

**Legacy Clinical Content
&
Clinical Guidelines
&
Quality Register**

***open*EHR Clinical Content Workshop**

Rong Chen, MD PhD

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Introduction

- **Cambio COSMIC**
 - Regional EHR solutions deployed in Sweden, Denmark and the UK
 - Sponsoring the *openEHR* open source Java project
 - Participate in Danish and Swedish *openEHR* pilot projects
- **Rong Chen, MD PhD**
 - Director of health informatics, CMIO, Cambio, Sweden
 - Informatics researcher, Linköping University, Sweden
 - Member of Architecture Review Board, *openEHR*
 - Project lead of the open source Java reference implementation of *openEHR*

Legacy Content – Why?

- Preserve the meaning of data that are still being collected with various proprietary EHR models
- Cope with changes
 - Major changes due to system migration
 - Minor changes due to upgrades and integrations
- Generate input for ongoing clinical content work
 - Legacy content often validated by reality
- Bottom-up approach supplementary to top-down approach

Legacy Clinical Content – Summary

- Phase 1 (2008-2009)
 - 86 care documentation templates from Swedish County of Östergötland converted into openEHR archetype format.
 - Nearly all semantic definitions preserved
 - Rong Chen et al. Archetype-based conversion of EHR content models: pilot experience with a regional EHR system. BMC Med Inform Decis Mak. 2009 Jul 1;9:33.
<http://www.biomedcentral.com/1472-6947/9/33>
- Phase 2 (ongoing)
 - Clinical content from different Swedish and Danish regions
 - Expressed in openEHR archetype/template formats
 - Explore where consensus on clinical content can be reached
 - Investigate how archetype/template can cope with local differences

COSMIC Admission Template Exported as Archetype

The image displays two software windows side-by-side. On the left is the 'Template manager' window, which shows a list of templates under the 'Admission' category. A context menu is open over the 'Admission' template, with the 'Update' option selected. On the right is the 'Ocean Archetype Editor [Admission]' window. The archetype file name is 'openEHR-EHR-EVALUATION.Admission.v1'. The 'Tree' view shows a hierarchical structure of the archetype, with 'Blood pressure' highlighted in red. The 'Constraint' tab is active, showing the 'Units' field set to 'mmHg' and the 'Count' field set to '1' with 'Limit decimal places' checked. A red arrow points from the 'Blood pressure' node in the tree to the 'Units' field in the constraint editor.

Clinical Guideline Representation

- Motivations
 - Overcome bottleneck between EHR and Guideline/DSS
 - Reuse of clinical content as building blocks of guidelines
 - DSS as part of clinical processes inside EHR
 - guideline compliance checking
 - Lymphoma Chemotherapy guideline as test-bed
- Result
 - 10 archetypes reused in the lymphoma chemotherapy guideline as base information models, e.g. Medication, lab investigation result
 - Templates are used to fill-in guideline specific data points
 - Reused the same authoring tools for EHR content models
 - Used general-purpose languages/engines for rules and processes

Representing a Chemotherapy Guideline Using *openEHR and Rules*, MIE2009

Guideline Example

CHOP-14 + Rituximab

| | | |
|--|----------------------------------|------------------------------------|
| Inf Rituximab | 375 mg/m ² | Dag 1 |
| Inf Vincristin | 1.4 mg/m ² (max 2 mg) | Dag 1 |
| Inf Cyklofosamid | 750 mg/m ² | Dag 1 |
| Inf Doxorubicin | 50 mg/m ² | Dag 1 |
| T Deltison | 50 mg/m ² | Dag 1-5 |
| Inj Neupogen | Standarddos | Dag 4 tom 11 (= 8 dagar) |
| Alt inj Neulasta | Standarddos | Dag 2, 24 tim efter avslutat cyto. |
| Pneumocystis profylax: T Eusaprim Forte 1 tabl, 1 ggr dagligen. Mån, ons och fre | | |

from "Regional guideline for Lymphoma 2009", p23, ROC.se

- Medications
 - Cytostatic: R-CHOP regimen
 - Supportive: antiemetic, prophylactic
- Lab & Imaging Investigations
 - Full blood count, CT /PET, Bone marrow biopsy
- Monitoring Orders
 - Vital signs, side-effects

Guideline Data in openEHR Template

| | | |
|---------------|-----------------------|-------|
| Inf Rituximab | 375 mg/m ² | Dag 1 |
|---------------|-----------------------|-------|

The screenshot shows a tree view of an openEHR template for Rituximab. The following fields are circled in red:

- Rituximab** (NAME (from 'Name of medication'))
- Dose unit** (VALUE (default = 'mg/m2'))
- Number or fraction** (VALUE (default = '375'))
- Route** (VALUE (default = 'i.v.'))
- Timing** (VALUE (default = '04:00'))

- Medication
 - drug name
 - dose units
 - dose
 - route
 - timing

Organizing Data & Structure

SECTION [cytostatic]

- INSTRUCTION [medication: rituximab]
- INSTRUCTION [medication: cyclophosphamide]
- INSTRUCTION [medication: doxorubicin]
- INSTRUCTION [medication: vincristine]
- INSTRUCTION [medication: prednisone]

SECTION [antiemetic]

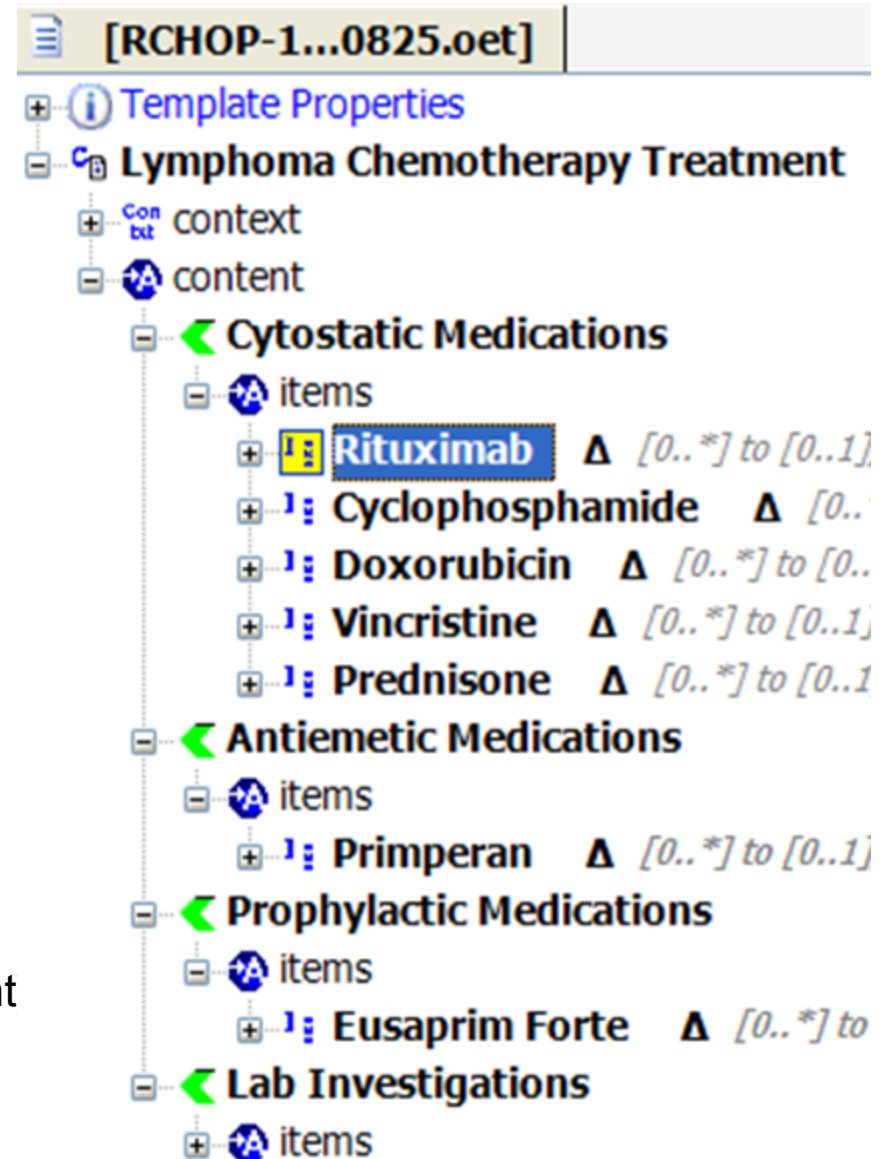
- INSTRUCTION [medication: primper]

SECTION [prophylactic]

- INSTRUCTION [medication: eusaprim forte]

SECTION [monitoring]

- INSTRUCTION [laboratory request: full blood count]
- INSTRUCTION [observation request: vital signs]
- INSTRUCTION [imaging request: CT/PET]



Quality Register

- Swedish National Heart Failure (RiksSvik) Quality Register
 - openEHR based **communication** and **validation** over web services
 - Specification fully expressed by archetypes/templates + terms bindings
 - Cambio COSMIC as one of the two EHRs
 - First test message sent from customer site successfully
- Preliminary Results
 - Possible to express detailed quality register requirement with openEHR templates (+100 data points, fully structured)
 - 9 reused international archetypes, 12 new archetypes, 2 main templates, 7 sub-templates
- Want to know more?

Workshop - Open EHR Developers

13/09/2010 17:15-18:45

Session location (room): 1.4.3 & 1.4.4

Inskrivnings-/besöksdatum:

DEMOGRAFI och LIVS
SJUKHUS/SPECIALIST

| | | |
|----------------------------------|--|------------------------|
| Civilstånd * | | 1=Öst 2=En 3=Öst |
| Vårdgivare * | | 1=Bl 2=En 3=3v |
| Klinik * | | 1= M 2= K 3= G |
| Orsak till * inläggning/besök | | 1=FO 2=Ny 3=Ru |
| Utlösande faktorer * | | 1=ic kard |

PRIMÄR ETIOLOGI (M)

Primär etiologi *

TIDIGARE ELLER NUVA

| |
|---------------------------|
| Ischemisk hjärtsjukdom * |
| Tidigare hjärtinfarkt * |
| Hypertoni i anamnesen * |
| Förmaksflimmer/fladder * |
| Diabetes * |
| Lungsjukdom * |
| Klaffsjukdom * |
| Dilaterad kardiomyopati * |

Ocean Template Designer - 2.5 Beta

File View Tools Help

[DIAGNOSTIK_v2.oet] [RiksSvikt_Inpatient.oet]

IFK2_TRUNK Repo

Templates

Template Properties

- quality-report
 - context
 - content
 - VID INSKRIVNING DEMOG
 - PRIMÄR ETIOLOGI Δ [0..
 - TIDIGARE ELLER NUVARA
 - GENOMGÅNGNA INGREPP
 - DIAGNOSTIK
 - ÖVRIGA UNDERSÖKNINGA
 - Biokemiska data
 - STATUS
 - PATIENTSKATTADE SYMTO
 - MEDICINSK BEHANDLING
 - items
 - ACE-hämmare
 - A2-blockerare/ARB
 - RAAS-blockad
 - Betablockerare
 - Diuretika
 - Aldosteronantagonist
 - Digitalis
 - Statiner
 - Erhållet i.v. inotrop st
 - Långverkande nitrate
 - Antikoagulantia
 - ASA alternativt övrig
 - Antal övriga icke hjär
 - PLANERAD UPPFÖLJNING
 - items
 - PLANERAD UPPFÖLJ

Cambio COSMIC, Erik Nissen, (ErikN)

Kvalitets register Journal Arkiv Administration Messenger Akutliggare Patient Översikter Vårdbegäran Fönster Hjäl

Hämta... Rensa 19 101010-1010 Tian Tiansson

RiksSvikt Sjukhus formulär 19 101010-1010 Tian Tiansson

DEMOGRAFI | PRIMÄR ETIOLOGI | SJUKDOMAR | INGREPP | DIAGNOSTIK | UNDERSÖKNINGAR | STATUS/LAB | PATIENTSKATTNING | MEDI

Primär etiologi*

- Ischemisk hjärtsjukdom*
- Tidigare hjärtinfarkt*
- Hypertoni i anamnesen*
- Förmaksflimmer/fladder*
- Diabetes*
 - Är patienten diabetiker? I så fall vilket typ och behandling?
 - 1=Typ 1
 - Behandling:
 - 2=Dietbehandlad
 - 3=Insulinbehandlad
 - 4=Behandling med oral antidiabetika
 - 5=Behandling med insulin och oral antidiabetika
- Lungsjukdom*
- Klaffsjukdom*
- Dilaterad kardiomyopati*
- Tidigare stroke*
- Njursjukdom*
- Depression*
- Pågående malign sjukdom*

Ny Ta bort Spara Sänd

Miljö: IFK2 testmiljö 7.3 Aktiv användarroll: Central administrator Aktiv arbetsenhet: Kirurgkliniken

Summary

- *Still ongoing work...* some early results suggest:
 - openEHR archetype formalism might be useful for preserving legacy clinical content
 - openEHR archetype/template could be used to represent clinical guidelines for decision support
 - openEHR framework seems to be a good platform for national quality registers
- *openEHR* seems to provide a interoperability framework for health information
- Thank you! Questions? rong.chen@cambio.se