CLINICAL DECISION SUPPORT
- A CLINICIANS’ VIEW -

Christoph Mitsch, MD
Department of Ophthalmology and Optometry
Head: Univ.-Prof. Dr. Ursula Schmidt-Erfurth
Medical University of Vienna

Workshop: Clinical decision support in practice – HL7 standards, interoperability, and selected applications
eHealth Summit 2016
24.5.2016
Schönbrunn, Vienna, Austria
Contents

• Why clinical decision support?
• Example: Efforts and Strategy to establish Precision Medicine in Ophthalmology
Why Clinical Decision Support?
Why Clinical Decision Support?

People are getting older.
Why Clinical Decision Support?

The prevalence of diabetes

One in 10 adults will have diabetes

MORE PEOPLE ARE
CRONICALLY ILL

2015
Why Clinical Decision Support?

More people need healthcare.
Why Clinical Decision Support?


HEALTHCARE IS GETTING MORE COMPLICATED
Why Clinical Decision Support?

HEALTHCARE IS GETTING MORE EXPENSIVE
Healthcare Challenges

• Quantitative
  – Age-related
  – Lifestyle-related
  – Medicine itself-related

• Qualitative
  – Medicine is on the doorstep to Precision Medicine:
    • Better, but largely more expensive and complicated diagnosis
    • Better, but largely more expensive and costly (time and money) treatment
eHealth as a solution

• Guideline-based management and treatment
• Available Knowledge Management Systems
  – Assures quality
  – Optimizes resources
• Population-based studies (EHR)
CDS and precision medicine - in Ophthalmology -
Moving towards Precision Medicine

OPTIMA
Ophthalmic Image Analysis

Preprocessing
Population reference frame
- Denoising
- Motion correction
- Vessel & Fovea detection
- Multimodal registration
- Longitudinal intra-patient registration
- Inter-patient registration

Feature detection
- Retinal and choroidal layers
- IRC, SRF, PED
- RPE analysis - Drusen, atrophy
- Hyper-reflective foci
- Vasculature analysis
- Vitreous segmentation

Population modelling
Machine learning
- Temporal progression alignment
- Progression / recurrence prediction
- Unsupervised biomarker learning
- Structure-function correlation
- Prediction of treatment intervals

Integrative software framework
- Annotation GUI
- Referential database
- Task administration
- Statistics
- Access & Coupling

Pathophysiological and clinical analysis

Department of Ophthalmology and Optometry | Medical University of Vienna | Christoph MITSCH, MD
Example: Macular Edema

- Intraretinal fluid
- Subretinal fluid
Morphological Patterns

Intraretinal cystoid fluid over time in patients with retinal vein occlusion
Stratified Medicine

![Diagram showing disease progression in populations A and B over time.](diagram.png)
An *integrated* view on clinical Ophthalmology
An integrated view on clinical Ophthalmology

- "eHealth"

- Electronic Health Records (EHR)

- HL7 CDA Guide

- Ophthalmology

- ELGA

- ViDiNet

- AKIM

- AKIM: Zeiss Forum

- Imaging

- Morphology + Morphometry

- Hypothesis Generation

- Phenotyping

- Phase-3 Studies: Safety/Efficiency

- OCT

- OCT-A

- FA

- AF

- CF

- “Translational research”

- Ressource Optimization

- Health Improvement

- Interoperability

- Structured Data Models

- Data models + processing

- OphthalNet

- Advanced education

- Healthcare Delivery

- Integrated Health Care

- Interoperability

- Process Mgmt.

- Implementation Projects

- A.I. + Clinical Decision Support

- Personalized medicine

- "Precision medicine"

-“Precision medicine”

- Individualized therapy

- "Translational research”

- "Precision medicine”

- "Precision medicine”

- "Precision medicine”

- "Precision medicine”

- "Precision medicine”

- "Precision medicine”
Conclusion

Clinical Decision Support Systems and Knowledge Management Systems will soon be essential to enable physicians to provide up-to-date care.
Conclusion

Translational research result and implementation cycles are getting shorter:

Standards need to be applied and test platforms must be implemented to improve transition.
Thank you

"Mr. Osborne, may I be excused? My brain is full."