

Role of SNOMED CT in Public Health Surveillance

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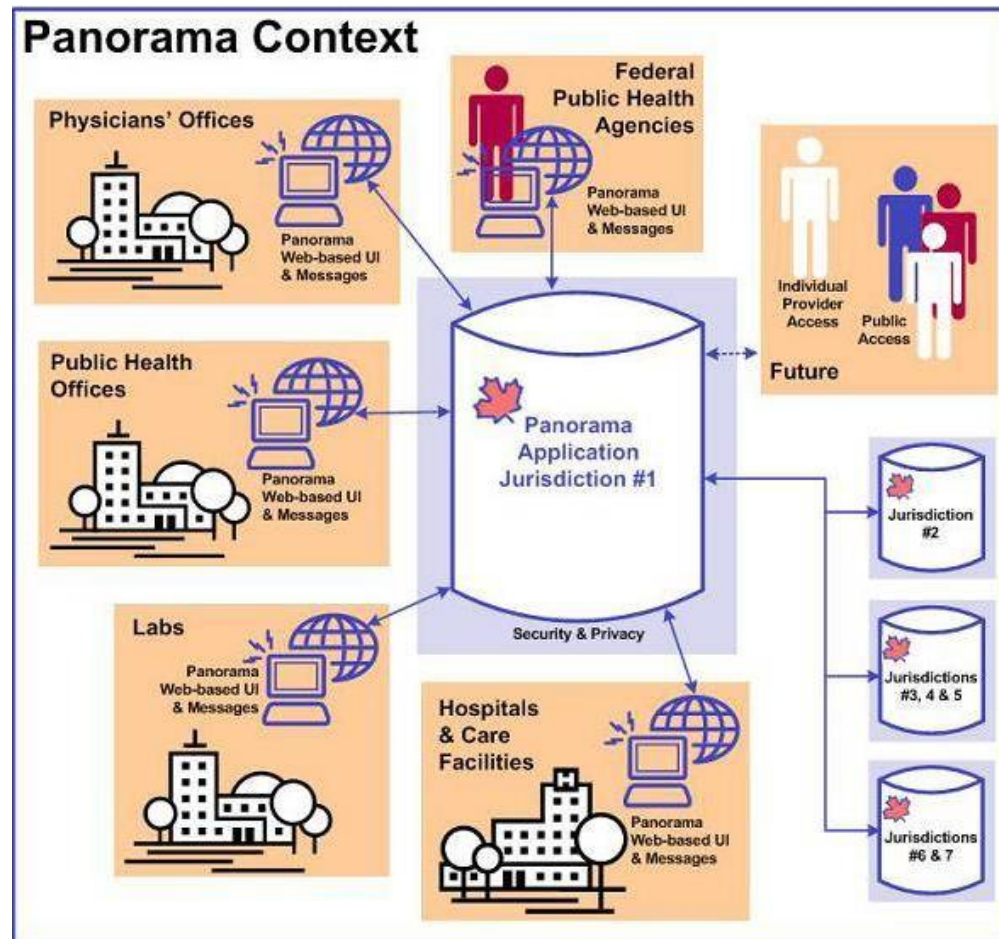
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Agenda

- Introduction to PH SDSM
- SNOMED-CT and PH SDSM:
 - SNOMED-CT Examples in PH SDSM
 - Configuring PH SDSM with SNOMED-CT
 - Role of SNOMED-CT in PH SDSM
 - Lessons Learned
- Conclusions
- Questions and Answers

Public Health Surveillance (PH SDSM)



Public Health - SDSM

Major Activities of Public Health



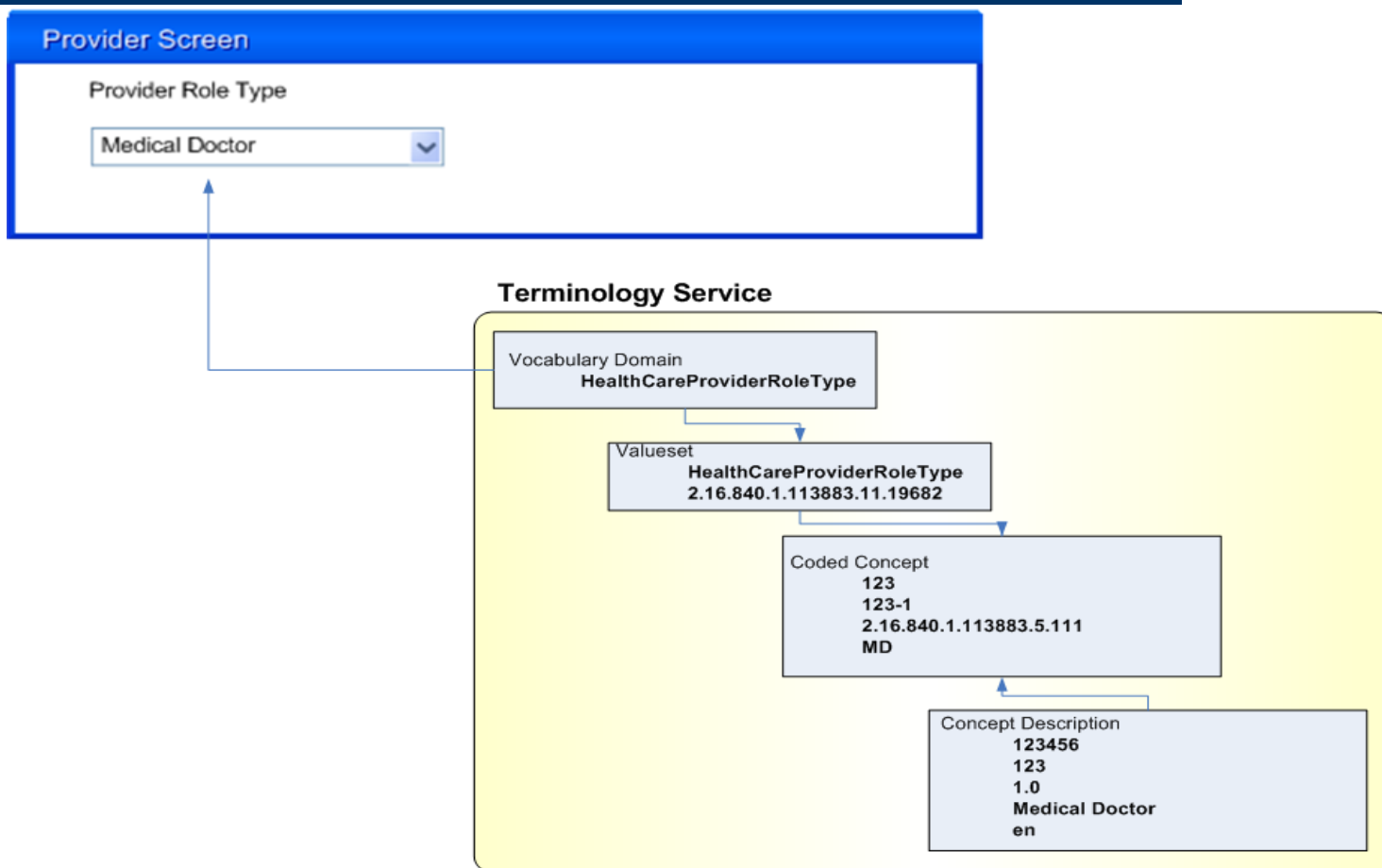
Shared Services – Terminology Overview

Terminology Services are a collection of content (data), UI, APIs, and process

- Solution repository for standard and customized terminology elements.
- Used throughout the solution functions for contents of drop down (or multi-select) lists in the UI, reporting and standardized information exchange through HL7 messages.
- Centralized administration, maintenance and customization of clinical terminology elements.
- Implements international and Canadian standard terminology code systems (SNOMED-CT, Canadian LOINC, Health Canada Drug Product Database, HL7 V3 messaging standard as defined by Canada Health Infoway).
- Implements code systems specific to the Canadian application.

Shared Services – Terminology Overview

Example of Usage



PH SDSM and SNOMED-CT

- SNOMED-CT is mandated in Canada by Canada Health Infoway as the preferred terminology for clinical systems.
- All Canadian Public Health jurisdictions are licensed to use SNOMED-CT.
- SNOMED-CT is a reference code set provided by PH SDSM, together with LOINC (pCLOCD) for lab tests and results, UCUM for units of measure, Health Canada DPD for drugs and active ingredients.
- SNOMED-CT is implemented using PH SDSM terminology services, a component of the PH SDSM shared services.

PH SDSM and SNOMED-CT

- PH-SDSM includes all active SNOMED-CT concepts for SNOMED-CT (pan-Canadian version from Feb 2010).
- PH-SDSM implements all concept relationships existing in the implemented version SNOMED-CT.
- PH-SDSM configuration makes explicit use of the SNOMED-CT hierarchies and causative relationships in defining value sets.
- Concept descriptions (preferred) in English and French (pan-Canadian version of SNOMED), with functionality for jurisdictions to add descriptions in other languages or customize descriptions.

PH SDSM Modules Using SNOMED-CT

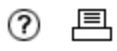
- 99 vocabulary domains in PH SDSM are based on SNOMED-CT and extensions. This represents about 10% of all PH SDSM vocabulary domains.
- **HL7 Messaging Component** - Vocabulary Domains examples:
 - ActCareProvisionRequestType
 - ActImmunizationReason (Immunization Management)
 - ActiveIngredientDrugEntityTypeForPh (Investigations – Rx)
 - ActProcedureCategoryList (Investigations Management)
 - ActProfessionalServiceCode
 - ActServiceDeliveryLocationService
 - DiagnosisValue (Investigations Management)
 - EncounterDischargeDisposition (Investigations Management)
 - EncounterReferralSource (Investigations Management)

PH SDSM Modules Using SNOMED-CT

- **Investigation Management Module**
(examples of 25 domains):
 - Diseases
 - Symptoms
 - Causative agents
 - Investigation site
 - ADR symptom
 - Drug therapy
 - Disease complications
 - Cause of death

- Recent Work
- Search
 - Search Investigations
 - Search Lab
 - Search Exposures
 - Search Interventions
 - Search Clients
 - Search Non-Human Subjects
- Investigation
 - Subject Summary
 - Investigation Summary
 - Investigation Details
 - Disease Summary
 - Recommendations
 - Investigation Information
 - Resp. Org / Investigator
 - Reporting Notifications
 - External Sources
 - Links & Attachments
 - Transfer Requests
 - Close Investigation
 - Lab
 - Encounter Details
 - Signs & Symptoms
 - Complications
 - Outcomes
 - Basic Assessment
 - Medical History
 - ADT Record
 - Incubation & Communicability

Disease Event Details



Warnings ACTIVE

Client ID: 35	Name(First,Middle,Last)/Gender: Rod No Middle Name M / Male	Health Card No: -	Date of Birth / Age: 1983 Sep 9 / 30 yrs
Phone Number: -(-)	Jurisdiction Info: BC Ministry of Health	Additional ID Type / Additional ID: Provincial health service provider identifier / -	

Investigation ID: 12	Status: OPEN	Disposition: Became a case	OB No: 36, 79, 191, 192	Investigation
Disease: AIDS	PHAC Date/Type: 2009 Sep 9 / Report Received	Causative Agent: Human immunodeficiency virus type 2	Authority/Classification: National / Case - Confirmed / 2009 Sep 9	

Disease Event Details

PHAC Date / Date Type: /

Disease Origin:

Living on Reserve Most of the Time: (during initial investigation)

Disease Event History

* **Disease:**

Causative Agent:

Site(s): Hold Ctrl and click

Available:	<ul style="list-style-type: none"> Neisseria gonorrhoeae Cephalosporin-resistant Neisseria gonorrhoeae Fluoroquinolone-resistant Neisseria gonorrhoeae Neisseria gonorrhoeae, beta lactamase negative Penicillinase-producing Neisseria gonorrhoeae Spectinomycin-resistant Neisseria gonorrhoeae Tetracycline-resistant Neisseria gonorrhoeae
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Selected Site(s):

PH SDSM Modules Using SNOMED-CT

- **Laboratory Component** in the Investigation module uses SNOMED-CT for (examples of the 13 domains in this category):
 - Specimen type
 - Specimen site
 - Antimicrobial drug
 - Result sensitivity value interpretation
 - Diagnostic imaging requisition test view
 - Diagnostic imaging test view
 - Diagnostic imaging site abnormality

Laboratory Component

Lab Tests

Encounter Group:

Test Panel:

Specimen Collection Date/Time: / / : :PD
yyyy mm dd hh mm

Specimens

* Required field (for Add/Update only)

* Specimen Type:

Site

Collection Date/Time:

Specimen Description:

Row Actions:

Specimen ID	Specimen	Date/Ti

Specimen:

- Biopsy sample
- Body substance sample
- Cardiovascular sample
- Cytologic material
- Dermatological sample
- Device specimen
- Drug specimen
- Ear sample
- Endocrine sample
- Fluid sample
- Food specimen
- Gaseous material specimen
- Genetic sample
- Genitourinary sample
- Intravenous infusion fluid sample
- Lesion sample
- Living sample
- Lymph node sample
- Microbial isolate specimen

Laboratory Component

Specimens

* Required field (for Add/Update only)

* Specimen Type:

Fluid sample

Site

Collection Date/Time:

Amniocentesis fluid sample
Amniotic fluid cytologic material
Mid-stream urine sample
Spot urine sample
Urinary catheter specimen

:PDT
hh mm

Specimen Description:

Add

Clear

Row Actions:

Update

Delete

Select All

Deselect All

Specimen ID

Specimen Type

Site

Collection Date/Time

Specimen Description

Lab Tests

PH SDSM Modules Using SNOMED-CT

- **Subject Management Component** – examples:
 - Allergen type – with embedded find component and SNOMED hierarchy browser
 - Allergy severity
 - Allergy reaction

Lab Summary

Electronic Lab Report
Inbox

Lab Quick Entry

DI Quick Entry

Encounter Details

Signs & Symptoms

Complications

Outcomes

Basic Assessment

Medical History

ADT Record

Incubation &
Communicability

▶ Treatment & Interventions

▶ Prescriptions

Exposure Summary

View Client Imms profile

Subject

Cohort

Notes

Document Management

Communication Templates

Reporting & Analysis

Notifications

Communications Log

Administration

View/Update

Delete

Add Allergy

	Allergen	Severity	Reaction	Onset Date	Effective From Date	Effective To Date	Client Warnings
<input type="radio"/>	Fish - dietary	High	Rigor - symptom	2009 Nov 06	2009 Nov 06		Client Warnings
<input type="radio"/>	Food allergen		C/O: itching	2009 Nov 30	2009 Nov 30		Client Warnings

Allergy Detail

✓ Contains Data

⤴ Hide Allergy Detail

Submit

Clear

Cancel

Show as Client Warning

* Allergen Type:

Status: Active

* Allergen:

Severity:

* Reaction:

Other Reaction Description:

* Date Reported: 2013 / 10 / 07
yyyy mm dd

* Effective From Date: 2013 / 10 / 07
yyyy mm dd

Type:

Onset Date: 2013 / 10 / 07 Onset Date is Accurate
yyyy mm dd

Source of Information:

Add Comment:

Browse

Search

- [-] Contact allergen
 - [-] Anhydrous lanolin
 - [-] Azelaic acid
 - [-] Benzalkonium
 - [-] Benzalkonium chloride
 - [-] Benzalkonium chloride (in water)
 - [-] Benzethonium
 - [-] Benzoic acid
 - [-] Benzoyl peroxide
 - [-] Benzyl alcohol and derivatives
 - [-] Coal tar
 - [-] Crotamiton

- Transfer Requests
- Close Investigation
- Lab
- Encounter Details
- Signs & Symptoms
- Complications
- Outcomes
- Basic Assessment
- Medical History
- ADT Record
- Incubation & Communicability
- Treatment & Interventions
- Prescriptions
- Exposure Summary
- View Client Imms profile
- Subject**
- Client Details
- Client Warnings
- Relationships
- Households
- Consent Directives
- Allergies
- Risk Factors
- Travel History
- Imms History Interpretation
- Upload Clients
- Client Merge
- Resolved Client Matches
- Subject

List of Allergies for Client ↑ Hide List of Allergies

* Reason for Deletion:

View/Update Delete Add Allergy

	Allergen	Severity	Reaction	Onset Date	Effective From Date	Effective To Date	Client Warnings
<input type="radio"/>	Fish - dietary	High	Rigor - symptom	2009 Nov 06	2009 Nov 06		Client Warnings
<input type="radio"/>	Food allergen		C/O: itching	2009 Nov 30	2009 Nov 30		Client Warnings

Allergy Detail ✓ Contains Data ↑ Hide Allergy Detail

Submit Clear Cancel

Show as Client Warning

* Allergen Type: Drug allergen or pseudoallergen Status: Active

* Allergen: Close Clear

Severity:

* Reaction:

Other Reaction Description:

* Date Reported: 201: yyyy

* Effective From Date: 201: yyyy

Type:

Browse Search

Description Search

Description	Code
Penicillamine	334498
Penicillin -class of antibiotic-	330076
Penicillinase sensitive penicillins	316198
Penicillin G potassium	11934
Penicillin G benzathine (substance)	301588

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PH SDSM Modules Using SNOMED-CT

- **Immunizations Management Module:**
 - Agents
 - Antigens
 - ImmunizationHistoryDisease
 - ImmunizationReason
 - InformationSource
 - ImmunizationRoute
 - SpecialConsiderationReason

Imms History
Interpretation

Upload Clients

Client Merge

Resolved Client Matches

▶ Cohort

▼ Immunizations

Record & Update Imms

View Client Imms profile

Special Considerations

Adverse Events (AEFI)


Mass Imms Event

Exported Imms Events

Client Immunization Profile

⤴ Hide Immunization Profile

Double-click in any date field below to enter the default date:

2013 10 10 
yyyy mm dd

Immunizing Agent						
Cholera-Unspecified	X 2011 Apr 14	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
MMRV	X 2012 Oct 10	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Reminder/Recall Count

⌵ Show Reminder/Recall Count

Antigen Count

✓ Contains Data

⤴ Hide Antigen Count

Doses by Antigen	Valid Doses	Invalid Doses	Total
Cholera	0	1	1
Measles	1	0	1
Mumps	1	0	1
Rubella	1	0	1
Varicella	0	1	1

TB Skin Tests and Follow Ups

✓ Contains Data

⌵ Show TB Skin Tests and Follow Ups

Configuring PH SDSM With SNOMED-CT

- Terminology services is a shared component of PH SDSM, containing configuration data for all drop down lists on the system's user interface (UI), HL7 messaging and reports.
- Elements of the terminology services are:
 - Vocabulary domains – symbolic references to drop down lists, messaging or report elements.
 - Value sets – define contents of the vocabulary domains
 - Code sets – collections of terminology concepts, managed by the code set owners (e.g. standards organizations – IHTSDO, reference implementation, jurisdictional customizations).

Configuring PH SDSM With SNOMED-CT

- Terminology services in PH SDSM provide SNOMED specific facilities to benefit from the full features offered by SNOMED-CT:
 - Include an individual SNOMED concept in a value set.
 - Include a complete SNOMED-CT hierarchy under a selected parent concept.
 - Capability to include or exclude the hierarchy parent in the value set.
 - Exclude any individual concepts from a hierarchy.
 - SNOMED-CT search capability.
 - Imbedded SNOMED-CT browser
 - Leverage on the disease causative relationship to define causative agents

Value Set

Add Entry to Value Set

Source Value Set:

Select Value Set Entry Type:

Select Code Set:

Include Concept: This Concept
 Children of this Concept

Search Code

Enter a description text to search:

Selected Target Coded Concept:

Selected Target Coded Concept Description:

- Biopsy of blood vessel
- Blast count, blood
- Blood**
- Blood (WBC) screen for a-fucosidosis
- Blood (WBC) screen for a-mannosidosis
- Blood (WBC) screen for b-mannosidosis
- Blood (WBC) screen for GM1 gangliosidosis
- Blood (WBC) screen for I cell disease
- Blood (WBC) screen for infantile neuronal lipofuscinosis
- Blood (WBC) screen for Krabbe's leukodystrophy
- Blood (WBC) screen for metachromatic leukodystrophy
- Blood (WBC) screen for MPS type VII
- Blood (WBC) screen for Sandhoff disease
- Blood (WBC) screen for Schindler disease
- Blood (WBC) screen for Tay Sachs disease
- Blood - infectious titre negative
- Blood A-fucosidase measurement
- Blood A-galactosidase measurement
- Blood A-mannosidase measurement
- Blood acetyl galactosaminidase measurement

- ▶ Blood
 - ▶ Banked whole blood
 - ▶ Serous blood
 - ▶ Extracorporeal blood
 - ▶ Circulating blood
 - ▶ Extravascular blood
 - ▶ **Venous blood**
 - ▶ Banked autologous blood
 - ▶ Menstrual blood
 - ▶ Peripheral blood
 - ▶ Blood from surgical drain
 - ▶ Arterial blood
 - ▶ Capillary blood
 - ▶ Cord blood
 - ▶ Operative salvaged blood

Configuring PH SDSM - SNOMED-CT Extensions and Customization

- SNOMED-CT extensions are defined at PH SDSM program level using the terminology services.
- Jurisdictions have the ability to define own extensions to SNOMED-CT.
- Capability to customize concept descriptions
- Define mappings from/to SNOMED-CT to/from other terminologies.

- vocabulary Domains
- Value Sets
- Code Sets
- Security
- Miscellaneous
- Reporting & Analysis
- Notifications

Source Value Set: RiADRTreatmentType

Select Value Set Entry Type: Include

Select Code Set: [Dropdown]

Include Concept:

Children of this Concept:

Search Code

Enter a description text to search: Hepatitis Search

Selected Target Coded Concept: 81665004

Selected Target Coded Concept Description: Hepatitis B virus

- Hepatitis B virus
- Hepatitis B virus DNA
- Hepatitis B virus DNA assay
- Hepatitis B Virus immune globulin, human, issued
- Hepatitis B virus polymerase DNA assay
- Hepatitis B virus rRNA
- Hepatitis B virus rRNA assay
- Hepatitis C antibody, confirmatory test
- Hepatitis C virus 100-3 antibody assay
- Hepatitis C virus 22-3 antibody assay
- Hepatitis C virus 5-1-1 antibody assay
- Hepatitis C virus antigen
- Hepatitis C virus c33c antibody assay
- Hepatitis C virus genotype determination
- Hepatitis C virus recombinant protein 5-1-1 antibody
- Hepatitis C virus recombinant protein C 100-3 antibody
- Hepatitis C virus recombinant protein C 22-3 antibody
- Hepatitis C virus recombinant protein C33c antibody
- Hepatitis C virus recombinant protein superoxide dismutase antibo
- Hepatitis C virus RNA

- Acute fulminating type B viral hepatitis
- Acute hepatitis B with delta agent (coinfection) with hepatic coma
- Acute hepatitis B with delta-agent (coinfection) without hepatic coma
- Acute hepatitis B with hepatic coma
 - Hepatitis B virus
- Acute hepatitis B with hepatitis D
- Acute type B viral hepatitis
- Anicteric type B viral hepatitis
- Chronic active type B viral hepatitis
- Chronic aggressive type B viral hepatitis
- Chronic hepatitis B with hepatic coma
- Chronic persistent type B viral hepatitis
- Chronic type B viral hepatitis
- Chronic viral hepatitis B with hepatitis D
- Chronic viral hepatitis B without delta-agent
- Congenital viral hepatitis B infection
- Hepatitis B carrier

Role of SNOMED-CT in Public Health Surveillance (PH-SDSM)

- Standardize on the clinical information captured by the system (e.g. diseases, causative agents, agents and antigens, ...)
- Exchange of clinical information between clinical systems, through HL7 messages, for centralization of data, notifications on reportable diseases at provincial and national level, outbreak alerts, and information exchange among clinical systems.

Lessons Learned

- All jurisdictions will customize PH-SDSM configuration to an extent that varies from jurisdiction to jurisdiction.
- SNOMED-CT version supported by PH-SDSM may not match requirements for all the jurisdictions. Switching to a different version of SNOMED-CT requires in-depth analysis and possible remediation of existing jurisdictional configuration.
- The complexity of SNOMED-CT makes it difficult for users to select individual concepts in a hierarchy (e.g. selecting an allergen in a hierarchy like Drug or Food Allergen).
- Users like pre-defined drop lists (e.g. disease causative agents), but need the capability to customize these lists at the same time.
- Users are not familiar with SNOMED-CT descriptions and ask to customize the descriptions. This creates maintenance problems.

Lessons Learned

- Drop lists are displaying concepts as a flattened list, in alphabetical order. The hierarchical relationships, that may be the logical order, are lost.
- Navigating SNOMED-CT hierarchies is slow and unnecessary if the user knows exactly what concept to select. Based on users' feedback, we added to the SNOMED-CT embedded browser also a search function.
- Focus groups or working groups that define the jurisdictional customizations of terminology services do not think in terms of SNOMED-CT, but in terms of meeting the business needs. The IBM implementation team suggested SNOMED-CT equivalent terms and received clients' approval.
- Providing alternate descriptions to SNOMED-CT concepts help users' transition to the new system and stimulate system adoption by all categories of users.
- Finding subject matter expert (SME) support to validate customized configuration definitions is a challenge.

Conclusions

- The presentation introduced a use case of a public health surveillance system (PH-SDSM) currently deployed in several Canadian and international jurisdictions. The system uses SNOMED-CT as a reference terminology.
- We demonstrated how SNOMED-CT is used to encode the main clinical information throughout PH-SDSM, in several system components.
- We presented how PH-SDSM terminology services have specific SNOMED-CT functionality to leverage the full set of features in SNOMED-CT.
- We highlighted the flexibility of our SNOMED-CT implementation through program or jurisdictional extensions.
- We wrapped-up by presenting the role of SNOMED-CT in public health surveillance and the lessons learned from working with our customers.

Questions and Answers



Thank you!

