Data collection in pathology and reporting to quality registries based on openEHR

Torbjörn Eles, RCC Väst
Eva-Lena Engman, RCC Väst
Background and project goals

Background
• Enable structured reporting of pathology and radiology data
• NSG SVI has finalized a process for how structured protocols should be defined. NAG Pathology has now started working according to this process.

Project goals
• Develop forms and templates using openEHR to facilitate a standardized data capture at the pathology laboratory
• Evaluate how easy these templates can be imported by Region Östergötland’s, Sectra’s and INCA’s systems to administrate openEHR template updates in clinical care and quality registries
• Creating a demo environment showing a care flow from a referring unit via a regional CDR to the national quality register for breast cancer.
Project organisation

Steering group
Region Stockholm: Patrik Georgii Hemming
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RCC Väst: Torbjörn Eles
Socialstyrelsen: David Pettersson
Sectra: Fredrik Lysholm

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Eva-Lena Engman, RCC Väst

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Erik Sundvall
Linda Aulin
Stefan Dubois, Region Skåne

Sub-project 3
Project manager: Joel Pettersson, RÖ
Team:
Carl Sköller, RÖ
Fredrik Lysholm, Sectra
Robin Andersson, Sectra
Leif Wennström, Tieto

Sub-project 4-5
Project manager: Joakim Jilderby
Team RCC:
Torbjörn Eles
Martin Landälv
Robert Åhs
CDR
Receiving system

Journal system
+ referral and reply system

RIS/PACS system

Pathologist

Source systems

Macro, Micro
Referral
Regional clinical data layer
Cancer registry

Internet

GitHub

NAG
Patologi,
KVAST (expert groups),
openEHR admin and mgmt
Care givers/regions etc.

openEHR CKM

Tools for templates, forms, AQL etc.

OpenEHR Templates for pathology

Users that want to continue working as they do today

IPÖ

Regional clinical data layer

Patient forms

DB

CDR Read-only

Quality registry X

Example form

Kvalitetsregister Y

Patient forms

IPÖ

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OpenEHR Templates for pathology

Order and result
AQL-frågor

AQL-frågor / PathologyResult_Breast / PathologyMacro

Spara

Översikt Aql Parametrar

Select-sats

1
2 'ial']/items[at0029,'Vävnadsprovtypen']/value/value as vavnadsprovtyp,
3 'ial']/items[at0099]/value/magnitude as antalFragment,
4 'ial']/items[openEHR-EHR-CLUSTER.specimen_measurements.v1,'Provmaterialsmätningar']/items[at0042,'Längd']/value as provmateriallängd,
5 'ial']/items[openEHR-EHR-CLUSTER.specimen_measurements.v1,'Provmaterialsmätningar']/items[at0042,'Bredd']/value as provmaterialbredd,
6 'ial']/items[openEHR-EHR-CLUSTER.specimen_measurements.v1,'Provmaterialsmätningar']/items[at0042,'Tjocklek (dm)']/value as provmaterialdjup,
7 'ial']/items[openEHR-EHR-CLUSTER.specimen_measurements.v1,'Provmaterialsmätningar']/items[at0020]/value as provmaterialvikt,
8 'ial']/items[at0007,'Provtagningsmetod']/value/value as provtagningsmetod,
9 'ial']/items[at0042]/value as kvalitesproblem,
10
11

Contains-sats

1 CONTAINS OBSERVATION o [openEHR-EHR-OBSERVATION.laboratory_test_result.v1]

Where-sats

1 e/ehr_id/value = $ehr_id and o/name/value = 'Makroskopisk analys av bröstvävnad'

Fullständig AQL-fråga

1 SELECT c/uid/value as compositionId,
2 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
3 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
4 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
5 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
6 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
7 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
8 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
9 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
10 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/data[at0003]/it
11 c/content[openEHR-EHR-OBSERVATION.laboratory_test_result.v1,'Makroskopisk analys av bröstvävnad']/data[at0001]/events[at0002]/time/value as t
12
13 FROM EHR e CONTAINS COMPOSITION c CONTAINS OBSERVATION o [openEHR-EHR-OBSERVATION.laboratory_test_result.v1]
14 WHERE c/archetype_details/template_id/value matches { 'breast_pathology_result_report_inlined', 'breast_pathology_result_report_inlined.v1',
15 e/ehr_id/value = $ehr_id and o/name/value = 'Makroskopisk analys av bröstvävnad' }
OpenEHR Templates for pathology

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Patologi, KVAST (expert groups), openEHR admin and mgmt

Care givers/regions etc.

openEHR CKM

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Example form

Kvalitetsregister

Patient forms

IPÖ

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OpenEHR Templates for pathology

Order and result

Pathologist
<table>
<thead>
<tr>
<th>Source systems</th>
<th>Macro, Micro Referral Regional clinical data layer Cancer registry Internet GitHub NAG Patologi, KVAST (expert groups), openEHR admin and mgmt Care givers/regions etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral system</td>
<td>Receiving system + referral and reply system RIS/PACS Pathologist</td>
</tr>
<tr>
<td>Macro</td>
<td>Micro</td>
</tr>
</tbody>
</table>

- Quality registry X
- OpenEHR CKM Tools for templates, forms, AQL etc.
- Example form Kvalitetsregister
- User forms IPÖ

- Orange arrows show configurations, not patient data
- Quality registry X System - specific forms

- Users that want to continue working as they do today

- OpenEHR Templates for pathology

- Pathologist

- CDR

- Read-only DB

- OpenEHR Templates for pathology

- Quality registry X

- Cancer registry

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<table>
<thead>
<tr>
<th>Frågeställning</th>
<th>Misstänkt cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typ av tjänst</td>
<td>Resektat</td>
</tr>
<tr>
<td>Beskrivning</td>
<td></td>
</tr>
<tr>
<td>Anledning till analys</td>
<td>Patentens val</td>
</tr>
<tr>
<td>Klinisk indikation</td>
<td>Sannolikt</td>
</tr>
<tr>
<td>Avsikt</td>
<td>inför diagnos</td>
</tr>
<tr>
<td>Brådskandegrad</td>
<td>Akut</td>
</tr>
<tr>
<td>Kompletterande information</td>
<td></td>
</tr>
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</table>
Journal system + referral and reply system

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Macro, Micro

Example form

System-specific forms

Example

NAG Patologi, KVAST (expert groups), openEHR admin and mgmt
Care givers/regions etc.

Orange arrows shows configurations, not patient data

OpenEHR Templates for pathology

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Order and result

Pathologist

Referral

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Results

Challenges:

- The open source CDR EHRbase did not support multiple datatypes for a single field and did not provide good error messages to signal this (another openEHR platform supported multiple fields). Quality assurance must be conducted at the source using the different system flora used within the consuming parties – at least until we have a good knowledge of what works where.
- Sectra has many functions surrounding form logic and data types, other systems available in care could have fewer possibilities
- Version handling of templates was problematic
- openEHR not widely in use yet, which makes it hard to find information to help with the development
Results

Sectra (data producing system):
• The informatics is well defined - however most work is spent on developing forms.
• Preferable if reference forms are created together with the templates on national level, until the logic has been standardised

INCA (data consuming system):
• It is easy to upload new templates and thereafter receive new compositions.
  – In the case of small updates in an updated template, no adjustment is needed
  – If the structure has major changes or when you need to collect new information, the AQL questions need to be updated
• Less work for the reporter (more automatic input). This will also improve the data quality.

General:
• Centralising the development of templates, forms as well as AQL questions leads to higher quality with much less time spent on redoing work further down in the workflow
• Easy to get started with openEHR from a developer’s standpoint.
Next step?

• Evaluate the Better platform
• Evaluate federation of nationally defined templates and forms to the regions and system providers
• Radiology protocol for colon cancer – setting up an openEHR template and form at Karolinska and transfer it from Sectra to INCA via the regional clinical data layer and integration platform
• Project in Jönköping together with CGM and RCC to set up openEHR templates for prostate cancer testing
• Implement a national group developing openEHR templates for radiology and pathology – in tight collaboration with the process for national standardised information specification (see next slide)
Process for standardising national protocols for pathology

1. Scrutiny of request and the supporting evidence
2. Request accepted
3. Planning phase

4. Process modelling: description of workflow
5. Concept modelling: scrutiny of concepts
6. Information model: relationships between the concepts
7. Terminology binding in coding system, eg, SNOMED CT
8. Definition of information specification, based on aggregate of 4, 5, and 6
9. Discuss draft proposal with stakeholders
10. Proposal rejected
11. Ensure availability to end users
12. Communicate with end users

- **NPO-MD**: National Program Division for Medical Diagnostics
- **NAG-SVI Pathology**: National Working Group for Standardised Healthcare Information in Pathology
- **NSG-SVI**: National Supervisory Collaborative Group for Standardised Healthcare Information
- **Regions**: Sweden’s Regional Healthcare Boards
Discussion

• How can we create a national structure/process defining openEHR templates, AQL queries and forms for pathology and radiology protocols?
  – National openEHR group creating and maintaining templates?
  – NAG groups with an assigned openEHR specialist?
• How can this structure work together with the process “Systematiskt arbetssätt för nationellt standardiserade mallar för patologisvar”?
• Can we create a national budget for this work?
• How can we get started?