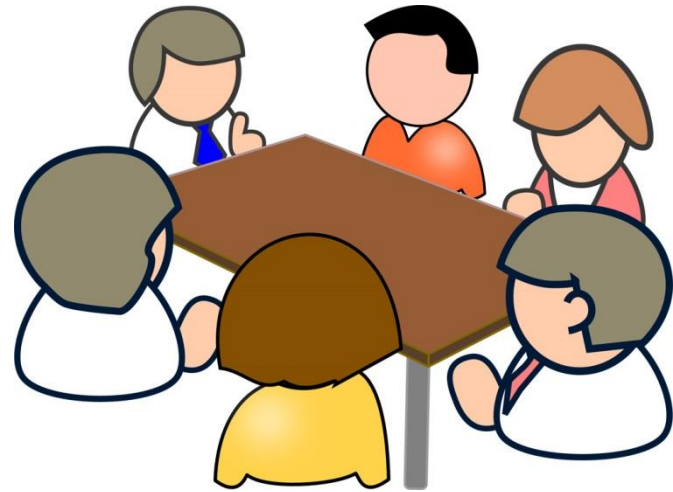
Implementation Plan for CLMS

- **<u>Education</u>** was provided in a "Meds Process" day for nursing
- Components included:
  - Best Possible Medication History (BPMH)
  - Medication Reconciliation (Med Rec)
  - Computerized Provider Order Entry (CPOE)
  - Integrated Medication Carts (IMC)
  - Positive Patient Identification (PPID)
  - Bar-Coded Medication Administration (BCMA)
  - Electronic Medication Administration Record (eMAR)

Peer Mentors assisted ward staff, as did Informaticians who provided elbow to elbow support.

Implementation Plan for CLMS

- Physician education was comprised of:
  - Orders management
  - Order entry
  - Order set use

  As part of teaching general system use and clinical documentation for program streams

Policy and Standards Development

- Policies and standards were developed in partnership with
    - Professional Practice
    - Learning Support
    - Local Leadership and Operations
    - IHealth Leadership
    - Clinical Governance
- Approval of policies by:
    - Clinical and Physician Accountability Group
    - Combined Operational Clinical Governance Council
    - Health Authority Medical Advisory Committee

Ongoing Education

- An enterprise-wide education plan for managing a closed loop medication system is in development by Learning and Performance Support. Executive sponsorship is co-led by IHealth, Quality and the Chief Nursing Officer.

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Results

Order type	Week 1 Results	Week 8 Results
CPOE Orders	**21,863**	**23,897**
Non-CPOE Orders	9,214	8,204
System generated orders or nurse protocols	28,359	24,172
TOTAL Orders	59,436	56,273

70-74% of Orders that a physician could place were placed by physicians

Week 1 Lingo:
-"Not as bad as expected"
-"Hard to find orders"
-"It takes lots of time"

Week 8 Lingo:
-"Ordering isn't intuitive"
-"We want to go back to paper ordering"
however…
-Some have hit their stride and are doing well

Gartner "Hype" Cycle

Visibility

Generation 4
The Mentor

Generation 3
The Helper

Generation 2
The Documenter

Technology
Trigger

Peak of Inflated
Expectation

Trough of
Disillusionment

Slope of
Enlightenment

Plateau of
Productivity

Maturity

Lessons Learned

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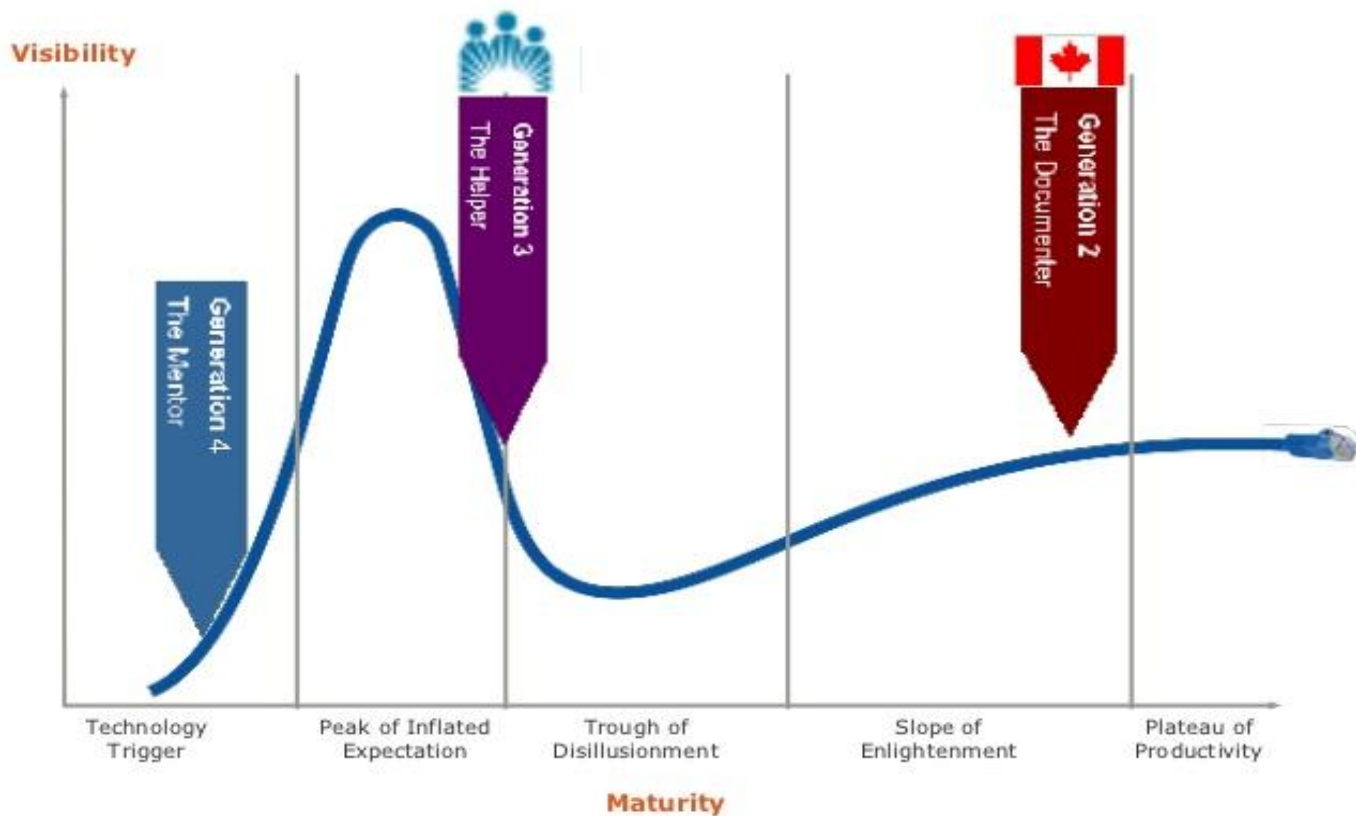
- A large scale change where CPOE, clinical documentation and bar coded scanning were implemented was overwhelming for clinicians, however they rose to the occasion.

- Adoption and usability varied depending on:
  - Complexity of the program area
  - Time pressures
  - Amount of prior engagement by clinicians

CPOE Lessons Learned

- **Order Catalogs need more Ordering Provider and Clinician input**
  - Synonyms and process clarification
- **Multidisciplinary group sessions worked very well to**
  - Discuss and incorporate standards into the build
  - Gain consensus on naming and interpretation of orders including downstream effects
  - Create an opportunity to make real time improvements
- **Users who were more engaged early on and often fare better**
- **Education**
  - Tailored to specialist workflow
  - Shorter sessions more frequently
- **Consider reducing scope?**

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Challenges

- Scanning:
  - Multi-dose vials
  - Plain IV bags
- Complex orders:
  - Range doses, IV Drips, Nomograms (Insulin, Heparin, etc)
- CPOE adoption

Questions?

Med Safety Alphabet Soup

CLMS = **Closed Loop Medication System** - includes:

CPOE = **Computerized Provider Order Entry**

    Create Orders that match to new Order catalogs

    Adapt existing paper orders and order sets to electronic workflow in Cerner

    New content where needed to support workflow

CDS = **Clinical Decision Support**

    Optimize order sets to reflect current/safe ordering practice (involve experts , Zynx evidence)

    Alerts (Drug-Allergy/Drug-Drug/High dose/Renal dosing/VTE reminders/Transfusion principles, etc)

BPMH = Best Possible Medication History

    Confirm med usage with patient, Pharmanet, Powerchart, etc

Med Rec = Medication Reconciliation

    Determine which meds to continue, stop, write prescription for (clinical judgement)

UDMD = **Unit Dose Medication Distribution**

    Robotics places Meds into right Med Cart, distributes to right ward/nurse

BCMA = **Bar Coded Medication Administration**

    Nurse notified that it is time for patient med, reviews order

    Scan patient, med to determine that right patient gets right med/dose at right time

    Computer notification about potential drug administration errors