



## Clinical Decision Support Standards and Systems: Global Updates

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## Overview

- A tale of 2 communities
  - Health services researchers
  - Informaticians
- Developing a KR for guidelines
- XML
- Reusability (teaser!)



## Health Services Community

- 1935 Redbook of the AAP
- Increasing skills with scientific study design and analysis
- Increasing costs/practice variation
- 1988 -- AHCPR: US initiative to develop clinical practice guidelines
- Evidence-based medicine



## Guidelines v. quality improvement tools

- "systematically developed statement to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances" (IOM 92)
- Synonyms = practice standards, protocols, practice parameters, algorithms, care plans, critical paths
- ≠ medical review criteria, reimbursement policies



## Influencing clinicians' behavior toward guideline adherence

- **Generally ineffective**
  - Passive educational (publication/dissemination)
  - Lectures and grand rounds (improve awareness but do not change behavior)
- **Variably effective**
  - Audit and feedback
  - Local opinion leaders
  - Consumer education
- **Generally effective**
  - Reminders (sparingly)
  - Educational outreach/academic detailing
  - Interactive educational interventions
  - Barrier-oriented interventions
  - Multifaceted approaches



## Most effective:

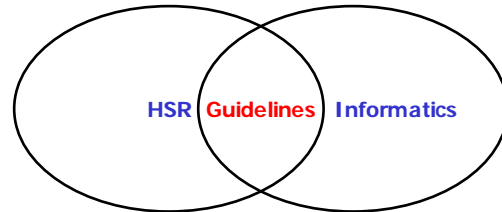
- Patient-tailored advice
- Available at the time and place of a consultation

Grimshaw and Russell, Lancet 1994

## Informatics Community

- 1970s/80s – MYCIN, INTERNIST/QMR, DxPLAIN - oracles
- Focused expert system assistants
- Knowledge acquisition bottleneck

## Guidelines: An intersection of interests



## Intersection: Informatics and guidelines



- De facto repositories of high-quality, current knowledge
- Subject of 10% of JAMIA publications in past 5 yrs
- Knowledge acquisition bottleneck
- Guidelines = knowledge source
- Guidelines ≠ computerized guidelines, computer-interpretable guidelines, computer-executable guidelines
- CDSS

## Guideline-Based Decision Support

|                  |                     |                          |
|------------------|---------------------|--------------------------|
| Arden syntax     | Arden TC at HL7     | MLMs                     |
| ActiveGuidelines | EPIC                | Linkage with EMR         |
| ASBRU            | Vienna, BGU         | Intention-based          |
| Guide            | Pavia               | Workflow                 |
| GLIF             | Intermed            | Algorithms               |
| PRODIGY          | Newcastle           | EON Model                |
| PROforma         | Cancer Research, UK | Executable process model |
| SAGE             | US Consortium       |                          |

## What makes a good KR for guidelines?

- Comprehensive
- Expressively adequate/informationally equivalent
- Flexible
- Comprehensible
- Shareable
- Reusable

## Defining a guideline KR

- Concepts pertinent to guideline **development** and **quality appraisal**
  - IOM Report
  - Hayward et al. (Structured Abstracts AIM 1993)
  - Shaneyfelt (JAMA 1999)
  - AGREE ([www.agreecollaboration.org](http://www.agreecollaboration.org))

## Defining a guideline KR (2)

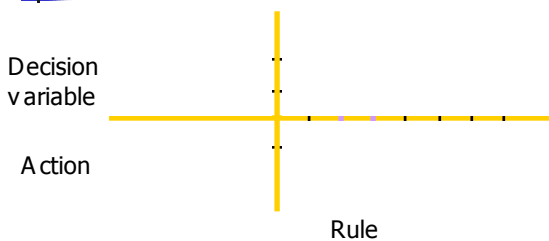
- Concepts pertinent to guideline development and evaluation
- Concepts pertinent to **dissemination**
  - [www.guideline.gov](http://www.guideline.gov)



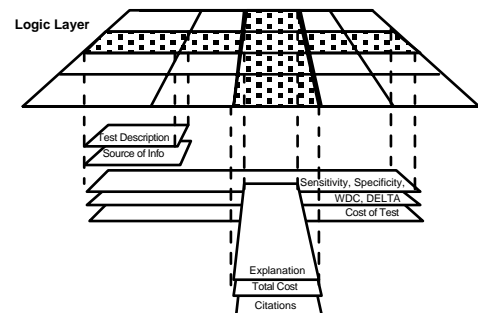
## Defining a guideline KR (3)

- Concepts pertinent to guideline development and evaluation
- Concepts pertinent to dissemination
- Concepts pertinent to **implementation**

## Classical Decision Table



## Augmented Decision Table



## Logical Analysis with Highlighters

- UTI Recommendation 3

If an infant or young child **2 months to 2 years of age** with **unexplained fever** is assessed as being **sufficiently ill to warrant immediate antimicrobial therapy**, a urine specimen should be obtained by SPA or bladder catheterization; the diagnosis of UTI cannot be established by a culture of urine collected in a bag. (Strength of evidence: good) Urine obtained by SPA or urethral catheterization is unlikely to be contaminated...

## XML

- Multi-platform, Web-based, open standard
  - the new "lingua franca" of cyberspace
- A more powerful technology for representing electronic documents than HTML

## XML

- Multi-platform, Web-based, open standard
- A more powerful technology for representing electronic documents than HTML
- Human-readable, yet can be processed by machine
- Markup can be performed by non-programmers

## XML: From a small number of discrete colors to an unlimited palette



## Generic content of published guidelines

- Administrative information
- Purpose, rationale, and objectives
- Developer profile—organization and individuals
- Intended guideline users
- Target population to whom recommendations apply
- Method of development
- Knowledge components
- Testing and revision

### Component Sources

|           | Health Svcs   | Informatics   | GEM   |
|-----------|---|---|---|
| Identity  | Guideline ID, Title, Author, Date, Version, Copyright, Status | Guideline ID, Title, Author, Date, Version, Copyright, Status | Guideline ID, Title, Author, Date, Version, Copyright, Status |
| Developer | Organization, Contact, Role, Address, Phone, Email            | Organization, Contact, Role, Address, Phone, Email            | Organization, Contact, Role, Address, Phone, Email            |
| Purpose   | Target Population, Objectives, Justification, Rationale       | Target Population, Objectives, Justification, Rationale       | Target Population, Objectives, Justification, Rationale       |
| Audience  | Intended Users, Target Population, Exclusions                 | Intended Users, Target Population, Exclusions                 | Intended Users, Target Population, Exclusions                 |
| Method    | Methodology, Evidence, Appraisal, Recommendations             | Methodology, Evidence, Appraisal, Recommendations             | Methodology, Evidence, Appraisal, Recommendations             |
| Knowledge | Concepts, Definitions, Terminology, References                | Concepts, Definitions, Terminology, References                | Concepts, Definitions, Terminology, References                |
| Testing   | Validation, Reliability, Reproducibility, Feasibility         | Validation, Reliability, Reproducibility, Feasibility         | Validation, Reliability, Reproducibility, Feasibility         |
| Revision  | Review Process, Update Cycle, Version Control                 | Review Process, Update Cycle, Version Control                 | Review Process, Update Cycle, Version Control                 |

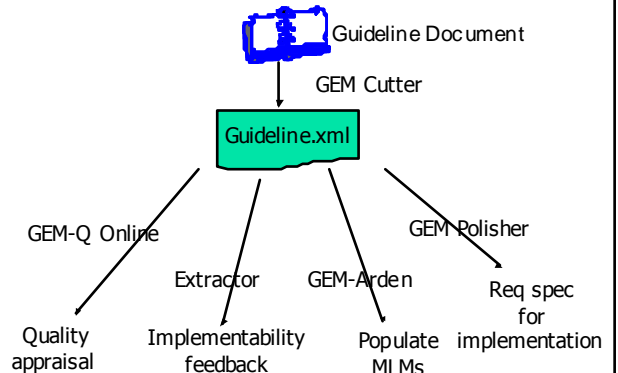
## GEM

Guideline Elements Model

- Knowledge model for guideline documents
  - Multi-level hierarchy (> 100 elements)
- Models heterogeneous information contained in guidelines
- Conceived and developed in XML
- GEM DTD adopted as a standard (ASTM E2210-02)

Shiffman, et al. JAMIA 2000  
ycmi.med.yale.edu/GEM

## MORO (Markup Once, Reuse Often)





## Review

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  - Informaticians
- Developing a KR for guidelines
- XML
- MORO



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