Standardized vaccine terminology to support interoperability across electronic health information systems

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Ontario's Immunization Repository

- Panorama has been implemented in support of Ontario's Immunization Program in 35/36 Public Health Units (PHUs)

- Panorama is Ontario's provincial repository of immunization records. Schoolchildren are the initial focus – further ensuring that the right child receives the right immunization at the right time.
  - Over 83 million immunization records and 5.9 million client records were migrated from legacy systems.
  - Over 1,300 end-users are registered and over 3,000 immunization clinics have been held using Panorama.

- Panorama's Vaccine Inventory Module has been implemented in Ontario's provincial pharmacy (OGPMSS).
  - Rollout is now underway in PHUs, and will be completed by Summer 2015.

Standard vaccine codes for public health

When configuring Panorama for implementation, Ontario used Canada Health Infoway's working group structure, which allowed stakeholders from other jurisdictions to collaborate on the development of standard vaccine terminology to support:

1. **more accurate recording of immunization data**

2. **consistent capture of immunizing agents using both generic and trade names**

   - to populate immunization histories, and
   - to record immunizations at the point of vaccine administration

3. **standardized inventory management of immunizing agents**

   - to support product ordering and recalls

4. **immunization validation against product monographs and forecasting against the provincial immunization schedule**

   - for individuals and target populations e.g., for routine immunization schedules and in the event of an outbreak

5. **vaccine safety surveillance**

   - investigation, management, and reporting of adverse events following immunization (AEFIs)

Vaccine terminology subsets

The team developed 7 reference subsets to address the required vaccine concepts

- intended to be used when populating a record at the point of immunization
- includes SNOMED-CT codes and descriptions for active and passive **agents**, and the **antigens** contained within the vaccines
- includes **trade names** for all vaccines that are currently licensed for use in Canada, as well as those obtained through special access programs
- discontinued products that were available historically, or products that are used in other countries are accommodated by **generic "unspecified" codes**

Vaccine terminology subsets	
Passive Historical Immunizing Agent Code	Includes passive immunizing agents previously used in Canada (without specifying the trade name, i.e., generically described), including those obtained through special access programs, and agents that have been discontinued and/or never licensed in Canada.
Passive Administered Immunizing Agent Code	Includes passive immunizing agents that are currently licensed and those obtained through special access programs for use in Canada.
Vaccine Administered Trade Name Code	Includes vaccines that are currently licensed and those obtained through special access programs for use in Canada.
Vaccine Historical Name Code	Includes vaccines previously used in Canada (without specifying trade name, i.e., generically described), including those obtained through special access programs, and vaccines that have been discontinued and/or never licensed in Canada.
Antigen Code	Includes antigens contained within the vaccines (based on Vaccine Historical Name Codes and Vaccine Administered Trade Name Codes) that may be administered to or have been received by a patient.
Immunoglobulin Code	Includes antibodies associated with the passive immunizing agents (based on Passive Historical Immunizing Agent Codes and Passive Administered Immunizing Agent Codes) that may be administered to or have been received by a patient.
Vaccine Preventable Disease Code	Includes diseases that are prevented by administration of vaccines.

4

Panorama configuration

The specified **lot number** of an immunization record in Panorama is linked to the **inventory catalogue**, resulting in the association of the *enpreferredTerm* and *referencedCode* with the administered dose.

Product-specific dose validation requires the *exact* **Trade Name**. The *enpreferredTerm* has been adopted as the standard **Trade Name.**

IMMUNIZATION MODULE:

Add Immunization

* **Immunizing Agent 1:**	Men-C-ACYW-135
* **Date Administered:**	2013 04 26
	yyyy mm dd
* **Time Administered:**	: EDT
	hh mm

Consent Ignore
Policy dictates that consent m... enter a reason for ignoring po...
* **Ignore** --select--

Age at Administration: 11 yrs 0 mos

Historical: YES ○ NO ◉

Holding Point Name: -No Data Available-

* **Lot Number:** U4368AB Exp. 2014/01/24

Display Expired and Recalled Lots ☐

Trade Name: Men-C-ACYW135 Menactra SP

Manufacturer:

INVENTORY MODULE:

View Product Lot Details

Lot Type:	New-Lot	**Product Trade Name:**	Men-C-ACYW135 Menactra SP
Lot Number:	U4368AB	**Product Alternate ID:**	6571-3360-1
Original Expiry Date:	2014 Jan 24	**Catalogue Item Name:**	Menactra (5ds-Gr7)
Current Expiry Date:	2014 Ja...	**Catalogue Item Code:**	28
Lot Status:	Active		

*Level 6 - Trade Product

Catalogue Item Description:	* **Current Catalogue Item Status:**
Meningococcal (Men-C-A(...	Active
Created By:	**Created Date:**
PERMISSIONS, ALL	2012 Oct 11
* **Catalogue Item Name:**	**Catalogue Code:**
Menactra (5ds-Gr7)	28
CCI Code:	**Product Budget Code:**
* **Product Trade Name:**	
C-ACYW135 Menactra SP	

CHI REFERENCE SET:

referencedCode	conceptName ▼	enpreferredTerm ↓↑
7511000087107	Menactra solution for injection Sanofi Pasteur Inc. (product)	Men-C-ACYW135 Menactra SP

Panorama configuration

- For immunization schedules with product-specific validation and forecasting, the *enpreferredTerm* is forecasted as the brand for the next recommended dose.

Immunizing Agent	Dose	Volume	Brand	Due	Eligible	Status
Tdap-IPV	1			2001 Mar 01	2001 Feb 12	Overdue
HB	2	1 ml	HB Recombivax HB MC	2012 Sep 01	2012 May 23	Due Now
Men-C-ACYW-135	1			2012 Sep 01	2001 Oct 01	Due Now
MMRV (Rubella*)	2			2013 Aug 02	2013 Aug 02	Up to Date
HPV-4	1			2013 Sep 01	2010 Jan 01	Up to Date
Pneu-P-23	1			2066 Jan 01	2007 Sep 27	Up to Date

Immunization Forecast (by Agent) ⌃ Hide Immunization Forecast (by Agent)

Last forecast ran on: 2013 May 02   [Only available for clients who have forecasted agents or antigens]   **Refresh Forecast**

*-Extra dose safe antigen.
Due Now - The recommended date for the immunization has been reached.
Overdue - The recommended date for this dose has passed.
Up-to-Date - The client is not yet due for the immunization.

Demonstrated system benefits

- The specificity of the vaccine subsets allows for very accurate electronic immunization records (e.g., client received administration of Tripacel® Hybrid at the clinic today), both for vaccine administration and for investigation and surveillance of adverse events following immunization (AEFIs).

- The subsets also support populating clients' electronic **immunization histories** (e.g., client had a TB vaccination in 1987), as concepts can be captured and coded regardless of the granularity of the data (e.g., flu shot- trade name not known, or Fluviral®).

- The subsets enabled Ontario to code provincial immunization schedule rules with unprecedented precision, allowing accurate:
  - **Validation–** e.g., M-M-R® dose given too close to VARIVAX®; dose might not provide sufficient immune protection
  - **Forecasting–** e.g., client had dose 1 of Twinrix® 12 months ago; overdue for dose two.

Epidemiological benefits

- Common terminology and coding support the comparative analyses of immunization data

  - e.g., how many people in Canada received Twinrix®? How many people in Canada received a vaccine that protects against Hepatitis A?

  - Data are more easily compared when a common code is used to identify a concept over time and across jurisdictions.

- Standard vaccine terminology simplifies immunization coverage reporting

  - enables the calculation of immunization coverage for a specific disease (e.g., polio) by allowing for the consolidation of components from single and combined vaccines

    - e.g., injectable polio vaccine, **IPV**; oral polio vaccine, **OPV**; diphtheria, pertussis, tetanus, polio, **DPTP**; diphtheria, pertussis, tetanus, polio, *haemophilus influenzae* B, **DPTP-Hib**

Immunization interoperability – the next step

When immunization information is shared there is an opportunity to improve patient care and ultimately population protection from vaccine preventable diseases. Standard vaccine terminology is a foundational component . Interoperability benefits include:

- Ability to share immunization data across care settings, health care providers and with consumers

- Ability to have access to reliable more timely immunization information in the event of an outbreak

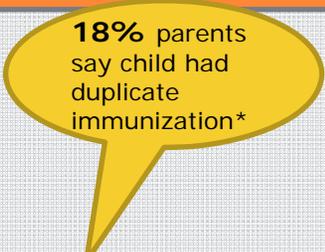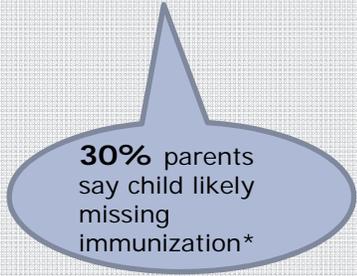- More complete records enable improved secondary use.

This vaccine terminology is a standard **well-positioned to jurisdictional and national interoperability**.

- The Ontario Health Informatics Standards Council (OHISC) recently approved the vaccine ref sets as a Level 3 standard for adoption in Ontario.

- Ontario's Associate Chief Medical Officer of Health (CMOH) has endorsed the subsets as the vaccine standards for use in Ontario.

- The terminology is being adopted in a growing number of projects for immunization and inventory management
  - Canadian Forces, CIHI's primary care content standard (v3) clinician friendly picklists, Immunize Canada mobile app, Alberta, Saskatchewan, Manitoba…

Provincial and national EHR alignment

- The subsets are supported by a Canadian vaccine model where the concepts and terms are linked together through relationships to allow complex epidemiological analytics to be performed.

  - The concepts and terms authored in the SNOMED CT® Canadian extension align with the Public Health Agency of Canada's (PHAC) Canadian Immunization Guide (CIG).

- The subsets support interoperability of immunization data, which is essential as immunization records are consolidated and transferred across the health care system

  - Without these standards, integration with providers outside of the public health domain-- such as Electronic Medical Records (EMRs) used by physicians or pharmacy systems-- would be impossible, meaning that Ontario's provincial Immunization Repository would be limited to immunization data collected or administered by public health units. Presently, approximately 80% of immunizations in Ontario are performed outside public health (e.g., by primary care physicians and pharmacists).

10

Benefits of sharing immunization information

	Immunization provider	Public health/ Health system	Consumer (Patient)
Provide view only access to health care providers	• Accurate assessment • Reduced duplication of immunizations • Cost savings	• Cost savings from vaccine waste • Savings from Improved coverage rates for population	*18% parents say child had duplicate immunization**
Provide view and update access	• Complete and accurate patient immunization information access	• Improved coverage reporting • Timely information to handle outbreaks	• Up-to-date immunization coverage: Reduced missing/ duplication of immunizations

Provide point of care system integration	• Productivity / Quality benefits:
	  ✓Patient safety
	  ✓coverage & reporting
	  ✓Adherence to clinical guidelines, decision support
			30% parents say child likely missing immunization*

Consumer access via web interfaces or app		*57% parents receive request to provide immunization record**	• Knowledge of personal/ child immunization schedule • Self-management of care • Access to immunization records when needed

Future Vision

More accurate electronic immunization records through broader adoption (e.g., in EMRs, pharmacies)
Immunization validation and forecasting for EMRs and consumer applications
Bar coding—for vaccine administration and for inventory management
Integration of EMR data in public health information systems
Complete immunization registries and repositories
Consumer mobile health applications
National vaccine safety surveillance—adverse events following immunization (AEFIs)
Electronic transfer of immunization records between jurisdictions

Next steps

- The ongoing governance and maintenance of the vaccine subsets are important considerations to ensure that newly-licensed vaccines are added and the subsets remain current and are incorporated into clinical settings and tools in a timely fashion.
  - Discussions are underway with the Public Health Agency of Canada (PHAC) to take business ownership of the subsets and to determine the maintenance schedule moving forward.
  - New vaccine products will be identified by PHAC as they are licensed for use by Health Canada, and Canada Health Infoway will provide new codes as required.
- Broad stakeholder clinical requirements (pharmacists, nurses, primary care docs) needed to support interoperability
  - E.g., descriptions for these users might be needed
- Data elements and dictionary to support other user sharing of immunization information
- Understand the use cases for barcoding and impact to the terminology

Next steps

- Canada Health Infoway is working with PHAC to add the relevant vaccine SNOMED CT® codes and terminology to PHAC's **Vaccine Identification Database System (VIDS)**

  - VIDS is a single, web-based repository of comprehensive information on all vaccines licensed for use in Canada.

  - VIDS currently contains **Global Trade Item Numbers (GTIN**). Mapping between GTIN and SNOMED CT® will allow for linking between the vaccine bar code and the information required to populate the client health record.

- Continued collaboration is underway through the Public Health Surveillance collaboration community on Canada Health Infoway's InfoCentral:

  # https://ic.infoway-inforoute.ca

Thank you

Global Scan – Immunization Information Systems ^{K,B5}

	Immunization Information System (IIS)	Data Submission to IIS			Defined Common Data Set	View access to consumer	View Access to Clinicians
		Via EMRs, public health systems	Via Web based applications	Paper based entered manually			
USA	R	✔	✔	✔	✔	V	V
Germany				✔			
Netherlands	N		✔	✔			✔
Norway	N	✔				✔	✔
Australia	N R	✔	✔	✔		✔	✔
New Zealand	N	✔	✔	✔			✔
Denmark	N	✔	✔		✔	✔	✔
Great Britain	R	✔		✔			
Canada	R	V	V	✔			V

IIS = Immunization Information System

R Regional   **N** National   ✔ Present   **V** Variable   ☐ Absent/Info NA

K,B5   may not use it

Knight , Beverly, 2015-05-26