

Medical Education: From Galen to Google

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Plan

- A selective history – relevant to our purpose
- Highlight important concepts and perspectives in medical education and demonstrate:
 - Some constancy across the ages
 - Influence of social, cultural, political, ... changes
- A personal view – not a scholarly study

Main Themes

- History of medicine and medical education is the history of civilization
- Civilizational forces have had positive and negative influences on medical education

References

- Sir Kenneth C. Calman: Medical Education Past Present and Future
- Kenneth Ludmerer: Time to Heal: American Medical Education from the Turn of the Century to the Era of Managed Care
- Several articles

Greece and Rome

- **Transition from magic/religion to nature/reason**
 - Hippocrates (Cos) emphasized the patient over the disease: observation and experience rather than theory
 - Rival school (Cnidos) emphasized theory and causes - a reductionist approach
 - Hippocratic prevailed – but this dichotomy will recur

The Hippocratic School

- Education was practical and personal with a master-**apprenticeship**

Mentorship and coaching

- Importance of rhetorical skills

Communication skills /narrative

- Practice of medicine seen as “craft” – an art or a skill to be mastered. Anyone can be doctor.

Competency based education?

Galen

- Left a huge literary output – teachings as late as the 19th century
- Reconciled Hippocratic and Cnidos schools – theory and experience – science and art
- Needed skills:
 - Physics (science of nature)
 - Logic (science of how to think)
 - Ethics (science of what to do)

Knowledge
Skills
Attitudes and behaviors

Quotes from Galen

- “A man cannot learn anatomy from books alone...”
 - “To study the phenomenon of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all.”
William Osler 20th century`
- “Young students must see specimens not once or twice but often. For it is only by applying oneself with intelligence to these things and by examining them frequently that one gets a thorough knowledge of them”

Is this the modern concept of Deliberate Practice?

Arab and Medieval Medicine

Keeping the Faith

- Preservation of Greek and Roman texts & teachings
- Many important figures and contributions:
 - **Hunayn** (809-873): books for medical students: Q & A
 - **Al-Razi** (845-930): systematic approach to differential dx
 - **Sinan Ibn Thabit Ibn Qurra** (880-943): licensing exams
- Curriculum: logic, anatomy, geometry, astronomy, mathematics, optics, music + regular attendance at hospitals, examining and visiting patients.

Avicenna (Ibn Sina, 980-1037)

- Wrote The Canon of Medicine
 - used for centuries – still taught in 1650 in France
 - knowledge is theoretical and practical.
Pedagogy: a theoretical base, then practical education linked to the treatment required

Is this Flexner's 2x2 model, proposed in 1910, and still prevalent?

More from Avicenna

- Practice includes two domains:
 - Hygiene: the science of regulating a healthy body to maintain it in health
 - Healing: the science of ruling the sick body so as to enable it to return to a healthy state

Health is a “state of complete physical, mental, and social well being, and not merely the absence of disease or infirmity”

WHO constitution 1946

Some quotes from Ibn Jumay (1153-1198) –physician to Saladdin

“ the physician, after encompassing all the knowledge mentioned above and establishing it firmly in his memory...possess the capability to apply all the general laws he knows to individual cases and adjust them to the patient and the treatment”

Is this the beginning of personalized medicine?

Medieval Europe

Rise of Universities in 11th & 12th Centuries

- Medicine became a scholarly pursuit
- Formalized teaching and outcomes of medicine
- Most emphasis on book learning vs. practice.
- Differentiated two types of doctors:
 - Medicus: the artisan or craftsman
 - Magister medicinae: the scholarly physician –who has the privilege to teach.

[Doctor: from Latin docēre: to teach]

Renaissance

- **Guttenberg - Invention of printing (~1450)**– a major development
 - books became available and knowledge could be disseminated widely
- **Reformation: challenge to authority**
 - Freer thinking, experimentation, dissection...
 - Paracelcus (1493-1541) burned books of Galen and Avicenna
- **New Knowledge** : e.g. Vesalius, Harvey
 - new outlook on human body and what to teach

Approaches in Medical Education

“His constant aim - to produce in their minds [the students] a change to an active from a passive state, and to force upon them such habits of thinking and observation as should enable them to instruct themselves”

Active learning, self-learning, life-long learning?

Benjamin Rush writing about William Cullen; 18th century

“Medicine is one and indivisible and must be learnt as a whole for no part can be understood if learnt separately”

Integration?

Written about John Hunter's views; 18th century

Ecclesiastes (1:9)

*“The thing that hath been, it is that which shall be,
and that which is done is that which shall be done,
and there is **no new thing under the sun.**”*

19th Century

The Rise of Scientific Medicine

- Growth of the biomedical science disciplines –led to new paradigms of disease
- **Paris:** Emphasis on bedside teaching & clinical examination
- **German Universities:** Emphasis on scientific research & the scientific education of physicians



The model for US medical schools of the 20th century

20th Century America

The Flexner Report

- Medical schools should be within universities
- Curriculum must teach scientific medicine
 - 2 years pre-med: biology, chemistry physics
 - 2 years basic science + laboratories
 - 2 years clinical science
- Faculty researchers

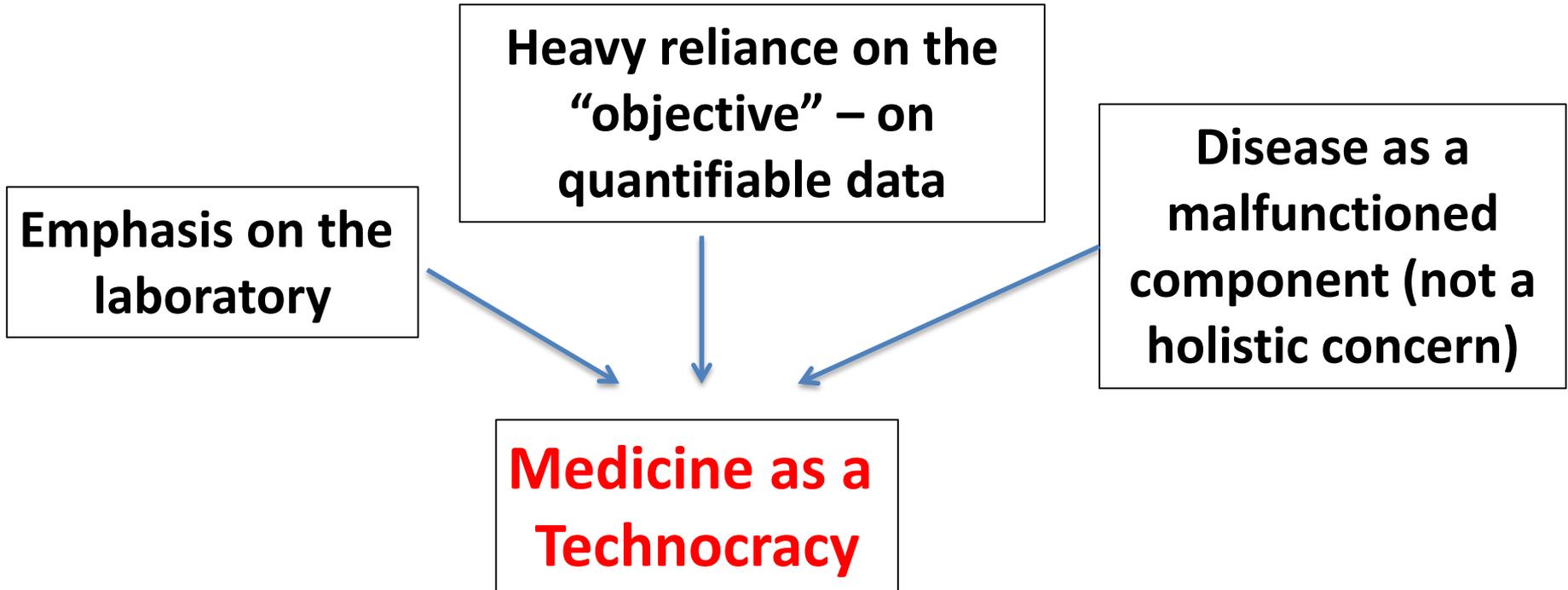
Flexner's Legacy

The Physician as a Skeptical Medical Scientist

- “Medicine is part and parcel of modern science. The human body belongs to the animal world”
- “Is there any logical incompatibility between science and the practice of medicine?”

Flexner's Negative Legacy

(among many positives)



Opposition to Flexner's Ideology

- Sir William Osler:
 - medicine should be learnt by the bedside not in the laboratory
- Francis Peabody:
 - “...the applications of the principle of science to the diagnosis and treatment of disease is only one limited aspect of medical practice.”

Evolution of the 20th century conceptions of the physician:
Scientist → Person with Character(istics) → Competent person

Second Half of 20th Century

Growth of Research and Clinical Practice

- **Major increased funding for research**
 - Research as the dominant activity of med schools
 - Faculty derived greater rewards from research
- **Private Insurance, Medicare and Medicaid**
 - Expanded clinical services & clinical work
 - Increase revenue for physicians
 - Clinical practice becomes the core business of medical schools

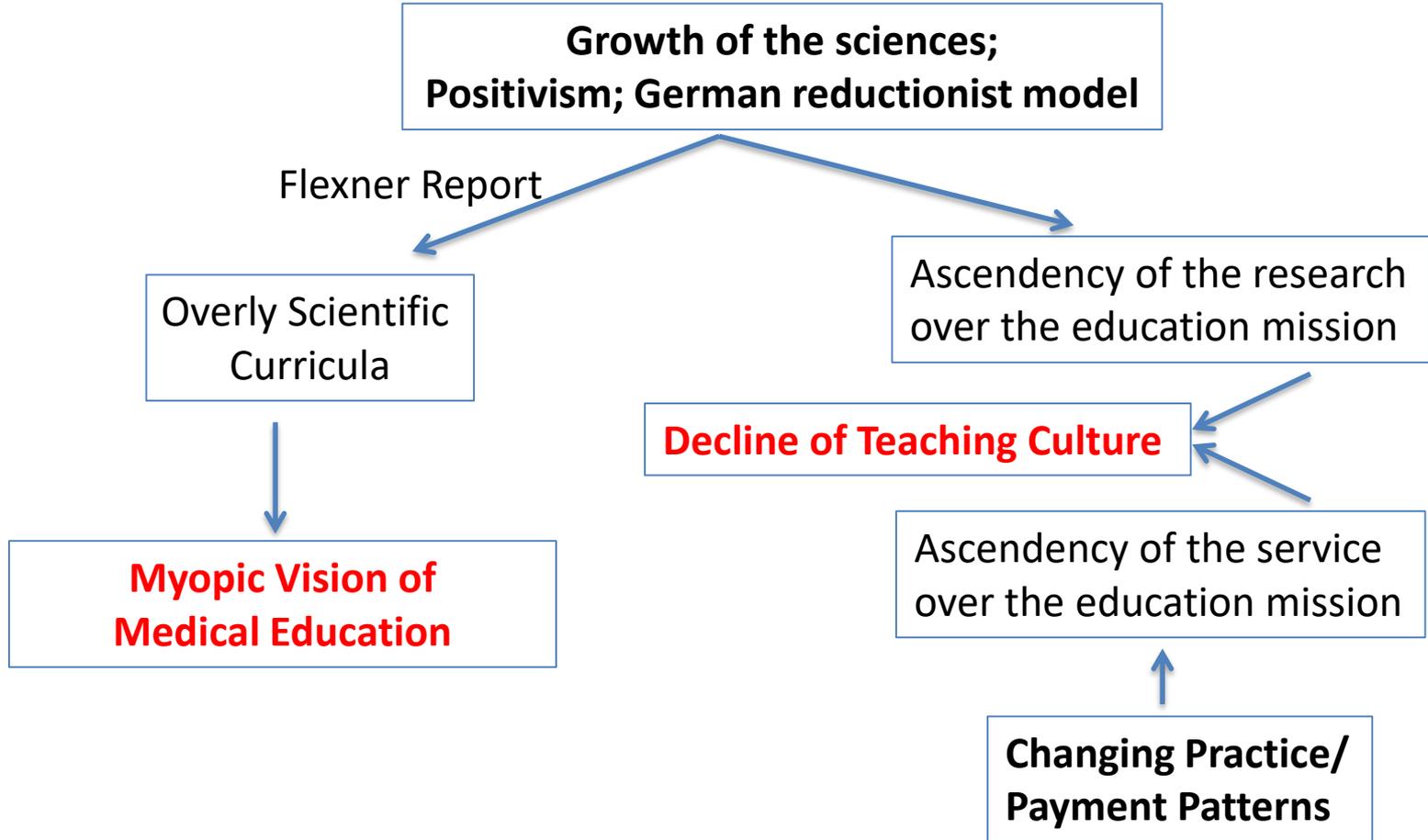


Academic medical centers building large empires at the cost of educating medical students

- the use of clinical income was “the most important and potentially destructive current issue within the medical center”

a department chairman at the University of Michigan

The 20th Century...



Late 20th – 21st Century

The IT Revolution

- Computers, Internet, World wide web, IT:

Knowledge everywhere...

(the 3rd communications revolution)

- Artificial Intelligence:

this conference's topic

Summary:

Major Forces that Shaped Medical Education

Hippocratic medicine
reason over magic

The Printing Press
spread of knowledge

The Scientific Revolution
New knowledge/scientific basis
but dehumanization

The IT Revolution
Access to knowledge
?

Rise of the Universities
a scholarly discipline

Renaissance & Reformation
freedom; experimentation;
new knowledge

Patterns of Practice & Payment
Commercialization, dehumanization
decline in education

Artificial Intelligence
?

Questions for Us

Does the new promise of AI pose the same challenge and threat to medical education as the scientific revolution did in the 19th -20th centuries?

How can we ensure that in our excitement and embrace of AI, we will not bypass the human being in both the physician and the patient?

Final Thought

“Each age has its ideals to which the physician model aspires. But our history clearly shows us that only by careful scrutiny to maintain a balanced view, will we free ourselves from damaging assumptions and myopic restrictions. Thus a warning is offered. So, if we are in the midst of some significant shift, what in fact are we changing?”

Alfred I. Tauber. J Royal Soc. Med. 1992