Networking and Health Information Exchange

Unit 4e

Basic Health Data Standards

---

**Slide 2**

Unit 4e Objectives
- Understand data elements; attributes of data elements

---

**Slide 3**

Why data elements?
- The level at which data is created and collected
  - Level that is necessary to define clinical models and input for clinical decision making
- Level at which data elements can be precisely, uniquely and unambiguously defined that is independent of use, location and circumstance.
- Simplifies achieving semantic interoperability
- Essential for computer understandability
Slide 4

Data elements and terminology

- What is a data element and what is a terminology?
- Is diagnosis a data element or a terminology?
- Any and every concept is a data element

---

Slide 5

Data elements

- Each data element assigned a unique code for identification purposes.
- Each data element will be derived to a level of precision to prevent any ambiguity in its meaning and use.
- If uniform agreement cannot be reached for an element, an element will be defined for each agreement with precise definitions to distinguish. Experience in use might ultimately resolve these disagreements.

---

Slide 6

Data element set

- Defines at the lowest level the structured components that are contained and used in health care.
- If all data is derived from this master data element set, data can be shared and understood independent of the interchange mechanism
- Can be harmonized across clinical domains
- Permits sites to define the data they collect
Slide 7

Master data element set

- Enables sites to define what data elements are collected and stored as part of the EHR.
- From this master, minimum data sets may be derived for various purposes, for example, a minimum data set defining decision support inputs, reporting quality measures or to a clinical data registry.
- Becomes the basis for interoperability in the interchange of data.

Slide 8

Master data element set

- The MDE set will include categorical terms from high to lower levels. The level of defining these levels will be a development issue. It is most likely that these will be hierarchical.
- Class examples include:
  - Demographic
  - Studies
  - Therapies
  - Problems
  - Physical Examination

Slide 9

Other uses

- It is likely that most data exchanges between various sites of care will be in a query response mode. A site’s database of the data elements collected with make it much easier to define what is available and what is desired.
- Query profiles can be defined from the site’s data element set.
- Permits local, dynamic classification sets for various purposes, including medical specialties.
Attributes

- Unique code
- Short name or acronym
- Long name
- Synonyms
- Definition
- Use and purpose, including context
- Category
- Units
- Data type
- Value set
- Mood (state)
- RIM Class
- Linkages to representation sets
- ...

List of attributes (1)

- Code
  - numeric without meaning
  - OID hierarchically assigned
- Name
  - As used in clinical setting
  - Preferred
  - Short name or display name
- Definition
  - Textual
  - Structured

List of attributes (2)

- Data type
  - Chosen from ISO/HL7/CEN standard
  - Simple or complex
- Units
  - Scientific; ISO
- Value set
  - A set of permissible values
  - Single or multiple
- Synonyms
List of attributes (3)

- Relationship to other data elements
  - Hierarchical relationships
  - Bidirectional (parent, children)
  - Other linkages (equivalent, opposite)
  - Flags: top level; leaf level
- Classifications (Antihistamine, beta blocker)
- Language

Administrative attributes

- Owner/caretaker/steward/responsible organization
- Submitting organization
- Registration authority
- Status (active/inactive or deprecated)
- Version
- Date

Potential issues

- Data elements should not be controversial, since they represent a master set, not a required set.
- Categories and groupings of data elements subject to discussion and debate
- Attribute sets subject to discussion and debate
- Tool sets might evolve in functionality provided
- Early user would be essential to define issues, gaps, unforeseen consequences
- Permanent support, including maintenance and distribution must be defined, including funding
What is ISO/IEC 11179?

- ISO/IEC 11179 Parts 1-6: Information technology – Specification and Standardization of data elements
- A metamodel for ‘data element’ metadata
  - Standard by which to convey semantic, syntactic and lexical meaning
  - Human and machine understandable
  - Unambiguous

ISO 11179

- Part 1: Framework for the Specification and Standardization of Data Elements
- Part 2: Classification for Data Elements
- Part 3: Basic Attributes of Data Elements
- Part 4: Rules and Guidelines for the Formulation of Data Definitions
- Part 5: Naming and Identification Principles for Data Elements
- Part 6: Registration of Data Elements

Data Element Details:

- Data Element Details
- Sex
  - Male
  - Female
- Race/Age
  - Caucasian
  - Latino
  - Asian
  - Other
- Race/Age
  - 18 yrs and older
  - 17 yrs and younger
- Gender
  - Male
  - Female
- Language
  - English
  - Spanish
- Data Quality
  - High
  - Low
Slide 19

Slide 20

Slide 21

National Cancer Institute

- Cancer Data Standard Repository (caDSR) – registry of common data elements
- Enterprise Vocabulary Service (EVS) – registry of terminology used by CDSR
  - Includes SNOMED CT, MedDRA, VA_NDF-RT, LOINC, HL7, NCI Thesaurus
- Based on ISO 11179
- Tools available
  - CDE Browser, UML Browser, free style search, CDE curation tool, form maker, others
Slide 22

caBIG

• Vocabularies & Common Data Elements
• Evaluate and integrate systems for vocabulary and ontology content development used throughout caBIG system
• Review process classifies vocabulary into bronze, silver, gold categories with rigid rules for definition
• Stores in caDSR, EVS

Slide 23

CDISC

• Study Data Tabulation Model – data elements used for clinical trials
• Uses NCI’s caDSR
• Operational Data Model (ODM)

Slide 24

How we use the result

Master Data Element Set

Value sets

Data Elements collected in this facility

Data Elements collected in this facility

Health-care facility A

Health-care facility A

SNOMED-CT
LOINC
RxNorm
Others

Attributes include definitions, terms, units, etc.

Business Agreements
Summary

• Necessary part of semantic interoperability
• Importance of fully defined set of characteristics
• Use 11179 standard as base
• Need global commitment