From 19th to 20th century medicine

Key changes 19c
- Concept of disease
- Physiology
- Diagnosis
- Surgery (treatment)
- Nursing
- Key role of hospitals
- Public health
- Training/regulation of doctors, nurses, pharm

Key changes 20c
- Continuation of 19c
- Germ & genetic cause of disease
- Reorg. of med. ed.
- “miracle” drugs
- Influence of war
- Growth of medical research

Medical Education and Research in the U.S., 19th -20th Century

Biomedical Research and Education in the U.S. To 1870
- Rise of proprietary schools
- Alternative medicine
- European study

1870-1910 Reform of U.S. Medical Education
- Rise of German medicine
- Transformation of U.S. universities
- First reforms: Harvard, Penn
- Special Case of Johns Hopkins

1870-1910 Reform of U.S. Medical Education
- Spread of reform
- Research
- Financial problems
- Early fund raising

1910-1930 U.S. Medical Education and Research
- Flexner Report 1910
- Era of Medical Philanthropy
- After Flexner
Medical Education in the U.S. (cont’d)

Biomedical Research and Education in the U.S.
To 1870
• First medical schools: 3 in 1800
• Rise of proprietary schools
  – 1810-1840 26 new medical school
  – 1841-1876 47 new medical schools
• Curriculum
• Alternatives
  – Apprenticeship/intern
  – European study

European training for American doctors to 1850

University of Edinburgh Medical School

1870-1910 Reform of U.S. Medical Education
• Rise of German medicine
  • Transformation of U.S. universities
  • First reforms: Harvard, Penn
  • Special Case of Johns Hopkins

First U.S. medical reforms:
example of Harvard, 1871->
• From 2 to 3 years
• Curriculum in sequence
• Laboratory work
• 4th year added in 1880s for clinical work

Medical Discoveries in Selected Countries 1900-1926

Americans at German medical schools
• 1870-1914: 15,000 (also Swiss, Austria)
  • Scientific medicine
  • Laboratory study
  • Full-time teachers/researchers
• New full-time professors
• Entrance exam

• Followed by Pennsylvania (1877) & Michigan (1880)

18 Surgery demonstration at University of Pennsylvania
   The Gross Clinic, 1875
19 Thomas Eakins painting "The Agnew Clinic"
20 Agnew performing a leg operation
   University of Pennsylvania, 1886
21 Prof. of Anatomy, U of Pennsylvania, School of Medicine
   lectures to students, 1888
22 Class in clinical microscopy, 1902
23 students in surgical pathology lab, U of Penn
   in new medical laboratory building, 1904
24 Physiology and Pharmacology Labs, University of Pennsylvania, 1904
25 Bedridden patients in amphitheater
   Hospital of University of Pennsylvania 1890s
26 Black medical students at University of Pennsylvania
   examining cadaver, 1896
27 Johns Hopkins reforms (1893)
   • Undergraduate degree required

   • 2 years basic science, 2 years clinical

   • Full-time faculty recruited: Welch, Osler, Halstead

   • Clinical instruction at University Hospital

28 Johns Hopkins Hospital, 1889
   preceded medical school which opened 1893
29 Aerial view of Johns Hopkins Hospital, 1924
30 Hopkins Revolution in Medical Education
   from “Great Moments”
31 “Four Doctors” by John Singer Sargent
32 Halsted, Osler and Kelley,
   1897
33 Osler in 1905
34 “Saint” Osler
35 Hopkins Med school class of 1901
36 1870-1910 Reform of U.S. Medical Education
   • Spread of reform

   • Research

   • Financial problems

   • Early fund raising
37 Spread of Medical Reform in U.S.1890-1910
   • East
     • Bowdoin
     • Dartmouth
• Tufts
• Yale
• New York University
• Columbia
• Georgetown
• George Washington Univ.

**Midwest and South**
• Western Reserve (Cleveland)
• Cincinnati
• Minnesota
• St. Louis University
• Nebraska
• Kansas
• Drake (Iowa)
• Tulane (New Orleans)

38 Spread of Medical Reform in U.S. 1890-1910

1 West
• Colorado
• University of Southern California
• California (Berkeley)

2 New Medical Schools
• Cornell (1898)
• Oklahoma (1902)
• West Virginia (1902)
• Wake Forest (1902)
• Indiana (1903)
• Mississippi (1903)
• Fordham, NY (1905)
• Utah (1906)
• Wisconsin (1907)

39 Medical students at Indiana University -- 1907

40 Women’s Medical College of Pennsylvania founded 1850

41 Women’s Medical College, early anatomy lab

42 Surgery in Women’s Medical College operating amphitheater, 1903

43 Clinical rounds
Women’s Medical College, 1942

44 Louisville Medical School founded in 1837, absorbed into Univ. of Louisville in 1908

45 Meharry Medical College created 1876 as Medical Department of central Tenn. College 1915 received its own charter

46 University of Colorado 1883 Medical department created

47 1924 University of Colorado Health Sciences Center opened UCHCS in 1940 (below)

48 U.S. Medical Research, 1890-1910
• 1896 *Journal of Experimental Medicine*
  • 1887 American Society of Physiology
  • 1888 American Association of Anatomists
Financial problems

Early Fund Raising
- 1874 Harvard $200,000
- 1877 Penn $500,000
- 1884 Vanderbilt $500,000
- 1898 Cornell $1.5 million
- 1901 Harvard $3 million

1910-1930 U.S. Medical Education and Research
- Flexner Report 1910
  - Era of Medical Philanthropy
  - Teaching, Research, Clinical care
  - U.S. and Europe
  - Research after WWII

Conclusion: Era of scientific medicine had arrived for research and practice

Requirements of scientific medicine:
- Medical schools as part of university
- Learning by doing (lab) instead of only lecture
- Properly equipped labs
- Teaching hospital for medical students
- Full funding (endowments) to build buildings & pay salaries
- Research by full-time faculty and students

Recommendation: reduce the number of schools to 31

Results
- 162 medical schools in 1906
- 76 medical schools in 1930
- 25,000 students in 1906
- 21,000 students in 1930

Era of Medical Philanthropy:
Changes in medical school funding and research
• To 1870
  – Financed by student fees
  – Research by individuals and hospitals
• 1870-1910
  – Some funding from universities and state government
  – Begin funding from private philanthropy
  – Begin research at medical schools
• 1910-1930
  – Accelerated change in funding & research
  – Beginning of “organized” philanthropy (foundations)

59 Era of Medical Philanthropy: Sources
• 1902-34, 9 major U.S. foundations gave $154 million
• 1913-1928 GEB gave $61 million
  – Initially required full-time clinical faculty
  – Always required matching funds
  – Proposals came from schools
  – Preceded by thorough study, not for weak schools
  – Eventually assisted schools in different regions
    » From private in East to state-supported in Midwest, South and West

60 Era of Medical Philanthropy: other sources

• Individual philanthropy
  – Wealthy local businessmen
  – Local citizens of cities and region

• State government (not national)
  – Rivals of private:
    » California
    » Minnesota
    » Michigan
    » Wisconsin

61 Era of Medical Philanthropy: examples

• University of Rochester (1920)
  – $5 million from GEB
  – $5 million from George (Eastman of Kodak)

• University of Colorado (1922)
  – $700,000 from GEB, expected match of $800,000
    – $600,000 from legislature
    – $120,000 from local philanthropist
    – $80,000 from general public

62 Results of Flexner and Medical Philanthropy
• Medical schools and academic positions
• Research versus Teaching
• Teaching hospitals
  – 1889 Johns Hopkins
  – 1910 New York, Boston, St. Louis
• U.S. versus Europe

63 Medical Discoveries in Selected Countries 1900-1926
64 U.S. Medical Education and Research Trends after 1930
65 Medical Students 1910-1930
66 Applicants and entrants to U.S. medical schools, 1925-1974
67 Funding University Biomedicine (1910, 1990)
  -tuition
  -philanthropy
  -governments (local, national)
  -clinical service
68 Medical students at Indiana University -- 1907
69 Medical students at Indiana University -- 1913
70 Medical students at Indiana University -- 1925
71 Medical students at Indiana University -- 1939
72 Medical students at Indiana University -- 1947
73 Medical students at Indiana University -- 1955
74 Medical students at Indiana University -- 1977
75 Medical students at Indiana University -- 1998