Detailed Clinical Models for Sharable, Executable Guidelines

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Roadmap

- What is SAGE?
- Sharing guideline information
  - Challenges
  - Solutions
What Is SAGE?

- Standards-based, Active Guideline Environment
- NIST ATP Grant
- Apelon, IDX, IHC, Mayo Clinic, Stanford, UNMC
What Is SAGE?

- Standards-based
  - Leverage existing standards
  - Help create new standards
  - Goal: shareable guidelines

- Active

- Guideline

- Environment
What Is SAGE?

- Standards-based
- Active
  - Executable
- Guideline
- Environment
SAGE Overview
Multiple EMRs, Multiple Mappings
Mappings Grow Exponentially

EMR 1

EMR 3

EMR 2

EMR 4
Standard, Shared Representation

EMR 1

EMR 2

EMR 3

EMR 4
For Guidelines

EMR 1

EMR 2

EMR 3

EMR 4

SAGE
What Needs to Be Sharable?

- Logic
  - E.g. Arden Syntax (procedural)
  - SAGE guideline format (declarative)
- Data (focus of this presentation)
  - Curly braces in Arden Syntax
  - VMR + Detailed Clinical Models in SAGE
For Data in Guidelines

VMR + DCM

EMR 1

EMR 2

EMR 3

EMR 4
What Is the VMR?

- Virtual Medical Record

- A small set of classes corresponding to the broad types of clinical data needed for guideline execution

- Classes defined on an as-needed basis

- Based on other existing standards (HL7 RIM) where possible
Virtual Medical Record
VMR in Protege

- 13 Classes (currently)
- Relatively flat inheritance hierarchy (currently)
- Designed to meet specific needs of specific guidelines
VMR Observation Class
Do We Need More Than a VMR?

- It describes broad areas of guideline related information
- It enables representations of clinical information
- It does not constrain or validate except at the coarsest level
Too Many Ways to Say the Same Thing

A single name/code and value
Left patellar deep tendon reflex intensity is 2+

Combination of two names/codes and values
Patellar deep tendon reflex intensity is 2+
Laterality is left

Combination of three names/codes and values
Deep tendon reflex intensity is 2+
Body part is patella
Laterality is left
Too Many Ways to Say the Same Thing

A single name/code and value

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
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Combination of three names/codes and values

Deep tendon reflex intensity is 2+

Body part is patella

Laterality is left

All of these examples can be represented by a single VMR
Detailed Clinical Models

- Specializations of VMR classes
- Define boundary between terminology and information models
- Similar to (if not the same as):
  - Archetypes
  - Templates
  - Clinical Statements
Pseudocode DCM Example

Refl{ex constra}ns <sup>vmr.Obse</sup>rvation {  
  code.equals("reflex finding")  
  value.isa(reflex_finding_value_set)  
  hasQualifier {  
    code.equals("body part")  
    value.isa(body_part_value_set)  
  }  
  hasQualifier {  
    code.equals("laterality")  
    value.isa(laterality_value_set)  
  }  
}
What Do We Gain?

- Preserve modeling decisions across guidelines
- Can be used as a catalog of the data used in a guideline
- A shareable definition of a clinical entity
Priorities

- Internally consistent
- Pragmatic - The ideal separation of information and terminology models was not always supported by:
  - Our chosen terminologies
  - Our information model
  - The real underlying EMRs
  - If every EMR stores the concept “no family history of breast cancer” what do we gain practically form using a post-coordination?
- Elegant
Status of DCMs in SAGE

- Currently:
  - Defines boundary between terminology & information models
  - Specify appropriate value sets

- In the future:
  - Aggregation
  - Qualification
Conclusion

- We have implemented a method for sharing data needed for representing clinical guidelines by:
  - Designing an abstraction of specific EMRs (the VMR)
  - Defining specializations of this abstraction (Detailed Clinical Models)
Thank You