

HEALTHCARE GROUP

IMPLEMENTING SNOMED CT BINDINGS IN CLINICAL DATA CAPTURE FORMS

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About me

- Medical background – practising GP
- Clinical Terminologist for ~ 20 years
- NHS & commercial sectors
- Content Committee member on original CAP/NHS project
- Involved in SNOMED CT implementation past 6 years
 - Medusa ambulance application
 - Lorenzo Regional Care
- UK Edition Committee member
- IHTSDO QA Committee member

Outline

SNOMED CT / Application Issues – the problems

Lorenzo Interface Terminology – the solution

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SNOMED CT / Application Issues – the problems

Lorenzo Interface Terminology – the solution

Lorenzo Regional Care

- Centrally hosted application developed for English NHS
- Multi-professional
- Live in 10 hospitals
- Three areas of SNOMED CT functionality
- Health Issues
 - Diagnosis, Symptoms, Allergies, Interventions
 - Subset driven > 35 SNOMED CT subsets in use
- Clinical Narrative
 - Smart tags
- Clinical Data Capture (CDC) forms
 - Developed collaboratively with NHS
 - Primarily secondary care

CDC Forms

Angina Pectoris

Page 1 - Angina Pectoris

SetContext Finalise Mark as significant Preferences

Actual date of assessment Assessed/performed by Copy from previous form

Medical history

Since About At least During

Hours Days Weeks Months Years

Date 14/08/2012

Intensity

Increasing Stable

Sensation

Heavy weight Stubbing Tightness Burning

Type

Pressure Pain

Location

Centre of chest Back Upper abdomen Throat

Radiation present

Without radiation Using radiation to

Radiation

Left arm Right arm Left shoulder Right shoulder

Vegetative symptoms present

Not Are

Vegetative symptoms

Nausea Vomiting Sweat Shortness of breath

Trigger

Mild exertion Heavy exertion At rest Cold

Relation with effort

Not present Present

Relation with effort

Did not resolve Resolved within

Minutes Hours

NYHA classification

I II III IV

Maximal pain presence

Continue Up to

Minutes Hours Days

Frequency of cardiac symptoms

Equal to More than Less than About

A day A week A Month A Year

CDC Forms

Initiate Diabetes Assessment_Monitoring - Encounter details:Inpatient,Acute Trust,RHEUMATOLOGY,Lee J...

Diabetes Assessment - Monitoring SetContext Finalise Mark as significant Preferences

Actual date of assessment: 22/12/2011 15:30 Assessed/performed by: Copy from previous for

Monitoring	Hypoglycaemia
Home monitoring Frequency of home monitoring Needle length Frequency of change Injection device Frequency of injecting	Hypoglycaemic episodes in the last 6 months <input checked="" type="radio"/> Yes <input type="radio"/> No Number needing external help Number occurring nocturnal Number needing self treatment
Injection site(s) <input type="radio"/> Injection sites normal <input checked="" type="radio"/> Injection sites abnormal <input type="radio"/> Lipohypertrophy <input type="radio"/> Lipotrophy <input checked="" type="radio"/> Other	Adverse Events <input checked="" type="radio"/> Yes <input type="radio"/> No Type of adverse event <input type="checkbox"/> Loss of consciousness <input type="checkbox"/> Injury to self <input type="checkbox"/> Injury to others <input type="checkbox"/> Seizures <input checked="" type="checkbox"/> Other
Other, please specify	Other, please specify Comments

CDC Forms & Issues

- Holy grail – set of national reusable SNOMED CT coded forms & data items
 - Early adopters strong influence
 - Simple translation of current processes - NHS is not a single organisation
 - In reality often difficult to persuade users to modify practices
- SNOMED CT specific issues
 - Availability & lateralisation of observables
 - Usability of SNOMED CT terms
- Lorenzo issues
 - Application constraints on subsets

CDC Forms Data Item Library

- Currently > 10,000 data items
- Governance process to approve additions/changes
- Managed in SQL Server Database
 - CSC & NHS access
 - MS Access front end
- Different data types
 - Numeric
 - String
 - Date
 - Enumerator
 - Terminology subset

SNOMED CT Bindings on CDC Forms

- Binding to the data item with additional data – observables
 - Body mass index
 - Systolic blood pressure
 - Barthel Index
 - Oxygen saturation
 - Claudication distance
- Bindings to response sets– findings/interventions
 - Short list e.g. relevant diagnoses
 - Repeating responses – e.g. Yes/No/Not known
 - Includes SNOMED CT context

Observables in CDC

- Mainly straightforward
- Some missing observables
 - Eponymous scales
 - Ongoing work on observables & procedure concepts
 - Guidance to use procedure concepts where available
 - Additions via UKTC request portal
- Laterality
 - Non-laboratory concepts e.g. joint range of movement
 - Laterality not modeled in SNOMED CT (was in CTV3)
 - Ongoing work on observable model
 - Escalated via UK Edition Committee
 - Lateralised concepts added to UK extension

Enumerators in CDC

- More challenging
 - But a lot more fun
- 2 main issues
 - Application constraints – subsets on CDC
 - Usability of SNOMED CT terms

Subsets in CDC

- ‘All or nothing’ rule for subsets
- In practice rare that all enumerators can/should be coded
- Repeating response sets
 - Epilepsy
 - Yes 84757009 Epilepsy
 - No Negation in context model but not in subsets
 - Not given Not in finding context
 - Not known Not in finding context
- Specific response sets
 - Diabetes control method
 - Diet 170745003 Diabetic on diet only
 - Insulin 170747006 Diabetic on insulin
 - Oral 170746002 Diabetic on oral treatment
 - Other Not in SNOMED CT!

Usability of SNOMED CT Terms

- Lorenzo subsets display preferred terms
- Tension between unambiguity & usability
- Strong user push back
- Urinalysis protein
 - Negative 167273002 Urine protein test negative
 - Trace 167274008 Urine protein test trace
 - + 167275009 Urine protein test = +
 - ++ 167276005 Urine protein test = ++
 - +++ 167277001 Urine protein test = +++
 - ++++ 167278006 Urine protein test = ++++

Outline

SNOMED CT / Application Issues – the problems

Lorenzo Interface Terminology – the solution

Lorenzo Reference Domains

- Internal terminology
- Variety of uses
- Used to populate pick lists
 - Gender
 - Language
- May affect application behaviour
- Adapted to support SNOMED CT

Lorenzo SNOMED CT Reference Domains – Fixed Response Set

IFM Name ClinHistDisorderEpilepsy

IFM Display Epilepsy - EP

DIL Name ClinHistDisorderEpilepsy

DIL Display: Epilepsy - EP

Flag/Domain CC_CDC_F_YNNGNK

Knowing Mode Reported

SNOMED 84757009 Validated

Term Epilepsy

DI Type: Primary **Data Type:** Reference valu

Comment

Domain: Status: Approved DGB

Domain Code CC_CDC_F_YNNGNK

Domain Name Finding Yes/No/Not given/Not known

Response Code: CC_CDC_F_YES

Display Order: 1

Display Term: Yes

SCT ConceptId:

SCT Term:

Context: Finding present

Match:

Classification

Classify 1: SysObs|Neuro

Classify 2:

Classify 3:

Additional

- Admin
- ClinHist
- ClinState
- FamHist
- Function
- Interven
- RegObs
- SocHist
- SysObs

SNOMED Expression

display	snomed_normal
Yes	413350009 finding with explicit context : { 246090004 associated finding =84757009 Epilepsy , 408729009 finding context = 52101004 present , 408731000 temporal context = 410512000 current or specified , 408732007 subject relationship context = 410604004 subject of record }
No	413350009 finding with explicit context : { 246090004 associated finding =84757009 Epilepsy , 408729009 finding context = 2667000 absent , 408731000 temporal context = 410512000 current or specified , 408732007 subject relationship context = 410604004 subject of record }

Enumerated values

Yes	1
No	2
Not given	3
Not known	4

Order Sc Forms

Pre-operative Assessment Medical Hist

Lorenzo SNOMED CT Reference Domains – Fixed Response Set

ValueDomainCode	ConceptCode	TermText	Display Order
CC_CDC_F_YNNGN K	CC_CDC_F_YES	Yes	1
CC_CDC_F_YNNGN K	CC_CDC_F_NO	No	2
CC_CDC_F_YNNGN K	CC_CDC_F_NK	Not known	3
CC_CDC_F_YNNGN K	CC_CDC_F_NG	Not given	4

SNOMED CT Expression
413350009 finding with explicit context : { 246090004 associated finding =84757009 Epilepsy , 408729009 finding context = 52101004 present , 408731000 temporal context = 410512000 current or specified , 408732007 subject relationship context = 410604004 subject of record }
413350009 finding with explicit context : { 246090004 associated finding =84757009 Epilepsy , 408729009 finding context = 2667000 absent , 408731000 temporal context = 410512000 current or specified , 408732007 subject relationship context = 410604004 subject of record }

SNOMED
Term

84757009
Epilepsy

ConceptCode	Prefix	Suffix
CC_CDC_F_YES	413350009 finding with explicit context : { 246090004 associated finding =	, 408729009 finding context = 52101004 present , 408731000 temporal context = 6493001 recent , 408732007 subject relationship context = 410604004 subject of record }
CC_CDC_F_NO	413350009 finding with explicit context : { 246090004 associated finding =	, 408729009 finding context = 2667000 absent , 408731000 temporal context = 410512000 current or specified , 408732007 subject relationship context = 410604004 subject of record }
CC_CDC_F_NG		
CC_CDC_F_NK		

Lorenzo SNOMED CT Reference Domains – Fixed Response Set

IFM Name ClinHistDisorderEpilepsy

IFM Display Epilepsy - EP

DIL Name ClinHistDisorderEpilepsy

DIL Display: Epilepsy - EP

Flag/Domain CC_CDC_F_YNNGNK

Knowing Mode Reported

SNOMED 84757009 Validated

Term Epilepsy

DI Type: Primary **Data type:** Reference value

Comment

Domain: Status: Approved DGB

Domain Code CC_CDC_F_YNNGNK

Domain Name Finding Yes/No/Not given/Not known

Response Code: CC_CDC_F_YES

Display Order: 1

Display Term: Yes

SCT ConceptId:

SCT Term:

Context: Finding present

Match:

Composites

Classification

Classify 1: SysObs|Neuro

Classify 2:

Classify 3:

Expression Component Table

Lookup Table Decomposed expression

Additional Admin
Clin
Clin
Far
Fur
Inte
ReguObs
SochHist
SysObs

SNOMED Expression

display	snomed_normal
Yes	413350009 finding with explicit context : { 246090004 associated finding =84757009 Epilepsy , 408729009 finding context = 52101004 present , 408731000 temporal context = 410512000 current or specified , 408732007 subject relationship context = 410604004 subject of record }
No	413350009 finding with explicit context : { 246090004 associated finding =84757009 Epilepsy , 408729009 finding context = 2667000 absent, 408731000 temporal context = 410512000 current or specified , 408732007 subject relationship context = 410604004 subject of record }

Enumerated values

Yes	1
No	2
Not given	3
Not known	4

Order Sc: Forms

Pre-operative Assessment Medical Hist

Lorenzo SNOMED CT Reference Domains – Unique Response Set

IFM Name: NeurologicalAssessmentLeftMotorReflexAnkle

IFM Display: Ankle

DIL Name: SysObsNeuroReflexesAnkleLeft

DIL Display: Left ankle motor reflex response

Flag/Domain: CC_CDC_115

Knowing Mode: Observed

SNOMED: Validated

Term:

DI Type: Primary **Data Type**: Enumerator

Comment:

Domain: Status: Predates DGB

Domain Code: CC_CDC_115

Domain Name: Left Ankle Reflex

Response Code: CC_CDC_115_1

Display Order: 1

Display Term: Brisk

SCT ConceptId: 299880006

SCT Term: Ankle reflex brisk

Context: Finding present left

Match:

Classification

Classify 1: SysObs|Neuro

Classify 2:

Classify 3:

Additional Admin

ClinHist

ClinState

FamHist

Function

Interven

RegObs

SocHist

SysObs

SNOMED Expression

Brisk: 413350009 | finding with explicit context | : { 246090004 | associated finding | =299880006 | Ankle reflex brisk , 408729009 | finding context | = 52101004 | present , 408731000 | temporal context | = 410512000 | current or specified | , 272741003 | Laterality | = 7771000 | Left , 408732007 | subject relationship context | = 410604004 | subject of record | }

Normal: 413350009 | finding with explicit context | : { 246090004 | associated finding | =299879008 | Ankle reflex normal , 408729009 | finding context | = 52101004 | present , 408731000 | temporal context | = 410512000 | current or specified | , 272741003 | Laterality | = 7771000 | Left , 408732007 | subject relationship context | = 410604004 | subject of record | }

Enumerated values	Order	Sc	Forms
Brisk	1		Podiatry Biomechanics Additional Exam
Normal	2		Podiatry Neurological Assessment
Reduced	3		
Absent	4		

Lorenzo SNOMED CT Reference Domains – Unique Response Set

ValueDomain Code	ConceptCode	TermText	DisplayOrder
CC_CDC_115	CC_CDC_115_1	Brisk	1
CC_CDC_115	CC_CDC_115_2	Normal	2
CC_CDC_115	CC_CDC_115_3	Reduced	3
CC_CDC_115	CC_CDC_115_4	Absent	4

SNOMED CT Expression
413350009 finding with explicit context : { 246090004 associated finding =299880006 Ankle reflex brisk , 408729009 finding context = 52101004 present , 408731000 temporal context = 410512000 current or specified , 272741003 Laterality = 7771000 Left , 408732007 subject relationship context = 410604004 subject of record }

response_code	display_term	snomed_conceptid	snomed_description	context_code
CC_CDC_115_1	Brisk	299880006	Ankle reflex brisk	CC_CDC_F_YES_L
CC_CDC_115_2	Normal	299879008	Ankle reflex normal	CC_CDC_F_YES_L
CC_CDC_115_3	Reduced	299878000	Ankle reflex reduced	CC_CDC_F_YES_L
CC_CDC_115_4	Absent	274818004	Ankle reflex absent	CC_CDC_F_YES_L

ConceptCode	Prefix	Suffix
CC_CDC_F_YES_L	413350009 finding with explicit context : { 246090004 associated finding =	, 408729009 finding context = 52101004 present , 408731000 temporal context = 410512000 current or specified , 272741003 Laterality = 7771000 Left , 408732007 subject relationship context = 410604004 subject of record }



Lorenzo Reference Domains – SNOMED CT Context

- Pre-configured post-coordinated representation of contextual SNOMED CT expressions
- Internal display in SNOMED CT compositional grammar
- Driven by user requirements
- Pareto effect?
- Scope
 - Findings context
 - Present, Absent, Suspected
 - Temporal context
 - Default, Past, Recent
 - Laterality
 - Findings & Procedure
 - Procedure context
 - Done, Not done, Planned, Indicated

Lorenzo CDC SNOMED CT Expressions - Validation

- Collaborative exercise with NHS
 - UK Terminology Centre
 - CFH Content Team
- Review of entire data item library
 - 10,000 items
- Initial assignment by CSC team
- Regular review sessions via webex
 - 4 persons
 - > 1 year

Lorenzo CDC SNOMED CT Expressions - Summary

- > 3000 SNOMED CT expressions
 - Findings 2316
 - Observables 183
 - Procedures 539
- Transparent to the user
- SNOMED CT binding application
 - Includes SNOMED CT browser for finding & entering concepts
 - Displays in SNOMED CT compositional grammar
- Lookup table
 - Decomposed relationship values for future retrieval
 - HL7 expressions for future messaging
- Excellent relationship with UKTC
 - Validation of bindings
 - Addition of content

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THANK YOU

