Basic Sciences in Medical Education: From Flexner to Today

(IAMSE Report on Basic Sciences in Medical Education)

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Abraham Flexner


MEDICAL EDUCATION
IN THE
UNITED STATES AND CANADA

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Themes of Flexner Report

- Overproduction of uneducated and ill-trained physicians
- Commercial, for-profit medical schools
- Educational methods: primarily didactic with inadequate laboratories and experiential activities
- Poor student preparation; lack of rigorous and uniform admission standards
- Need for educationally sound teaching hospitals affiliated and supported by Universities

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Outcomes of Flexner Report
- Academic Model of Medical Education -

- Reduction in medical schools
- Reduction in physician graduates
  - better education and training
- Medical school affiliation with a college/university
  - financial support and academic rigor
- Uniform admission standards and general curricular design
- Higher quality faculty
- Fundamental role of the sciences

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Flexner and the Basic Sciences

Anatomy and physiology form but the vestibule of medical education. They teach the normal structure of the body, the normal function of the parts, fluids, organs, and the conditions under which they operate. The next step carries the student in *medias res*; he begins pharmacology,[1]—the experimental study of the response of the body to medication.

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Basic Sciences in Medical Education Today

- Uniform and rigorous admissions standards
- 2+2 Curricular structure
- Didactic-based instructional methods
- Minimal laboratory instruction and activities
- Highly structured time
- Tension to increase instruction on clinical application, behavioral, ethical and management knowledge and skills while maintaining a focus on the sciences fundamental to medicine and the core skills necessary for preparation for the clinical experiences

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Flexner Revisited Study Project

- IAMSE-initiated project in 2006
- Study Group:
  - Sheila Chauvin
  - Giulia Bonaminio
  - Mark Andrews
  - Robert Carroll
  - Louis Pangaro
  - Peter Anderson
  - Aviad Haramati
  - Nehad El Sawi
  - Gary Rosenfeld
  - Tom Schmitt
  - Doug Wood
  - George Dunway
  - Many other contributors
- IAMSE
- Alliance for Clinical Education
- Generalists in Medical Education
- Society of Osteopathic Medical Educators
- Group for Educational Affairs (AAMC)
- American Physiological Society
- American Society for Pharmacology and Experimental Therapeutics
- Group for Research in Pathology Education
- Other discipline societies

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Flexner Revisited: Defining the Role and Value of the Basic Sciences in Medical Education

Goals:

1. Define and describe the sciences that constitute the foundation of medicine
2. Identify the role and value of the sciences and scientific thinking in medical education
3. Identify the best practices of when, where and how the foundation sciences should be incorporated into medical education

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Flexner Revisited: Questions to be Addressed

- What are the sciences that constitute the foundation for medical practice?
- What is the value and role of the foundational sciences in medical education?
- When and how should these foundational sciences be incorporated into the medical education curriculum?
- What sciences could/should be pre-requisite components of the undergraduate medical curriculum (i.e. be part of the pre-medical requirements)?
- What are examples of the best practices for incorporation of the foundational sciences in the medical education curriculum?

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What are the sciences that constitute the foundation for medical practice of the future?

- Traditional 'Basic Sciences'
  - Anatomy
  - Physiology
  - Biochemistry
  - Microbiology/Immunology
  - Pathology
  - Pharmacology
- Genetics
- Molecular biology
- Epidemiology (Biostatistics)
- Behavioral sciences

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What are the sciences that constitute the foundation for medical practice of the future?

- Clinically relevant and applicable to medical practice
- Goal is understanding of the fundamental principles to develop effective thinking, reasoning and problem-solving skills

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Value of the Foundational Sciences

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What is the value and role of the foundational sciences in medical education?

- Critical for clinical application and effective thinking skills
- Integrative approach to problem-solving
  - Woods, et al, Acad Med 81: S124, 2006.
- Normal structure and function
  - basis for understanding abnormal-(pathophysiology)
- Grounds clinical practice
- Basis for understanding
  - Common → algorithm
  - Complex or unusual → deeper learning and understanding
  - Mimicry does not = competency and quality

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What is the value and role of the foundational sciences in medical education?

The question raised is fundamental; the answer decides the sort of medical education that we shall seek generally to provide. If, in a word, scientific method and interest are of slight or no importance to the ordinary practitioner of medicine,' we shall permanently establish two types of school,—the scientific type, in which enlightened and progressive men may be trained; the routine type, in which "family doctors" may be ground out wholesale.

Flexner Report

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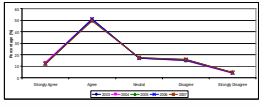
Basic Science Provided Relevant Preparation for Clerkships



Source: 2003-2007 AAMC Medical School Graduation Questionnaire

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When and how should these foundational sciences be incorporated into the medical education curriculum?

- Early and throughout all 4 years
- Incremental
  - Repetition/redundancy
- Avoid Curriculum attack ("hard and fast")
  - Dispersal over longer time
  - Opportunity for distillation vs efficiency
- Process vs content
- Experiential vs didactic

"That method rather than any particular content is the very essence of scientific discipline is admirably pointed out by Professor Dewey in his address "Science as Subject-matter and as Method," *Science*, xxxi., no. 797, p. 121. "Science has been taught too much as an accumulation of ready-made material, with which students are to be made familiar, not enough as a method of thinking, an attitude of mind, after the pattern of which mental habits are to be transformed."

Note: Flexner Report

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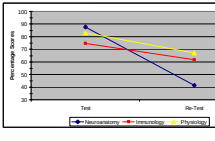
Knowledge Retention Over Time



Source: BMC Med Educ. 6:5, 2006

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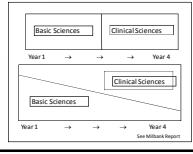
What are examples of the best practices for incorporation of the foundational sciences in the medical education curriculum?



See Millbank Report

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What sciences should be pre-requisite components of the undergraduate premedical curriculum?

- Retain the diversity of matriculants
- Genetics, molecular/cell biology; biochemistry; anatomy and physiology
- Basic science vocabulary and core concepts
- Statistics –as a means to develop thinking skills
- Courses promoting problem solving and reasoning skills
- Ethics

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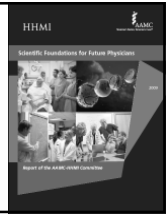
Pre-Medical Preparation



What are examples of the best practices for incorporation of the foundational sciences in the medical education curriculum?

- Clinical presentation as focus
- Problem set with vignettes
- Reference to biosciences in clinical years
- Incorporate clinician perspective into the basic science teaching
- Build on principles of adult learning towards knowledge application

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Summary

- Traditional mammalian sciences fundamental to medical practice
  - Understanding the sciences key aspect distinguishing physicians as clinical scientists vs technicians
- UME curriculum:
  - Clinical relevance
  - Promote deep learning
  - Integrated with clinical experience
- understanding foundational sciences are essential to developing discipline and rigor for clinical reasoning and problem-solving

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Resources

- Academic Medicine
  - Feb. 2010


Flexner Revisited: The Role and Value of the Basic Sciences in Medical Education

- JIAMSE
  - Summer 2010

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