Data Standards, Data Quality, and Interoperability

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Health Data

- From Health Informatics perspective

MANUAL / PAPER BASE  COMPUTERIZATION
Hospital

Problem?

Other Hospital

Data

Data

Different structure
Different words/term

System unable to understand resulted in wrong presentation
PROBLEMS ???

• Each individual
  • own way of thinking
  • define our own words & sentences
  • own way of structuring information

• CLINICAL PRACTISE ?? → PROBLEMS WHEN SHARING INFORMATION
Health Data Systems

- Data is **Standardized**
- Data is **Stored**
- Data is **Shared**
- Better Information for Patient Care
The Institute of Medicine report “Patient Safety: Achieving a New Standard for Care” states, “At the most basic level, data standards are about the standardization of data elements:

- (1) defining what to collect,
- (2) deciding how to represent what is collected (by designating data types or terminologies), and
- (3) determining how to encode the data for transmission

Without data standards and data quality, the future of interoperability is bleak. Data fields and the content of those fields need to be standardized.
What Standards are Required?

System A  Network  System B

General ICT standard such as web service, xml etc
What Standards are Required?

Structure:
- Data Component
- Data Element

System A
System B

Structure: Data Component

- General ICT standard
- Data Structure
  - component
  - element
- Messenger
  - commonly used: HL7
Nevertheless, clinical data standards play a key role in improving the efficiency and quality of health care delivery. Without data standards, organizations cannot readily share clinical information, public health initiatives become unnecessarily cumbersome, and medical care remains geographically isolated and highly variable.
<table>
<thead>
<tr>
<th>Standard Name</th>
<th>Subject Area</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Terminology Standards</strong></td>
<td></td>
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<tr>
<td>International Classification of Disease version 9 (ICD-9)</td>
<td>Disease Names</td>
<td>A common set of terms and codes for clinical diagnoses. Commonly used in billing and clinical applications.</td>
</tr>
<tr>
<td>Systematized Nomenclature of Medicine (SNOMED)</td>
<td>Clinical Terms</td>
<td>A broad set of standardized clinical terms commonly used in a variety of software applications including EHRs.</td>
</tr>
<tr>
<td>Logical Observation Identifiers Names and Codes (LOINC)</td>
<td>Lab Terms</td>
<td>A standard set of universal names and codes for identifying lab results. Facilitates the exchange of lab information between different systems.</td>
</tr>
<tr>
<td><strong>Conceptual Standards</strong></td>
<td></td>
<td></td>
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<tr>
<td>Health Level 7 – Reference Information Model (HL7 RIM)</td>
<td>Clinical Concepts</td>
<td>An important object-oriented model that maps a broad array of clinical concepts and domains. Allows for interoperability between different and competing standards.</td>
</tr>
<tr>
<td>Unified Medical Language System (UMLS)</td>
<td>Medical Terms and Concepts</td>
<td>A large vocabulary database that maps a variety of medical terms to common clinical concepts.</td>
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<tr>
<td><strong>Document Standards</strong></td>
<td></td>
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<tr>
<td>Continuity of Care Record (CCR)</td>
<td>Clinical Summary Documents</td>
<td>A document standard that codifies the manner by which important clinical information (such as problem list and allergies) should be shared.</td>
</tr>
<tr>
<td>Health Level 7 - Clinical Document Architecture (HL7 CDA)</td>
<td>Clinical Documents</td>
<td>A standard exchange model for clinical documents such as discharge summaries and progress notes. Formerly known as the Patient Record Architecture.</td>
</tr>
</tbody>
</table>
## Messaging Standards

<table>
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<tr>
<th>Standard</th>
<th>Messaging Type</th>
<th>Description</th>
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</thead>
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<tr>
<td><strong>Health Level 7: HL7 v2.x, v3.0</strong></td>
<td>Data Exchange Messaging</td>
<td>A messaging standard for the exchange of clinical, financial, and administrative data.</td>
</tr>
<tr>
<td><strong>Digital Imaging and Communications in Medicine (DICOM)</strong></td>
<td>Radiology Messaging</td>
<td>A common language structure for sharing radiology images.</td>
</tr>
<tr>
<td><strong>Institute of Electrical and Electronics Engineers (IEEE)</strong></td>
<td>Medical Device Messaging</td>
<td>A common messaging structure for sharing medical device communications.</td>
</tr>
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</table>

## Application Standards

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<th>Standard</th>
<th>Application Interoperability</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Health Level 7 - Clinical Concept Object Workgroup (HL7 CCOW)</strong></td>
<td></td>
<td>An architecture that allows secure access to separate software applications.</td>
</tr>
</tbody>
</table>
Terminology Standards (ICD-9, SNOMED, LOINC): Much like a dictionary does for language, terminology standards define which terms and codes are the accepted vocabulary for clinical software and how they should be used. In ICD-9 coding, for example, “chest pain” is a recognized term and is linked to a standardized code. “Chest pressure,” “pain in the chest,” and other similar phrases are not. Similarly, LOINC provides a standard nomenclature for laboratory test names and documenting clinical observations.
Conceptual Standards (HL7 RIM, UMLS):
At a more abstract level, a conceptual or “meta-element” standard defines how certain informational concepts get conveyed in a standardized fashion. This type of standard enables systems to interpret and use data in a more meaningful manner. Just as sentences are more than a collection of words, so are concepts more than a collection of terms.
Document Standards (CCR, CDA): A document standard generally includes several informational elements and lets someone (or a software application) know which type of information is included in a document and where it can be found. A common standard in paper medical records is the SOAP (Subjective, Objective, Assessment, Plan) format. CCR provides a standard format for inter-provider communication and includes patient identifying information, medical history, current medications, allergies, and a care plan recommendation.
**Messaging Standards** (HL7, DICOM, IEEE, NCPDP): Messaging standards define how information is packaged and communicated from one party to another. They set the language, structure, and data types needed for seamless integration. DICOM is the messaging standard for radiology imaging, while NCPDP is used for exchanging prescription information.
**Application Standards** (CCOW): An application standard such as CCOW is used to integrate the functions of different software applications so they can work together seamlessly. With CCOW, the same username and password combination can be recognized across different software applications for better user performance, and a common user interface can be employed to view data from a variety of sources.
Figure 7-13 Domains of communication of health information covered by different industry and legislative standards.
Data is Standardized

Standards & Terminology Services
Analogy of the Structure

- Front page
- Table of Content
- Chapter
- Index
Benefits of Data Standardization

• Foundational to interoperable data sharing
• Ensures consistent interpretation of clinical information
• Supports clinical decision making
• Supports public health and bio-surveillance activities

• *Improves quality, safety, and cost-effectiveness of patient care*
Value of Standard Terminology

Hines VAMC
Acetyl salicylic Acid
Wm Beaumont AMC
Aspirin
Puget Sound VAMC
St. Joseph’s Aspirin
Martinsburg VAMC

Standardized Term
ASPIRIN
Prior to Standardization:

1,000,000 free text allergies
Not computable

Now **coded standard allergy terms**
that function in order checks.
Prior to Standardization: Decentralized Note Titles

• 156,000 active and in-use note titles → 2,452
• Titles created locally/difficult to decipher:
  - AUDIO/REEVAL/HA CHECK (T)(CI)
  - CH-SARP NOTE
  - CIH/STAR II CONSULT
  - DME CLINIC (T)
  - IC/ID/V
  - MH-CWT PATIENT CHECKLIST (CH)
  - NURSING PRRTP NOTE
  - SOCIAL WORK BOMH DISPOSITION NOTE (O) (T)
  - UR 67CD (T)(K)

• There were more than 1500 different titles for Infectious Disease Encounters alone
• Standardization now allows clinicians to quickly find relevant content
HEART FAILURE CLINIC FIRST VISIT NOTE

Title Mapping Example

Local Note Title

CARDIOLOGY OUTPATIENT INITIAL EVALUATION NOTE

Standard Note Title
Next Domains

• Current:
  – Problem List
  – Encounters
  – Immunizations
  – Radiology
  – Lab
    • SNOMED Mapping
    • Lab Display Name
  – Pharmacy-R
  – Surgery
  – Prosthetics
  – Consults

• Next:
  – Clinical Procedures in Medicine
Health Data Systems

Data is Standardized

Data is Stored

Data is Shared

Better Information for Patient Care
TUGAS

• Membuat makalah tentang standarisasi data (pilih salah satu) misal snomed, h7,loinc, dll

• Isi makalah :
  – Latar belakang
  – Definisi
  – Struktur
    • Data elemen
    • Data component
  – Contoh penerapan