**HEALTHCARE GROUP** 

# IMPLEMENTING SNOMED CT BINDINGS IN CLINICAL DATA CAPTURE FORMS

David Robinson Clinical Terminology Director





#### 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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Lorenzo Interface Terminology – the solution

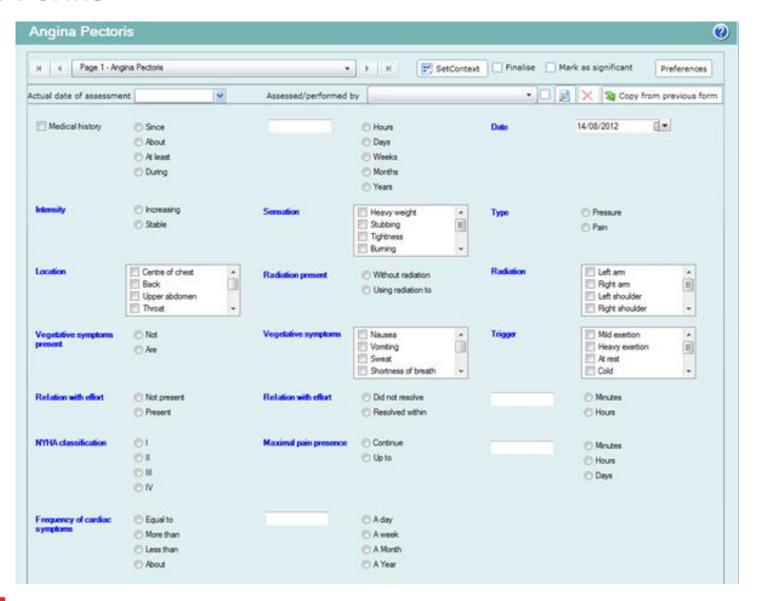


# Lorenzo Regional Care

- 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

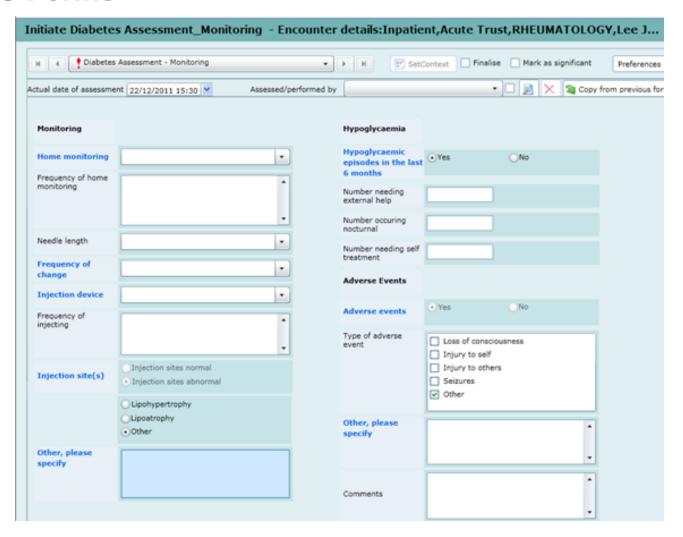


## **CDC Forms**





## **CDC Forms**





#### **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 givenNot in finding contextNot knownNot 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

<ul><li>Negative</li></ul>	167273002	Urine protein test negative
<ul><li>Trace</li></ul>	167274008	Urine protein test trace
- +	167275009	Urine protein test = +
- ++	167276005	Urine protein test = ++
- +++	167277001	Urine protein test = +++
- ++++	167278006	Urine protein test = ++++



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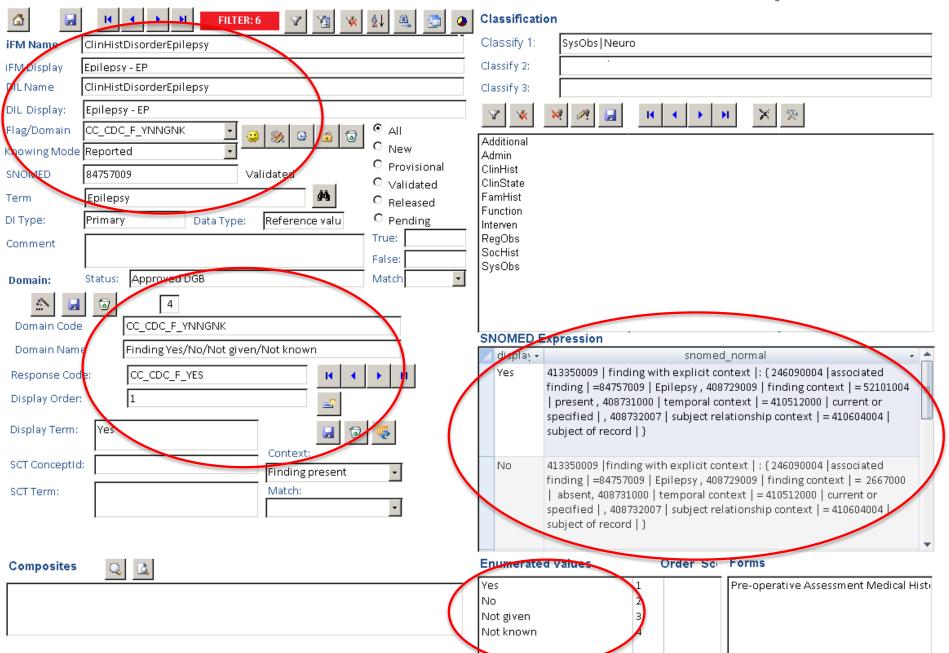


#### **Lorenzo Reference Domains**

- 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

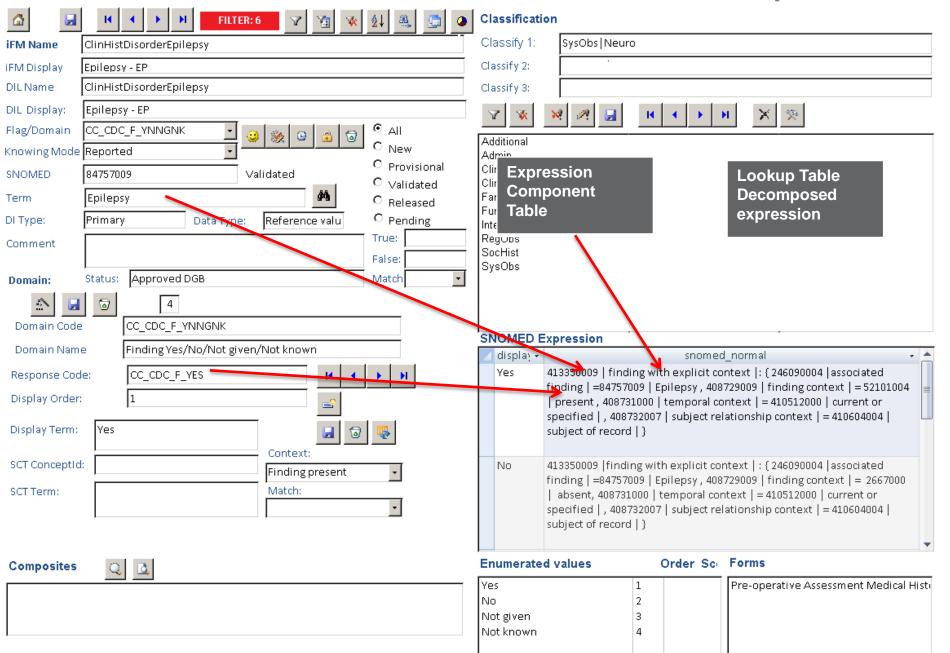


# Lorenzo SNOMED CT Reference Domains – Fixed Response Set

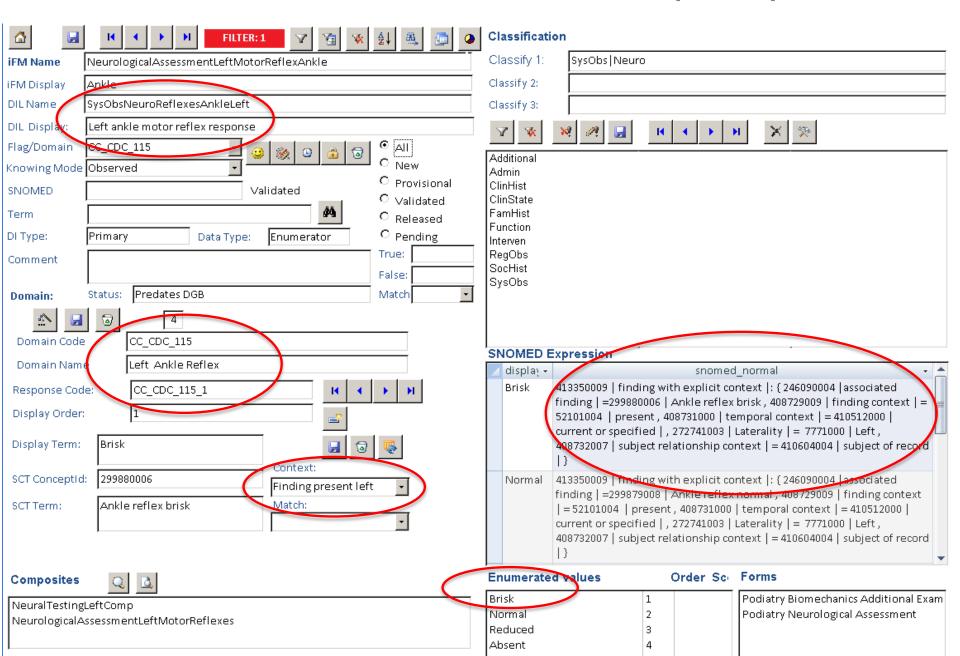
ValueDomainCode ConceptCode	TermText	Display Order	SNOMED CT Expression
CC_CDC_F_YNNGN K CC_CDC_F_YNNGN K CC_CDC_F_NO CC_CDC_F_NO		2	413350009   finding with explicit context  : { 246090004   associated finding   =84757009   Epilepsy , 408729009   findin context   = 52101004   present , 408731000   temporal context = 410512000   current or specified   , 408732007   subject relationship context   = 410604004   subject of record   }
K CC_QDC_F_NK	Not known	3	3 413350009  finding with explicit contaxt   : { 246090004
CC_CDC_F_YNNGN K CC_CDC_F_NG	Not given	4	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
C_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	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



## **Lorenzo SNOMED CT Reference Domains – Unique Response Set**



# **Lorenzo SNOMED CT Reference Domains – Unique Response Set**

ValueDomain ConceptCode Code	TermText [	DisplayOrde	SNOMED CT Expression	
CC_CDC_115	Brisk 1	1	413350009   finding with explicit context  : { 246090004   associated finding   =299880006   Ankle reflex brisk ,	
CC_CDC_115	Normal 2	2	408729009   finding context   = 52101004   present , 408731000   temporal context   = 410512000   current or	
CC_CDC_115 CC_CDC_115_3	Reduced 3	3	specified   , 272741003   Laterality   = 7771000   Left , 408732007   subject relationship context   = 410604004	
CC_CDC_115	Absent	4	subject of record   }	
response_code display_terr	n snomed_con ceptid	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	
		2460	1,408729009   finding context   = 5210100   cit context  : {   present   408731000   temporal context   = 1090004   associated   410512000   current or specified	= .



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



# **Acknowledgements**

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- Elaine Wooler
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