

# **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

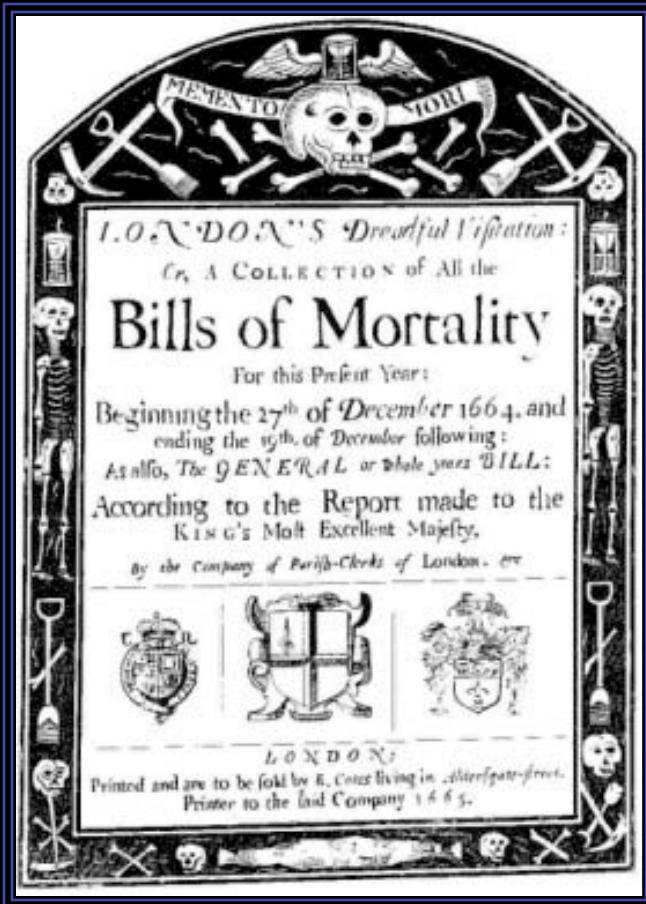
# Clinical Terminology

*(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 causes of death in childhood
  - Captured statistical information on causes of death
  - Found there was a 36% mortality rate before age 6



A generall Bill for this present year, ending the 19 of December 1665, according to the Report made to the KING'S most Excellent Majest.			
By the Company of Parish Clerks of London, &c.			
<i>The Diseases and Casualties this year.</i>			
A	Bottise and Stillboise — 617	Executed — 21 Pal sic — 30	
	Aged — 1545	Floz and Scall Pox — 625	
	Ajus and Peaver — 523	Found dead in Streets, fields, &c. — 2 Plasmet — 6	
	Appoyles and Suddenly — 116	French Pox — 86 Pluric — 19	
	Betric — 10 Frighted — 43 Posturis — 2		
	Kalnd — 5 Gout and Sciatica — 27 Quinle — 35		
	Bleeding — 16 Grief — 46 Rickets — 157		
	Bloody Flux, Scourring & Flux — 185	Griping in the Guts — 1238	Rising of the Lights — 197
	Burnt and Scalded — 8 Hang & made away themselves — 7	Hunger — 14	
	Coleture — 3 Headmouldshot & Mealefallen — 14 Scurvy — 1-7		
	Cancer, Gaugenc and Fiftain — 16 Jaundies — 12 Blingles and Swine pox — 2		
	Canker, and Thrush — 11 Impotisme — 227 Stomach Ulcers, broken and bellied		
	Childbed — 625 Kill'd by severall accidents — 46 Limbs — 62		
	Christmes and Infants — 1258 Kinge Evill — 28 Spleen — 14		
	Cold and Cough — 68 Leprose — 2 Spotted Fever and Purples — 1529		
	Collick and Winde — 134 Lethargy — 14 Scopping at the Stomack — 334		
	Confumption and Tislick — 48 Livergown — 21 Stote and Strangury — 8		
	Convulsion and Morise — 1034 Meagrom and Headach — 11 Sustet — 1-2		
	Distracted — 3 Measles — 7 Teeth and Worms — 2614		
	Drousf and Tempny — 1478 Mortifered and Shot — 9 Vomiting — 7		
	Drowned — 3 Overaid & Sizved — 453 Vom — 7		
	Male — 4856		
	Male — 5114		
	Female — 817		
	Female — 4853		
	Total — 9567		
	Total — 9365		
	Ol the Plague — 68195		
	Increased in the Burials in the 130 Parishes end at the Pest-houſe this year — 79429		
	Increased of the Plague in the 130 Parishes end at the Pest-houſe this year — 68570		

1665: Listed causes of death included “Bloody Flux, Griping 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