HEALTH ECONOMICS OF PERSONALIZED MEDICINE – DO WE NEED A COMPREHENSIVE RESEARCH PROGRAM?

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Overview

- Are general HTA principles applicable to PM or should HTA procedures and methods differ in PM?
- How we study such questions in a Personalized Medicine Research Center
- Example
ONCOTYROL – Center for Personalized Cancer Medicine

- **ONCOTYROL** is an applied research center for personalized cancer medicine and an international partnership between academia and industry located in Innsbruck, Tyrol.

- Our goal is to accelerate the development and evaluation of individualized preventive, diagnostic and therapeutic interventions in oncology.

- *From bench to bedside to population and back*

- Consortium: Local/international universities and industry

- >40 industry partners

Research Areas

Share of Strategic Research

Exploitation

Biomarker and Drug Target Identification

Assay Development and Drug Screening

Innovative Therapies

HTA and Bioinformatics

New Approaches

Bioinformatics
Management
Technical Infrastructure
Toxicology

UMIT
6
ONCOTYROL Area 4: Health Technology Assessment and Bioinformatics

To translate results from other ONCOTYROL areas into
- individual and population health
- efficient health care decisions and policies
- and research prioritization

Systematic, transparent & quantitative approaches
- decision modeling, HTA, economic evaluation, information systems

Data
- from clinical research, trials, routine databases/registries
- on effectiveness, safety and resource utilization
Key Principles in HTA and Health Economics for Personalized Medicine

- Are general HTA principles applicable to PM? Are some of them not valid for PM?
- Which general HTA principles can be made more specific for PM?

→ Addressed in Oncotyrol Project 4.1
Focus on Cancer
ONCOTYROL Project 4.1. HTA

Goals:

- To prepare and establish an international and interdisciplinary expertise platform with different stakeholders,
- to review and assess structures, processes and methods for HTA
- to develop recommendations for the specific application of HTA in personalized cancer medicine (e.g. for use of biomarkers, patient-relevant outcomes, evidence synthesis); formulate an extension to each principle with a specification of the principle for PCM
- Dissemination, roll-out, communication and facilitation of the HTA framework
Published Key Principles & Guidelines of HTA

Drummond et al., IJTAHC, 2008
Definitions of Personalized Medicine

- ... Oncotyrol Task Force - broader view:
  - Individual characteristics can be any property of the patient (including, age, severity of disease, risk measurements, course of the disease, former treatments, patient preferences)

1President’s Council of Advisors on Science and Technology. Priorities for Personalized Medicine. September 2008
ONCOTYROL HTA Framework for Personalized Cancer Medicine

HTA Guidelines for Personalized Cancer Medicine

Dissemination and Education
(Round-Table-Meetings, Web-meetings, 2 internat. Summits)

~ 50 Experts

Causal Evaluation
Value of Innovation
Reimbursement
PM Study Design

Decision maker
Payer
Manufacturer
Provider
HTA producer
Scientist
Guideline Workshops 2012 Innsbruck, Oslo, Bilbao

March 2012 Innsbruck: Definition of Domains and Topics

June 2012 Oslo: Recommendations

June 2012 Bilbao: Dissemination
# Working Groups (I)

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## Working Groups (II)

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Evidence Requirements and Key Principles

- In general, all principles, recommendations and methods were found to be applicable and valid in the field of PCM.

- Fundamental evidence requirements remain:
  - Causality → RCTs
  - Consequences → full scope of long-term consequences and trade-offs → observational studies & decision modeling
  - Need for post-approval and post-reimbursement evidence

- But …
Specific Features (selected examples) I

Population/Perspective:
- Time horizon: „cover relevant clinical and economic events“ → consider relatives, may go beyond lifetime
- Innovation: manufacturer, incentives for companion diagnostics
- Preferences: individual utilities, value of knowing

Interventions:
- Definition of strategies: dynamic rules, multiple markers

Comparator:
- Inclusion of non-personalized intervention
Specific Features (selected examples) II

- Outcomes:
  - Ethical issues with genetic information (principles?)
  - Personalized utilities for expected events

- Statistical Analysis:
  - Crossover in oncology trials → causal models such as rank preserving structural failure-time models (RPSFTM), marginal structural models (MSM), etc.
  - Evidence hierarchy?
  - Undereducation → Dissemination, Causal Graphs

- Modeling:
  - Personalized dynamic interventions require microsimulations (e.g., consider course of treatment or screening)
Examples: Oncotyrol Projects

- Cervical Cancer Screening
- Prostate Cancer Screening Decision Tool
- Breast Cancer Treatment
- Multiple Myeloma Treatment, Registry
- CML Treatment, Registry

To be added: Colorectal Ca, Lung Ca, Melanoma, …
Example: Prostate Cancer Screening Biomarkers and Patient Preferences
Concept of the Personalized Decision Tool

To assess technologies and answer core HTA questions:
1. Is it effective and efficient?
2. Can it be modified?
3. Is there a suited subpopulation?

Phase I

- Austr. Ca. Registry
  - Incidence and mortality data

- Epidemiol. studies
  - Predictive and prognostic functions

- OT-Area 2/3
  - Clinical and diagnostic data

Phase II

- Individual men
  - Individual risk profiles and preferences

Advice to individual men and their physicians

To screen, or not to screen?
Modeling Projects

- Cervical Cancer Screening
- Decision Tool for Prostate Ca. Screening Candidates
- Breast Cancer Decision-analytic Outcome Model
- Multiple Myeloma Registry and Decision-analytic Modeling
- CML Registry and Decision-analytic Model
Conclusion: Personalize wisely

• Not just personalized treatment yes/no, or drug, but also personalized dosing, sequences, combinations, variants, dynamic rules
• Diagnostic strategies and work-up
• Screening tests and intervals depending on
  – Risk profile
  – History
  – Preferences

  Consider all trade-offs and the full scope of outcomes
Enthusiastic?

• Enthusiastic about
  – HTA and HE also works for PM
  – There are unique challenges waiting for solutions
  – Valid methods may get more attention (e.g., specific trial designs, statistical analysis of crossover)
  – Work in an interdisciplinary real center joining academia and industry

• Less enthusiastic about
  – „We will solve all problems in the next 5 years“
  – All medicine can harm, including PM
  – Small samples
Thank you