Clinical Decision Support Strategies

CIMI Meeting, Amsterdam

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Objectives

• The common goal of improving healthcare using health IT
  − Patient safety, treatment efficacy and efficiency

• **Clinical decision support (CDS) as a key enabler**
  − Safety net to catch error
  − Speed up spread of best practices & evidence-based medicine

• Clinical knowledge management through the use of **informatics**
  − Computerized artefacts instead of narrative guidelines
  − Break the barriers of natural languages and terminologies

• Scalable CDS product/services across sites/countries
  − Not just a black-box behind thin web services
  − **Global library of CDS logic / apps / modules**
Proposal

• CDS Working Group in CIMI
  – build prototypes, demonstrators based on real clinical requirements
  – generate feedbacks to clinical modelling process
  – set up initial lab environment for the CIMI community

• Interoperability showcase of portable CDS
  – Involve local EHR systems from different sites
  – Present at trade shows/informatics conferences
Outline

• Background
  – Product vision & general requirements

• Design & informatics
  – Theories
  – Choice of informatics standards

• Implementation & product solutions
  – Product demo

• Proposal
Background

• The Presenter
  - Medical doctor
  - PhD in medical informatics, EHR semantic interoperability
  - 10+ years R&D on openEHR technologies, lead of Java Ref Impl.
  - CDS expert to SemanticHealthNet

• The company & the product
  - 20+ years, 380 employees
  - EHR product with significant market share in Sweden and Denmark
  - Regional EHR system covering entire healthcare
  - CMIO & responsible for Clinical Decision Support & Knowledge Management
CAMBIO HEALTHCARE SYSTEMS

Takes 17 years in average

Clinical outcomes

Change of clinical practices

Awareness of new knowledge

Evidence-based clinical guidelines

Quality registries

Research Databases

EHR

Information

Research

Trials

Evidence

Care

Guidelines

Clinical Practice

Continuous Education
Vision

• **Sharing of CDS Logic**
  - Machine readable format (informatics standards)
  - Agnostic to natural language and reference terminology

• **Computerized Clinical Decision Support (CDS)**
  - At-point-of-care real-time applications
  - Facilitating decision making / safety net to catch human errors
  - App-style rapid development/release cycles

• **Near-real time feedback system**
  - Use production data directly
  - Aggregated level, comparisons, trends
Guideline Definition Language (GDL)

A minimum language to glue together archetypes, terminologies and rules

Three design pillars

• Bindings between archetype elements and variables in the rules

• Rule expressions easily converted to industry rule engine languages

• Bindings between local concepts used in the rules and concepts from reference terminologies
GDL Specs Released through openEHR

Guideline Definition Language (GDL) first release

March 11, 2013 | from: Rong Chen

We are pleased to announce the immediate availability of the design specifications of Guideline Definition Language (GDL) and its reference implementation under open source software licenses. GDL is a formal language designed to express and to share Clinical Decision Support rules across language and technical barriers by leveraging openEHR designs. CDS rules in GDL format is agnostic to natural languages, reference terminologies and rules engine languages.

There are considerable synergies in the development of clinical models and CDS rules. Semantically well-defined clinical models can provide reliable means of input and output of the rules. On the other hand, experiences from CDS rules development can lead to improvements of the clinical models as well as increased motivations to adopt structured and standardized clinical models. Reusing existing high-quality clinical models in the form of archetypes would hopefully increase the productivity in authoring and maintaining clinical rules.

Please note that GDL is still in development. We aim to submit the GDL specifications for review in openEHR in the near future. We look forward to the community’s feedback to further improve the specifications.

Some important links from this release:

- GDL Specifications (v.90)
- GDL Editor
- GDL sample files
- GDL Reference Implementation Project

Rong Chen MD, PhD
On behalf of the Informatics Team, Cambo Healthcare Systems, Sweden
GDL Editor (open source software)

The GDL Editor is an open source software used for developing and managing clinical decision rules. In the image, the GDL Editor interface is shown, with a guide named "CHA2DS2-VASc Score" by Rong Chen. The guide details include:

- **Guide Name**: CHA2DS2-VASc Score
- **Author**: Rong Chen
- **Email**: rong.chen@cambio.se
- **Organization**: Cambio Healthcare Systems
- **Date**: 2012/12/03

The description of the guide states:

**CHA2DS2-VASc Score for estimation stroke risks in atrial fibrillation**

**Purpose**
Calculates stroke risk for patients with atrial fibrillation, possibly better than the CHADS2 score.

**Use**
Calculates stroke risk for patients with atrial fibrillation, possibly better than the CHADS2 score.

In the **References** section, the following studies are mentioned:

CDS Knowledge Manager

CDS Dashboard for monitoring

CDS App for interventions

Open standards & Light-weight technologies
Closed loop system for improvement
CDS Platform

CDS Dashboard

Dashboard Server

Web Client Admin Client

openEHR Backend Studies

Rules Engine Knowledge Management Server

Terminologies Ontologies

Guidelines

Archetypes Templates

Apps, Studies

CDS Apps

EHR Adaptor

Local EHR

Apps

EHR Extractor

DB

Patient data

Cambio Healthcare Systems

27/05/2014

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**Example**

**Stroke Prevention CDS**

- Atrial fibrillation (AF) causes strokes
  - high mortality and long term disability
  - Stroke prophylactic treatment exists and is effective
  - Recent advance causes changes in the clinical guidelines
  - Sweden: currently 42% compliance, national goal: 80%!
  - 3000 yearly preventable strokes if compliance rate is 75%

- CDS Pilot study with Östergötland (ongoing)
  - 5 clinical units (2 hospital depts., 3 primary centres)
  - 8 weeks (pre/post study interview/surveys + measurements)
  - Planned regional roll-out + clinical trail in 2015
CDS demo

• GDL Editor (open source software)

• Knowledge Manager

• CDS Dashboard (remote)

• CDS Apps
  – Stroke Prevention CDS
  – Apps embedded in EHR
Summary

• GDL – open specification to express clinical rules
  – With OSS implementation/tools
  – Proven with real-life CDS projects
  – Exploring order-sets/care plans

• Open CDS Platform
  – based on informatics standards / open specifications
  – Knowledge manager, CDS apps & dashboard

• Willingness to share clinical rules/apps/modules with CIMI members and build demonstrators
  – Sharing within Sweden/Nordic countries is not enough!
Proposal for next step

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