

„Of all the forms of inequality, injustice in health care is the most shocking and inhumane”

Martin Luther King Jr.,

21st Century Health Systems

CHALLENGES AND SOLUTIONS

Prof. Annette Grueters, MD, Dean, Charité Berlin, Germany

BACKGROUND

- Health is the most important value - for the individual and the society
- Biomedical science and healthcare are the only significantly growing economic sectors
- They are therefore an important pillar of economy (regional and national)
- Funding and governance of these pillars are fragmented
- Innovation is slow despite unprecetended advance in technology
- Costs for health care increase
- Demographic changes challenge the health care systems

Health system: deficits and roadblocks

Medical Research

- **Untapped complementary strengths** between university, non-university and private research and development partners to **diversification of biomedical research institutions**
- Lack of validity

University Medicine

- Constraints on research due to **diversity of tasks (physicians faced with burden of juggling multiple responsibilities e.g. teaching, clinical obligations, research, administration)**
- Heavy dependance on **hierarchical structures**

Health Care System

- **Demographic change**
- **Increase of chronic diseases**
- **Increasing costs**
- **Lack of qualified personel**
- **Lack of adequate wages for nursing staff**

Academic System

- **Disciplinary segmentation** (Natural Sciences - Medicine; Dominance of traditional speciality orientated structures, separation of basic and clinical research)
- Education and Research based on traditional taxonomies and concepts
- **Lack of innovation and translation**

21st Century Health System

Medical Research

*Quality & validity of
(pre)clinical research*

University Medicine

*Gaps and balance
between education,
research and patient care*

Health Care System

*Slow application of
innovation*

Academic System

*Compartmentalization
("Versäulung") between
university and non-
university system*

The problem list

- Non reproducible results
- Non transferable experiments (e.g. species specificity)
- Insufficient and unstratified cohorts
- Non reporting of negative and undesired results
- Scientific misconduct and fraud

TRUST ?? Credibility ???

- **Extensive regulations**
- **Reduced interest of industry and the private sector to invest in biomedical research**

Increasing value, reducing waste of biomedical research

Multiple reasons for invalid studies

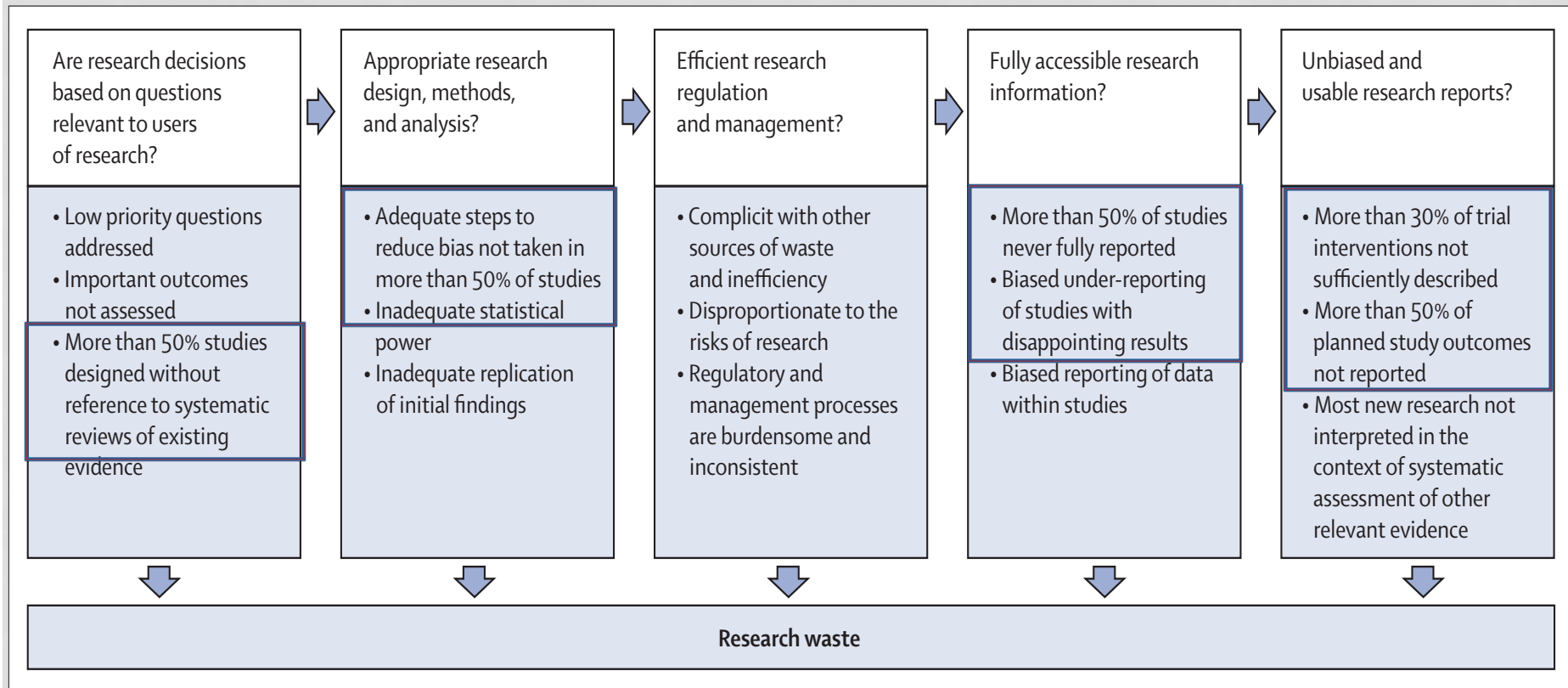


Figure: Avoidable waste or inefficiency in biomedical research

Lancet, January 2014

A global phenomenon: Up to 50% of results are not reported

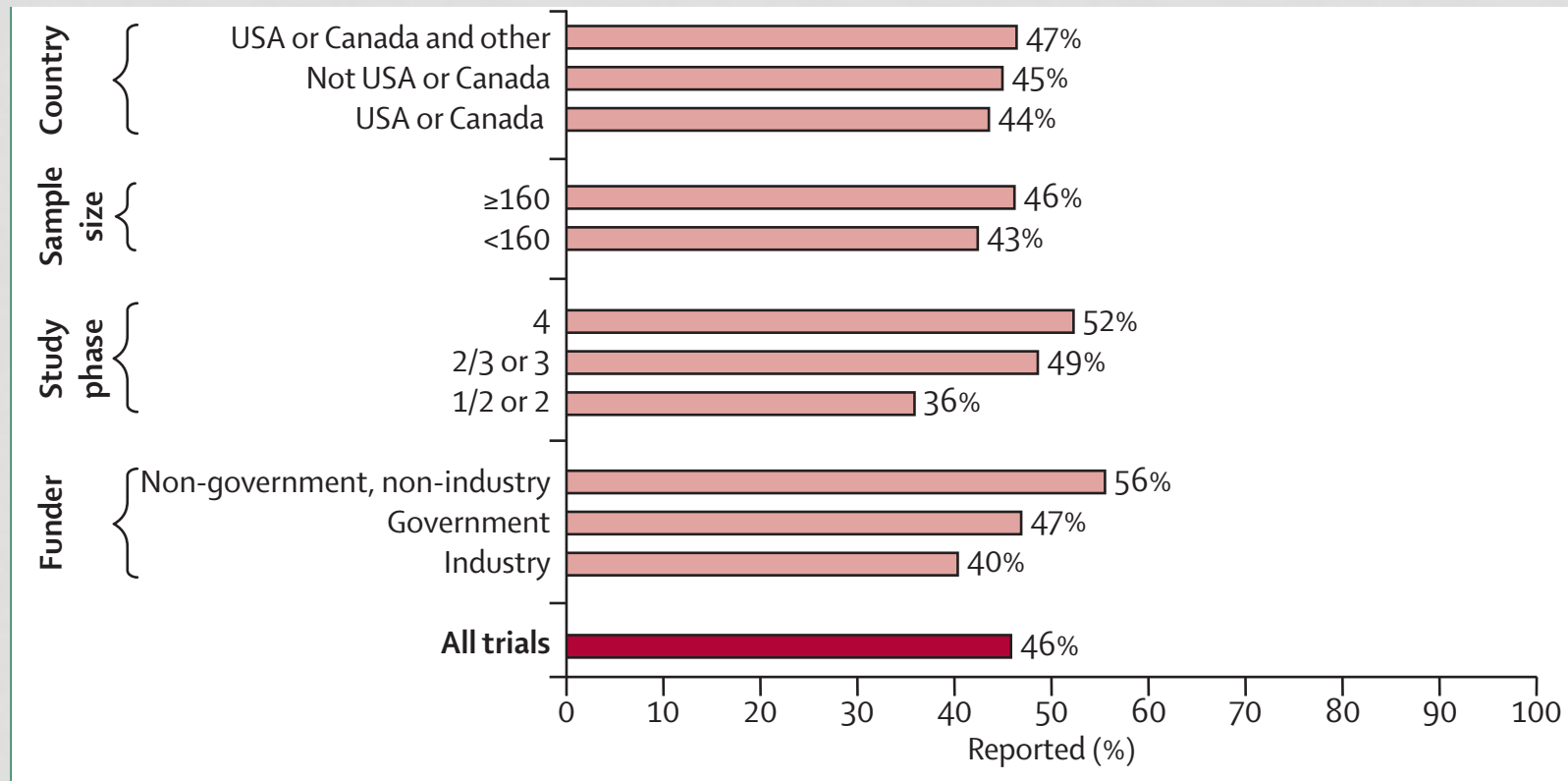


Figure 2: Reporting of completed trials, by study characteristic

Data taken from Ross and colleagues' analysis¹¹ of a random sample of 677 completed trials registered with

Solutions

Clinical research

- Stratification strategies for cohorts
- De-regulations for vulnerable minority group
- Standardization (biobanks, data, procedures)
- **Policy for publication of negative results**

Basic /Pre-clinical research

- Objective information on animal models
- Animal model research
- **Evaluation of quality (impact factor or impact?)**

21st Century Health System

Medical Research

*Quality & validity of
(pre)clinical research*

University Medicine

*Gaps and balance
between education,
research and patient care*

Health Care System

*Slow application of
innovation
Costs
Demographic change*

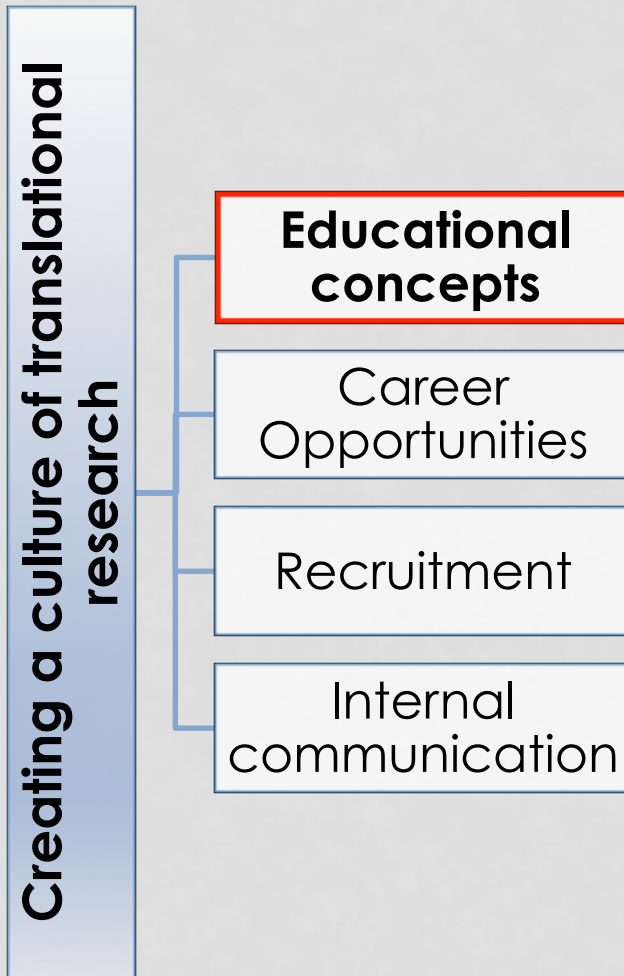
Academic System

*Compartmentalization
("Versäulung") between
university and non-
university system*

The need to generate a new generation of physician scientists:

- A tremendous **increase of knowledge** in biomedical research
- Students are **not interested** in academic careers
- The funding system of health care (DRG) and economic pressure on the system leaves **no time for research of MDs** in academic medicine.
- **Reduced incomes** for MDs in biomedical research compared to practitioners
- **Scarce career perspectives** for physician scientists and basic scientists in medicine.

Educational Concepts



Educating a new generation of physician scientists


- Introducing **translational research all along** medical & scientific education
- Providing access to **natural science & innovative technology**
- Providing exposure to clinical context to develop **patient-orientation**
- Emphasizing **communication, teamwork & transdisciplinary thinking**
- Interaction with **industries**
- **Provision of protected time for research**

Education and Training: Towards a Culture of Translation


Career level




Tandem professorship



**Professional training
for translational
scientists**



Doctoral researchers



**Master programs
Medical School**

Concepts

- Training 'translational professors'

Physician Scientist

- Graduate Schools
- Scholarships/grants for research rotations of medical & life science students

21st Century Health System

Medical Research

*Quality & validity of
(pre)clinical research*

University Medicine

*Gaps and balance
between education,
research and patient care*

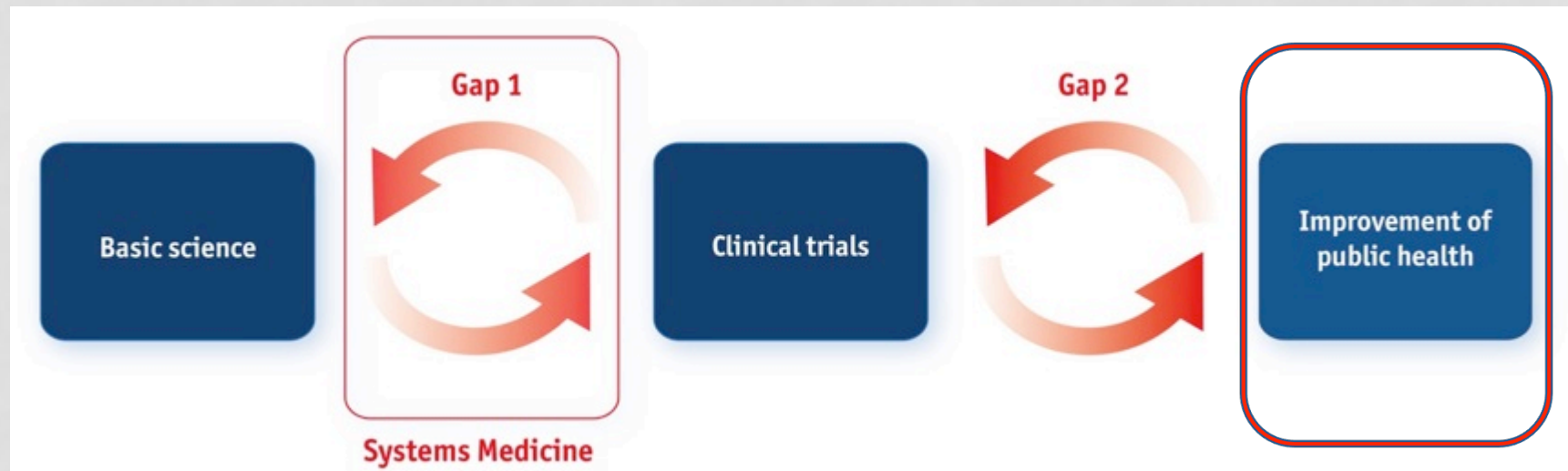
Health Care System

*Slow application of
innovation
Costs
Demographic change*

Academic System

*Compartmentalization
("Versäulung") between
university and non-
university system*

Gaps in the translational chain for unmet clinical needs



- **Advent of new technologies (omics, imaging, stem cells, bioinformatics etc.)**
- **Translation into better prevention, diagnosis and treatment of disease**

Challenges in biomedical research



- New **omics-technologies** hold tremendous potential for biomedical research and health care (“**personalized medicine**”)
- Yet: translation into better prevention, diagnosis and treatment of disease has been a **fragmented and slow process**; hardly any **structures** for translation in place and lack of outreach to communities
- **Therefore: integration of hospitals, universities and research institutions as well as community based approaches to tackle the gaps in the translational chain**

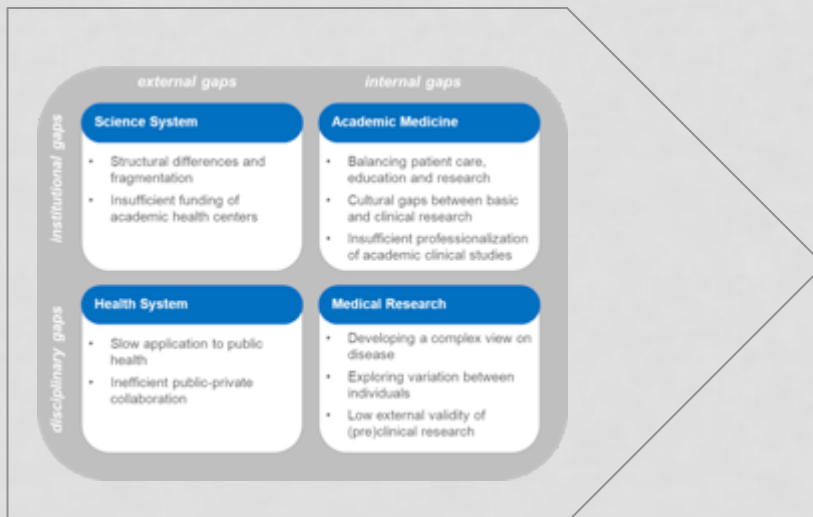
Opportunities of new INTEGRATED research structures

A **translational cluster of excellence** offers:

- Recognised experience in excellent healthcare delivery, clinical research, development of **protocols, recruiting and monitoring**, public health
- Expertise in **pathophysiology and disease causing mechanisms**
- Cutting edge **technologies and infrastructures**, imaging, biobanking, lab facilities
- **IT based structures of data transfer from and to practitioners**
- „Deep phenotyped,, stratified and morbidity **specific cohorts** to be followed longterm and biometrics

and the Integration of BIG DATA

Towards novel solutions for health care



- Bridging centers of excellence with community based care
- Focus on quality based refunds
- Diminish inequalities in health research and care (e.g. gender, age, rare diseases minority groups)
- Focus on prevention in children, adolescents and young adults
- Increase health education

21st Century Health System

Medical Research

*Quality & validity of
(pre)clinical research*

University Medicine

*Gaps and balance
between education,
research and patient care*

Health Care System

*Slow application of
innovation
Costs
Demographic change*

Academic System

*Compartmentalization
("Versäulung") between
university and non-
university system*

Scientific concepts

Biomedical Research Areas- present

A. Organ oriented

Liver = Hepatology

Heart = Cardiology

Lung = Pulmonologist

B. Disease oriented

Cancer

Diabetes

Infection

One organ = different diseases

One disease = different mechanisms

Biomedical Research Areas- future

A. Mechanism oriented

Immune Mechanisms

Metabolism

Genetic/Epigenetic

B. Systems oriented

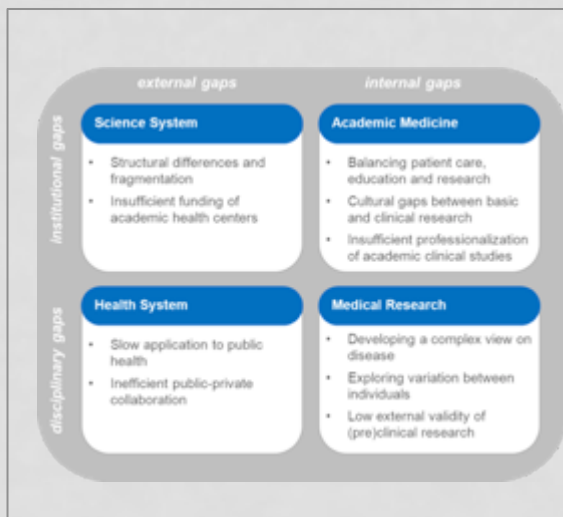
Cancer-Metabolism

Obesity Inflammation

One mechanism = different diseases

One mechanism affecting several organs and functions

Towards novel solutions for research



- Bridging academic health care centers with specialized centers for bio-medical research
- **Overcome barriers from bedside to bench & from bench to bedside**
- Better career opportunities for translational junior scientists
- Establish management of translation and Innovation
- Validation of approaches of personalized medicine and screening procedures
- Increase quality of (pre-)clinical and clinical investigator-initiated trials

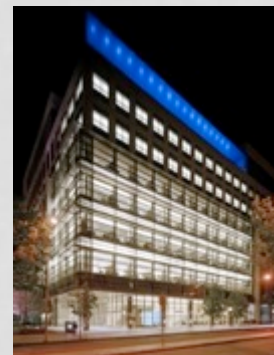
New translational structures worldwide

International examples

- **NCATS** (National Centers for Advancing Translational Science, NIH)
- **Broad Institute** (Boston, USA)
- **ITMAT** (Institute Translational Medicine and Therapeutics, Philadelphia, USA)
- **NYGC** (New York Genome Center, USA)
- **TMAT** Programme (Translational Medicine and Therapeutics, Wellcome Trust, UK)

Translation in Germany

- DZGs (Cancer, Cardiovasc, Diabetes, Infection, Neurodegeneration)
- Helmholtz Translational Centers
- Berlin Institute of Health



Conclusion

We need to:

1. Integrate research and health care structures (EIH?)
2. Accelerate translation
3. Increase attractiveness for health care and biomedical research workforce positions and careers
4. Implement quality instead of quantity based funding in healthcare and research