“Clinical Data Models at University Hospitals Of Geneva”

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SIMPLIFIED VIEW OF CLINICAL INFORMATION SYSTEM

- Physicians
- Nurses
- Labs
- Interventions
SECONDARY USAGE OF CLINICAL DATA

- Admission/Discharge letters (textual form)
- Nurses’ notes (textual form)
- Radiology reports (textual + images)
- Digital data, e.g. data generated by medical devices

Billing information*: ICD-10, CHOP, LOINC, WHO-ATC

*The only information which is structured is for the billing purpose
Data integration challenges:

- Data centralization (1 department vs N, 1 hospital vs N, etc)
- Data structured – potentially useful information remains unstructured
- Data meaning - standardisation codes
- Multilingualism – Switzerland: fr, de, it
- Data quality

Research shall respect:

- Identified data
- Pseudonymized data
- Anonymized data
HOW TO KEEP DATA FOR SECONDARY USE?

There is no generic model that will fit to everything!

The main points of the model:

0. objectives of the model (what, why, how, what for, etc)
1. completeness – does the data coverage fit the project needs
2. integration – does the model link all data dimensions correctly?
3. understandability – do the data structure and concept make sense to all end users?
4. simplicity – is it easy to transform data elements to the model?
5. flexibility – is it possible to extend the project scope within the data model?
3 DATA MODELS IN HUG

Cohort (Swiss Transplant Cohort Study)
Raised from institutional project and is based on the legacy clinical system.

DebugIT
Ontology-driven model to extract antibiotic-relevant information.

EHR4CR
Data-driven model for data reuse systems of EHRs for clinical research.
Every row in EAV model is composed of three fields:

1) an entity representing a described item (a consultation with a patient)
2) an attribute describing the entity (e.g. cardiac frequency) and
3) the value of the attribute (e.g. 64 beats/min)

*Patient oriented model
**The semantics of data is developed by clinicians to match the needs of the project
bottom-up approach for the data integration

The goal of a pilot site: to formalise the data so that it can be ubiquitously accessed using a formal query language.

Query construction: “What is the evolution of bacteria resistance to antibiotic during period at location?”
DATA-DRIVEN MODEL

Form of data exposure - Clinical Data Warehouse
CDW is i2b2 based – observation-centric
Standardized terminologies via Terminology Server
## COMPARISON

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Ontology-driven</th>
<th>Data-driven</th>
<th>EAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completeness</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Integration</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Understandability</td>
<td>partly</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Simplicity</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Flexibility</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

What about implementability?
WHAT IS IN THE FUTURE?

- To operate directly with unstructured data
- To bring tools to data
- SNOMED as a language to communicate?
ACKNOWLEDGMENTS & ADVERTISEMENT

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