SEMANTIC DATA PLATFORM FOR HEALTHCARE

Dr. Philipp Daumke
ABOUT AVERBIS

Founded: 2007
Location: Freiburg, Germany
Team: Domain & IT-Experts
Focus: Leverage structured & unstructured information
Current Sectors: Health, Pharma, Automotive, Publishers & Libraries
The aim of SEMCARE (FP7, 2y, 1,5M) is to build a semantic data platform to support patient cohorting across large amounts of (un)structured patient data for primary and secondary use cases.

Scientific Coordinator, Language Technology Provider, Commercial Exploitation

Leading Clinical Partner & Content Provider, Usability & Evaluation

Language Technologies for Dutch, Terminology, Clinical Content Provider

Terminology/Ontology Expert, Language Technologies for German, Clinical Content Provider

Project Manager, Commercial Exploitation, Communication Planning
The aim of SEMCARE is to build a semantic data platform to support patient cohorting across large amounts of (un)structured patient data for primary and secondary use cases.

- Identify cohorts based on patient-level criteria
- Gain insights in structured and unstructured data
- Integration of heterogeneous data in various input formats
- Anonymization of unstructured data for research purposes
- Easy and powerful interfaces for experts and novices
- Open infrastructure, easy 3rd party integration (e.g. tranSMART)
The aim of SEMCARE is to build a semantic data platform to support patient cohorting across large amounts of (un)structured patient data for primary and secondary use cases.
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**Terminology Management**

**Text Mining**

**Search & Analytics**

**3rd party applications**
- I2B2,
- tranSMART
- EHR4CR

**ETL, Data Integration**

**Data Storage**

**Data Privacy**
<table>
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<tr>
<th>HEALTHCARE Terminology</th>
<th>Categories</th>
<th>PHARMA Terminologies</th>
<th>Categories</th>
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<td>ATC</td>
<td>Drugs</td>
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<td>Compounds</td>
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<tr>
<td>FMA</td>
<td>Anatomy</td>
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<td>HL7</td>
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<td>Indications</td>
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<td>Onc</td>
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<td>Lab</td>
<td>Uberon</td>
<td>M. Anatomy</td>
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<tr>
<td>MedDRA</td>
<td>Misc</td>
<td>Uniprot</td>
<td>Genes</td>
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<tr>
<td>MeSH</td>
<td>Misc</td>
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<td>Misc</td>
<td>Agrovoc</td>
<td>Agriculture</td>
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<td>OPS</td>
<td>Procedures</td>
<td>Averbis Thesaurus</td>
<td>Misc</td>
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<td>RadLex</td>
<td>Radiology</td>
<td>eClass</td>
<td>Products</td>
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<td>Misc</td>
<td>GND</td>
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<td>UCUM</td>
<td>Units</td>
<td>ProfiClass</td>
<td>Products</td>
</tr>
<tr>
<td>UMLS</td>
<td>Misc</td>
<td>Quantities</td>
<td>Units</td>
</tr>
</tbody>
</table>
Sehr geehrter Herr Kollege,

wir berichten über o.g. Patientin:

Diagnosen:
1. Koronare Herzkrankheit
2. Hypertrophe obstruktive Kardiomyopathie
3. Mitralklappeninsuffizienz Grad 1-2
4. Tricuspidalklappeninsuffizienz Grad 2-3
5. Arterelle Hypertorie
6. Chronisch venöse Insuffizienz

Anamnese:

Labor:
20.05.02 11:10 Uhr: Leukozyten 5.9 Tsd/µl; Erythrozyten 3.73 Mio/µl; Hamoglobin 11.8 g/dl; Hamatokrit 34.8 %; MCV 93.4 fl; MCH (HbE) 31.6 pg; MCHC 33.8 g/dl; Thrombozyten 342 Tsd/µl; Quick 100 %; Kalium 4.5 mmol/l; Natrium 137 mmol/l; Hamostoff 22 mg/dl; Bilirubin gesamt 4.9 mg/dl; GOT 43 U/l; GPT 33 U/l

Therapieempfehlung:
ASS 100mg 0-0-1
Concor 5 mg 1-0-0
Norvasc 5 mg 1-0-0
Pantozol 40 0-0-1
Delix 5 mg 0-0-1

Mit kollegialen Grüßen
Clinical History and Examination:
History of **coronary artery disease** described as chest tightness on exercise. Seen GP, referred to local hospital for further assessment.

Investigations:
On 04.11.2013 **coronary angiography**: 3 vessel **coronary artery disease**, low-normal with an **EF between 50-55%**, Aortic valve 3 cusps, thin and mobile, dilated to 44mm., MV thin and mobile leaflets, reduced coaptation, exc

```json
EjectionFraction "EF between..."
sofa: _InitialView
begin: 1007
done: 1024
componentId: <null>
confidence: 0.0
value: <null>
label: "EF"
parsedElements: <null>
min: 50
max: 55
```
Städtisches Krankenhaus Braunschweig
Abteilung Innere 3
Station DaVinci

Ärztlicher Direktor: Frau Prof. Marta Müller
Arztzimmer Tel. 0121/123 Fax 012172223
Buxtehude, den 17. März 2012
Unser Zeichen: XXXX

Herrn
Dr. med. Martin Müller
Willy-Brandt-Allee 12
01292 Berlin

Betrifft Patienten Louise Kisselbach, geb. 17.07.1921

Sehr geehrter Kollege Müller,

wir berichten Ihnen nachfolgend über o.g. Patienten, der sich am 21.04.2003 in unserer Behandlung befand.

Betrifft Patienten XXXXX XXXXXXXXXX, geb. XX. XX. XXXX

Sehr geehrter Kollego XXXXX,

wir berichten Ihnen nachfolgend über o.g. Patienten, der sich am XX. XX. XXXX in unserer Behandlung befand.
-100. He continued on amiodarone, dig and bisoprolol. 24 hour tape 27-28/01/12 showed SR 64-78 bpm, few single VEs and 1 couplet. Amiodarone was stopped on EP advice.

CAD and RCA disease, and he was therefore referred for surgery. CCS1, NYHA 2, M. 2004. PMHx: reflux oesophagitis, anxiety and depression, R knee replacement 2006.

Function post-op (markedly reduced from pre-op function). Simpson's biplane LVEF of 30%. Severely dilated LA. Mildly dilated RA. Normal RV structure, borderline.

LBBB (adenosine given to evaluate underlying rhythm - AF) and commenced on IV amiodarone, digoxin and bisoprolol. He required inotropes in view of his hypotension.

Kingston Hospital in February with chest pain and diagnosed with an inferior myocardial infarction. Her transthoracic echocardiogram showed severe mitral regurgitation and...

infero septal, basal to mid inferior wall and basal infero lateral wall. Estimated LVEF of 33%, Normal RV size with impaired global function., Mildly dilated LA, MVR.

She was in Sinus Rhythm on discharge. Approved TTO Drugs: Follow Up: Outpatient.
Investigations:
Angio 15/8/12: LMS significant disease, LAD occluded, LCx disease diffuse 80%, RCA: unable to catheterise. ECG 16/8/12: SR, 65/min, PQ 162 ms, QRS 124 ms, QTc 473 ms. Echo 17/8/12:
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- Clinical Care
  - Decision Support
  - Coding & Billing
  - Quality Management

- Research
  - Predictive Analytics
  - Hypothesis Validation
  - Biomarker Validation

- Pharma
  - Feasibility Studies
  - Patient Recruitment
  - Commercial Insights for Pharma
Show me all patients eligible for an implantable cardioverter-defibrillator (ICD)

<table>
<thead>
<tr>
<th>ID</th>
<th>Age</th>
<th>Date of Birth</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>111.txt</td>
<td>62</td>
<td>17.9.1950</td>
<td>changing position quickly or bending but denies syncope or chest pain. CCS0, <strong>NYHA Class II</strong>, PMHx: rheumatic fever, aortic aneurysm under RV, bladder neck resection, eccentric LVH, overall systolic function severely impaired with visual, <strong>ejection fraction</strong> estimated at 30%. Grade I diastolic dysfunction., Mild - moderately dilated structure and function., Dilated ascending aorta. Angio: normal. ECG showed <strong>QRS duration</strong> of 125 ms. Postop echo: 01/10/12, AVR is functioning well. Foward flow PG 32mmHg more</td>
</tr>
</tbody>
</table>
Show me all patients with typical Morbus Pompe symptoms, but without a Morbus Pompe diagnosis.
Show me all patients without secondary diagnosis „Parkinson“, but with mentionings of Parkinson or the drug Madopar in the EHR
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<table>
<thead>
<tr>
<th>First Name</th>
<th>Name</th>
<th>Age</th>
<th>Text</th>
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</table>
| John       | Clark  | 78  | slight paresis of the left leg. 2. UTI 3. dehydration in known light Parkinson’s syndrome. 4. Arterial Hypertension. Recent history: ...

Therapy: ASS 10 1.0.0, Norvasc 10 1.0.0, Dytide H 1.0.0, **Madopar 20 1.0.0**, Sortis 20 1.0.0...

<table>
<thead>
<tr>
<th>DRG</th>
<th>Description</th>
<th>Fee</th>
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<tbody>
<tr>
<td>G08B</td>
<td>Complex reconstruction of the abdominal wall</td>
<td>3.390,68 €</td>
</tr>
<tr>
<td>G08A</td>
<td>Complex reconstruction of the abdominal wall with severe complications</td>
<td>5.667,61 €</td>
</tr>
</tbody>
</table>

*G08B and G08A are DRGs (Diagnosis-Related Groups) in the German reimbursement system.*
Show me all patients with 'diabetes mellitus‘, age between 18 and 70, and symptoms of depression, but without schizophrenia.
For further questions, please contact:

Dr. Philipp Daumke
☎ + 49 (0)761 203 97690
✉ philipp.daumke@averbis.com