

# Redwood MedNet Informatics Conference

*Connecting California to Improve Patient Care*

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## Standards in HealthCare The Role of Terminology

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# Standards in Health Care: Terminology

- Need for a “common language” of medicine to share information between health care enterprises
- Only a very limited amount of information is stored as digital, codified data that can be shared
- Many systems have developed their own local methods of storing data
  - **E.g., there are over 400 codes that represent “hospital admission”**
- Standard terminologies allow for accurate sharing of information at reduced cost
  - **Independent of software being used**
  - **Language and “term” independent**
    - Synonyms are treated as one concept

# Clinical Terminology

*(What is it Good For?)*

- Interoperability: sharing of information between systems
  - **Immediate, continuous access to machine readable information useful for:**
    - Medication warnings
      - Med-Med interactions
      - Med-Med Allergen interactions
      - Med-Disease interactions
    - Alerts and reminders
    - Population based queries
    - Biosurveillance
      - Epidemic outbreaks
      - Terrorist attacks

# Brief History of Terminology

- Started in 17<sup>th</sup> century England with “London Bills of Mortality”
  - **John Graunt wanted to study caused of death in childhood**
  - **Captured statistical information on causes of death**
  - **Found there was a 36% mortality rate before age 6**

**LONDON'S Dreadful Visitation:**  
 OR, A COLLECTION of All the  
**Bills of Mortality**  
 For this Present Year:  
 Beginning the 27<sup>th</sup> of December 1664, and  
 ending the 19<sup>th</sup> of December following:  
 As also, The GENERAL or whole years BILL:  
 According to the Report made to the  
 KING'S Most Excellent Majesty,  
 by the Company of Parish-Clerks of London. &c.

LONDON:  
 Printed and are to be sold by R. Coates living in Aldersgate-street.  
 Printer to the said Company 1665.

**A general Bill for this present year,**  
 ending the 19 of December 1665, according to  
 the Report made to the KING'S most Excellent Majesty,  
 By the Company of Parish Clerks of London, &c.

*The Diseases and Casualties this year,*

<b>A</b> Bortive and Stillborne — 617	Executed — 21	Pallie — 30
Aged — 1545	Flux and Small Pox — 655	Plague — 68526
Ajut and Beaver — 5257	Found dead in Streets, fields, &c. — 2	Plasme — 6
Appoplex and Suddenly — 116	French Pox — 80	Plurisie — 13
Bedric — 10	Frighted — 23	Posioned — 4
Blasid — 5	Gout and Sciatica — 27	Quinsie — 35
Bleeding — 18	Grief — 46	Rickets — 157
Bloody Flux, Scouring & Flux — 187	Gripping in the Guts — 1238	Rising of the Lights — 197
Burnt and Scalded — 8	Hanged & made away themselves — 7	Rupture — 14
Colicure — 3	Headmouldsthor & Mouldfallen — 14	Scurvy — 107
Cancer, Gangrene and Fistula — 56	Jaundies — 100	Singles and Swine pox — 2
Canker, and Thrush — 121	Imposiume — 227	Sores, Ulcers, broken and healed — 83
Childbed — 625	Kild by severall accidents — 46	Limbs — 83
Cholimes and Infants — 1258	Sings Evil — 28	Spleen — 14
Cold and Cough — 65	Leprosie — 2	Spotted Fever and Purples — 1229
Collick and Winde — 134	Lethargy — 14	Stoppings of the stomack — 334
Consumption and Tiflick — 4888	Liverrotten — 24	Stone and Strangury — 58
Convulsion and Mordie — 1058	Meagrom and Headach — 4	Sarlet — 1217
Distracted — 5	Measles — 7	Teeth and Worms — 1014
Decide and Tempany — 1476	Mortified and Shot — 9	Vomiting — 54
Drowned — 5	Overjard & Starved — 45	Vunn — 7

  

Crabbed — 5114	Buried {	Male — 48569	} Of the Plague — 68195
Crabbed & Females — 4853		Female — 48717	
In all — 9967		In all — 97286	

Increased in the Burials in the 130 Parishes and at the Pest-houses this year — 79009  
 Increased of the Plague in the 130 Parishes and at the Pest-houses this year — 68526

1665: Listed causes of death included “Bloody Flux, Gripping in the Guts, Mortification, Rising of the Lights, and Teeth”

# Clinical Terminology History (cont)

- 1839 William Farr (England)
  - Early attempt at classification
  - Found current schemes lacking:
    - ***“Each disease has, in many instances, been denoted by three or four terms, and each term has been applied to as many different diseases: vague, inconvenient names have been employed, or complications have been registered instead of primary diseases.”***
- Bertillon Classification of Causes of Death
  - Paris, 1893
- **International Lists of Causes of Death, 1890s**
- **ICD-1 released in 1900 (fell under control of the WHO)**

# Current Widely Used Terminologies

- Current “Administrative Terminologies” such as ICD-9 and CPT are widely used but were not designed to support HIT applications
  - **Lack adequate granularity and structure**
    - E.g., no ICD-9-CM code for “Pelvic Pain”
    - However, there is an ICD code for “Accident Involving Spacecraft” (E845.9)
  - **Not truly concept based**
    - E.g., “Malignant Neoplasm of connective and other soft tissue, NEC”
      - Could represent multiple concepts
  - **Limited, inconsistent organization**
    - E.g., no polyhierarchy

# Newer Terminologies

- **Added structure and granularity to support machine processing of information**
  - Capture of information at point-of-care
    - Information stored currently in written records as free text has limited value
  - Processing of information (e.g., reminders)
  - Sharing of information between enterprises
    - Termed “Semantic Interoperability”
- **Composed of unique concepts tied to identifiers (codes)**

# Newer Terminologies

- Clean, unique concept representation
  - **True synonyms only**
  - **Not loosely grouped similar terms**
  - **Allows for accurate retrievals**
    - i.e., Less “noise”
- Support rich interrelationships between concepts
  - **Formation of rich ontologies**
  - **Concepts can be defined through relationships to other concepts**
    - E.g., Streptococcal pneumonia
      - Is\_a respiratory infection AND Is\_a streptococcal infection
      - Has\_etiology streptococcus
      - Has\_location lung

# Newer Terminologies (cont.)

- Support for modifiers as concepts that support other “atomic” concepts
  - E.g., ***mild* chest discomfort**
- Concepts can be gathered into phrases that can be stored and retrieved
  - E.g., support a query for the severity of chest pain in patients that later were proven to have an acute MI
    - ***without additional effort at point-of-care and with minimal effort generating the report***

# SNOMED CT History

- Formed from:
  - **United Kingdom's *Clinical Terms***
    - > 2,000 clinicians contributed from multiple Royal Colleges
    - Extensively used in the U.K.
  - **SNOMED RT**
    - Developed by the College of American Pathologists
- Two terminologies merged (completed in 2001)
- U.S. Government purchased unlimited license in 2003
- CAP donating IP rights to International SDOs in 2007
  - SNOMED has been translated into >30 languages



SNOMED Tea Party, Edinburgh , Scotland, 2000

# Point of Care Usage

- SNOMED's highly refined concepts are more machine friendly than point-of-care friendly
- Use of SNOMED concepts at point-of-care has not been efficient
  - Base concept is chosen
  - Base concept may need supporting modifiers (e.g., moderate, refractory, burning, etc.)
  - E.g., severe aching right jaw pain (4 concepts)
- Effort of choosing each modifier and the core concept inefficient at the point of care
  - Referred to as “post-coordination”
  - Necessary but should be minimized whenever possible

# Pre vs. Post-Coordination

- Post-Coordination
  - **Moderate + Aching + Right + Flank Pain**
  - **Code 1 + Code 2 + Code 3 + Code 4**
- Pre-Coordination
  - ***“Moderate aching right flank pain”*** = one code
    - “Preassembled” single concept
    - Mapped to several reference terminology (e.g., SNOMED CT codes)
      - Compositional expressions
    - Information can be shared between applications
    - Documentation more efficient
      - One click instead of four
      - No need to search vocabulary for items

# “Interface” Terminologies

- Bridge between “canonical formalism” of SNOMED CT and natural sounding point-of-care documentation
- Provides pre-coordinated phrases designed for pick lists
- Save clicks assembling phrases and searching for concepts to compose phrases
- Only certain modifiers are allowed
  - **Prevents user from documenting:**
    - “Aching yellow discharge”
    - “Chest pain in right toe”
    - “Testicular pain in right ovary”

# Templated Documentation

- Topic specific (e.g., Abdominal pain, female)
- Can store commonly used phrases that are likely to be used for that type of encounter
  - **E.g., crampy right lower quadrant abdominal pain**
- Commonly used phrases are pre-coordinated for this encounter
- Less commonly used expressions can be assembled from preexisting concepts (i.e., post-coordination)
  - **E.g., “pain started after patient fell from a jet-ski and struck her abdomen on the handlebar”**

# Interoperability

- Codified data (i.e., concepts stored as coded data elements)
  - **Can be shared between systems sharing the same “language”**
  - **SNOMED CT is viewed as the most likely terminology for clinical concepts**
    - General consensus within standards bodies
      - E.g., HITSP

# Quality Initiatives

- Pay-for-performance
  - **DOQ-IT**
  - **PQRI**
  - **Multiple smaller programs**
- Goal is to reduce reimbursement for procedures and E&M services
- Effective in the U.K.
  - **Physician incomes have increased**

# Quality Initiatives

- A comprehensive *standard* terminology is needed to facilitate physician reporting required for quality initiatives
- For each quality initiative
  - **Identify which patients should be included**
    - E.g., all the different ways to identify CHF
  - **Identify which patients should be excluded**
    - Otherwise physicians will be unfairly penalized

# Conclusions

- Capture of clinical information as structured data using a ***standard*** terminology (e.g., SNOMED CT) offers many advantages
  - **Sharing of data**
  - **Processing data locally for use in patient care**
  - **Research**
  - **Quality of care measurements**
- Terminologies must be designed to allow for ease of use at point-of-care to facilitate data capture
- Interface terminologies make this process more efficient and still allow for capture of structured data