

4/24/2006

## Science in Medicine FY180

“Medicine is a science of uncertainty and an art of probability” – Sir William Osler

Rhett Mays, maysrhettc@uams.edu  
Olin 353, x6563 Office Hours: M/T/Th 1-3pm  
6865

### Course Overview:

That it has become cliché to say that the practice of medicine is both an art and a science makes it no less true. That medicine has become increasingly grounded in basic science and exposed to the rigor of the evidence-based approach also makes this no less true. As long as medicine is an applied science, an applied science whose subjects are human and whose practitioners are human, its practice will be fraught with all the lesser qualities of humanity including error, bias, greed, racism, cynicism, frank coldness, and most significantly, dogma. Fortunately, it is also practiced with caring, compassion, and increasingly, with fact. Medicine is, as a profession, both highly esteemed and maligned, as are its practitioners. The purpose of this course is to explore the current state of medicine and health care, how it came to be what it is today, and where it is going.

This course is designed to be an introduction to the topic of medicine, as both a scientific discipline and a career. The course content is primarily directed at students that are interested in becoming physicians, but will by and large be relevant to those interested in any health professions career, in medicine as an academic topic, and for any consumer of health care services, which includes all of us. The course will begin with a brief overview of the history of medicine. The bulk of the course material will then focus on contemporary and future issues in medicine such as medical education and medical education reform, medical error and malpractice, death and dying, ethics, the daily practice of medicine, nursing, alternative and complementary medicine, health care funding, evidence-based medicine, public health, etc. The format of the class will primarily be round table discussion with occasional lectures by me or guests from the local medical community. A few lectures on medical ailments of common public interest will supplement the course material. A significant amount of reading will be required. Readings have been selected carefully for readability and applicability. Because interests vary you will occasionally be bored. Despite this, you are expected to come to class having read the material and prepared for discussion. Grading will be based on participation, 3 writing assignments, and a final exam.

The end goal of this course is to make you a more informed consumer of education and health care, to become more informed about health care professions, and to have a good time during 8<sup>th</sup> block.

**Resources:**

1. Porter, Roy, *Blood and Guts: A Short History of Medicine*, 2002
2. Gawande, Atul, *Complications: A Surgeon's Notes on an Imperfect Science*, 2002
3. Konner, Melvin, *Becoming a Doctor: A Journey of Initiation in Medical School*, 1987
4. Reynolds and Stone, editors, *On Doctoring*, 3<sup>rd</sup> ed. 2001  
(provided by the University of Arkansas College of Medicine)
5. Electronic Reserves – multiple journal articles and book chapters

**Papers:**Paper 1: History of Disease: 3-5 pages, due on the 2<sup>nd</sup> Monday

## Option 1:

Compare and contrast two human diseases or pathologic conditions, one that has become less significant with the evolution of society and one that has become more significant. Keep in mind that the prevalence of some diseases ebb and flow with societal changes and human adaptation. Provide evidence to support your claim of association between societal change and disease development/disease eradication. Use and cite creditable references.

## Option 2:

Pick a health condition and describe how its explanatory model has changed over time, focusing on its historical description. Use and cite references in addition to the text.

Paper 2: Critical Analysis: 5-8 pages, due on the 3<sup>rd</sup> Monday

Critically evaluate the scientific merit and limitations of a contemporary medical /health claim (from anyone, anywhere) by comparing and contrasting that claim to the results of a clinical research paper that addresses the topic

Included in the evaluation should be a critical analysis of formal research done on the topic with a discussion of the limitations of the research.

Include a discussion of what can (in your opinion) be objectively concluded about the topic (if anything) and what could be done to further clarify the issue (if anything)

Reference at least one clinical research paper (not a review article)

\*Be prepared to give an informal 5 minute presentation on your research

Paper 3: Careers and Pathways in Medicine: 3-5 pages, due the 4<sup>th</sup> Monday

## Option 1- Health Care Professions

Choose a career in the health professions from the list provided. You may choose a career that is not on the list with prior approval. Your paper and presentation should include but need not be limited to:

- a. History and background

- b. Prerequisites for enrolling in training
- c. Educational and training required
- d. Certifications and degrees required
- e. Work environment and responsibilities
- f. Salary or pay, other compensation
- g. Availability of specialization

\*Pick a career that is interesting to you and attempt to convince the reader that it is an attractive career

\*Be prepared to give an informal 5 minute presentation on the career

## Option 2- Complimentary and Alternative Medicine

Choose a therapy or approach in complimentary or alternative medicine on the provided list that interests you. You may only choose a topic not on the list with prior approval. Investigate the history, origins, background, and/or philosophy of the practice. Explain the foundations of the method including underlying philosophy and views of the body, health, healing, disease, and treatment. Discuss training standards and techniques used. Review the scientific foundations of the practice, if any, and studies that evaluate its effectiveness.

\*Be prepared to give an informal 5 minute presentation on your topic

## Grading

25%- class participation

Attendance, involvement in discussions, presentations

60%- papers

15% -Paper 1 , 25%- Paper 2, 20%- Paper 3

15%- Final Exam

Short answer review of the topics covered in reading and discussion

\*In order to limit subjectivity a standardized way of grading papers will be provided

## Course Outline

### Week 1

Day 1 Monday April 24<sup>th</sup>

### Course Introduction and Overview

Reading: None

Lecture: Course Overview

Introduction to Health Care Careers

Objectives

- Get acquainted
- Understand the course content and whether it interests you
- Understand the basic structure of medical education and health care specialties

Day 2 Tuesday April 25<sup>th</sup>

### **History of Medicine**

Reading: *Blood and Guts*: “Disease” and “Doctors” (pp 1-52)

*Becoming a Doctor*: “Introduction” and “Basic Clinical Skills” (pp 1-40)

Learning Objectives

- To understand how disease has evolved and changed with man, how society and civilization affect disease
- To understand how allopathic doctoring developed

Lecture: Diseases of Historical Significance and Modern Convenience

Day 3 Wednesday April 26<sup>th</sup>

### **History of Medicine**

Reading: *Blood and Guts*: “The Body” and “The Lab” (pp53-98)

*Becoming a Doctor*: “Emergency Ward Surgery” (pp41-73)

Learning Objectives

- To understand the role of anatomy and observation in medical discovery
- To understand the historical introduction of science into medicine

Day 4 Thursday April 27<sup>th</sup>

### **History of Medicine**

Reading: *Blood and Guts*: “Therapies”, “Surgery”, and “The Hospital” (pp99-152)

*Becoming a Doctor*: “Anesthesiology” (pp75-91)

Learning Objectives:

- To understand the history of medications in medicine
- To understand the history of surgery in medicine
- To understand the development of hospitals and their role in medicine today

Afternoon: **Travel to CC Cabin**

Evening: Introduction to Wilderness Medicine

Day 5 Friday April 28<sup>th</sup>

### **Wilderness Medicine**

Reading: None

Learning Objectives:

- To understand some basic principles of wilderness first response and backcountry medicine

## **Week 2**

Day 6 Monday May 1<sup>st</sup>

### **Medicine in Modern Society**

Assignment: Paper Topic 1 due

Reading: *Blood and Guts*: “Medicine in Modern Society” (pp 153-169)

*Becoming a Doctor*: “Ward Surgery” (pp93-124)

Film: The Citadel/ Arrowsmith

Learning Objectives:

- To understand the direction that modern medicine has taken and why
- To understand the importance of “alternative” medicine movements historically and in the present

Day 7 Tuesday May 2<sup>nd</sup>

### **Research Careers in Medicine**

#### **Trip to University of Colorado Health Sciences / Anatomy Exhibit**

Reading: None

Learning Objectives:

- Orientation to Colorado's health education system
- Introduction to careers in research medicine and academic medicine
- Understand the role of public health and preventive medicine in modern health care
- Develop an appreciation of human anatomy

Day 8 Wednesday May 3<sup>rd</sup>

### **Evidence-Based Medicine**

Reading : Guyatt et al Users Guide to the Medical Literature part XXV, JAMA;Vol. 284 No. 10, Sept 13, 2000 (electronic reserves)

*Complications*: "Introduction", "The Education of a Knife" and "The Computer and the Hernia Factory"

*Becoming a Doctor*: "Neurosurgery and Neurology" (pp 125-153)

Lecture: How to Read a Paper

Learning Objectives:

- To understand the role of science in allopathic medicine
- To understand the importance of the emergence of evidence- based medicine and how this is a change from the way that science and medicine interrelated in the past

Afternoon: Session on research tools- Rebecca Harner, Natural Sciences Librarian

Day 9 Thursday May 4<sup>th</sup>

### **Primary Care / Sports Medicine**

Reading: *On Doctoring*: "A Day in the Life of an Internist"-Richard C Reynolds (pp239-247)

Fincher, Ruth-Marie, "The Road Less Traveled-Attracting Students to Primary Care", NEJM, Volume 351:630-632, August 12, 2004 (ER)

Whitcomb and Cohen, "The Future of Primary Care Medicine", NEJM, Volume 351:710-712, Aug 12, 2004 (ER)

Whitcomb, "Who's Going to Take Care of the Folks", Academic Medicine, Vol. 80(9), Sept 2005, pp789-790

*Becoming a Doctor*: Pediatrics (pp 183-207)

Lecture: Sports Medicine, J. Steven Geraghty M.D. , Family Medicine, CC alum

Learning Objectives:

- Understand the term primary care and what it has come to include
- Appreciate the elements of daily practice of primary care
- Understand the reasons for shortages in primary care and the steps being taken to attract students to these fields
- Learn about common sports medicine injuries and their treatment

Day 10 Friday May 5<sup>th</sup>

### **Medicine and the Media**

Assignment: Bring one recent piece of media coverage related to health and the health care system (any length)

Reading: "Your Very Good Health" and "The Health Care System"- Lewis Thomas

*Complications*: “The Dead Baby Mystery”(pp202-207)

*Becoming a Doctor*: “Psychiatry”(pp154-182)

Lecture: TV Medicine

Learning Objectives:

- To understand the role that the media has in affecting health care
- To appreciate the accuracies and inaccuracies of how medicine and health care personnel are portrayed in the media

### **Week 3**

#### **Day 11 Monday May 8<sup>th</sup> Public Health**

Assignment: Paper 2 due, informal 5 minute presentations on your topic to the class

Reading: *Complications*: “The Man Who Couldn’t Stop Eating”  
(pp3-8, 162-186)

*Becoming a Doctor*: “Obstetrics” and “Gynecology” (pp208-241)

Lecture: Public Health and Obesity

Learning Objectives:

- To understand the role of public health measures in prevention of disease
- To appreciate the current challenges to public health

#### **Day 12 Tuesday May 9<sup>th</sup> Nursing**

Reading: “Nursing”- Lewis Thomas (ER)

Kimball, “Health Care’s Human Crisis- Rx for an Evolving Profession”

Online Journal of Issues in Nursing 9(2), 2004

*Becoming a Doctor*: “Medicine I”(pp261-272)

Discussion: Maggie Conser R.N., ICU Nurse with the US Air Force and CC Alum

Learning Objectives:

- To understand the role of nurses in health care
- To understand the implications of the nursing shortage

#### **Day 13 Wednesday May 10<sup>th</sup> Alternative and Complimentary Medicine**

Reading: “Leech, Leech et cetera” – Lewis Thomas (ER)

Lecture: Emily Matuszewicz, D.C., Chiropractor and Alternative and Complimentary Medicine Practitioner, CC Alum

Learning Objectives:

- To learn about alternative medical careers and training
- To appreciate the breadth and diversity of the alternative and complimentary medicine movement, and how these approaches can conflict with or compliment allopathic medicine

#### **Day 14 Thursday May 11<sup>th</sup> The Patient**

Reading: *On Doctoring*: “Doctor, Talk to Me”-Anatole Broyard.

“The Girl with the Pimpley Face” and “The Use of Force” by William Carlos Williams. “Coming into the End”, Doris Grumbach

*Becoming a Doctor*: “Medicine II” (pp278-297)

Film: Wit

Learning Objectives:

- To appreciate the complexities of the provider-patient relationship
- To appreciate the difficulties of being a patient

Day 15 Friday May 12<sup>th</sup>

**Medical Ethics / Right to Life**

Assignment: read the cases provided. Make a decision as to what is the best solution, and using the elements of ethical decision making come to class prepared to defend your decision.

Reading: *On Doctoring*: “Medical Ethics and Living a Life” by Robert Coles and “Mercy” by Richard Selzer, (additional reading to be provided)  
*Becoming a Doctor*: “Medicine III” (pp298-323)

Learning Objectives:

- To appreciate the spectrum and difficulty of medical ethics

Day 16 Monday May 15<sup>th</sup>

**Practice and Malpractice**

Reading: *On Doctoring*: “Imelda” by Richard Selzer and “Mistakes” by David Hilfiker

*Complications*: “When Doctors Make Mistakes”, “When Good Doctors go Bad”, and “The Case of the Red Leg”

Learning Objectives:

- To appreciate the difficulty of the malpractice dilemma

Day 17 Tuesday May 16<sup>th</sup>

**Medical Education and Medical Education Reform**

Assignment: Paper 3 due, 5 minute, informal presentation on your chosen topic

Reading: *Becoming a Doctor*: “Conclusion” (pp360-378)

*On Doctoring*: “It’s still a Privilege to be a Doctor” by Carola Eisenberg and “The House Officers Changing World” by Joseph Hardison

Lecture: How to Get into a Health Professions Program

Learning Objectives:

- To appreciate the realities of medical education, how it is changing, and how it should be changed

Day 18 Wednesday May 17<sup>th</sup>

**Final**

Careers in Health Care	Complimentary and Alternative Medicine
Advance Practice Registered Nurse	Acupuncture
Biostatistician	Alphabiotics
Cardiology Tech EEG Tech	Aromatherapy
Chiropractor	Aura therapy
Counselor	Ayurvedic medicine
Dental Hygienist	Chelation
Dentist	Chiropractic medicine
Dietitian (Nutritionist)	Craniosacral therapy
EKG Tech Lab Medicine Tech	Crystal therapy
Emergency Department Technician	Dietary supplements
Emergency Medical Technician	Ear candling
Epidemiologist	Electromagnetic fields
Massage Therapist	Energy therapy
Medical Social Worker	Homeopathy
Medical Statistician	Hypnosis
Occupational Therapist	Kinesiology
Operating Room Technician	Leeches
Optometrist	Macrobiotics
Paramedic	Maggot therapy
Pharmacist Pharmacy Tech	Magnet therapy
Phlebotomist	Massage therapy
Physical Therapist	Naturopathic medicine
Physician Assistant	Osteopathic medicine
Psychologist	Psychic therapy
Radiology Technician	Qi gong
Registered Medical Technologist	Reflexology
Registered Nurse	Reiki
Respiratory Therapist	Rolfing
Speech Pathologist	Shark cartilage
	Therapeutic touch
	Traditional Chinese medicine
	Urine therapy
	Yoga

Note: These lists are not meant to be exhaustive. If you think of another career path or alternative therapy that you would like to investigate, please contact me.



## DEFINITIONS

- Absolute risk reduction (risk difference) – the amount the absolute risk is reduced
- Allopathic medicine – therapy with remedies that produce effects differing from those of the disease treated
- Association – a state in which two attributes occur together either more or less than would be expected by chance
- Bias – a factor that produces results which depart from the true values in a consistent direction
- Cause – an agent or condition that permits the occurrence of an effect or leads to a result
- Case-control study – a study where a group with disease are identified and a group without disease are used as controls for comparison
- Cohort study – a study of a group with individuals with and without a particular experience, exposure, or characteristic to observe the different rates of disease occurrence
- Confidence interval, 95% – the interval over which one can be 95% confident the true value is found
- Disease – a harmful deviation of normal function of any body part, organ, or system that is characterized by at least two of the following: recognized etiologic agents, identifiable group of signs or symptoms, and consistent anatomical alteration.
- Disorder – a derangement or abnormality of function, structure, or both, resulting from an unknown etiology but may include genetic or embryologic failure in development or from exogenous factors such as poison, trauma, or disease
- Effectiveness – the extent to which a treatment produces a beneficial effect when implemented under the usual conditions of clinical care
- Efficacy – the extent to which a treatment produces a beneficial effect under ideal conditions of an investigation
- Etiology – 1) the science dealing with causes of disease; 2) assignment of a cause, an origin, or a reason for something
- False negative – an individual with a negative test result but who actually has the disease as defined by the gold standard
- False positive – an individual with a positive test result but who actually does not have the disease as defined by the gold standard
- Fun – bombing down Captain Jacks on a sunny spring Colorado day.
- Gold standard – the criterion used to unequivocally define the presence and absence of a condition or disease
- Illness – 1) poor health; the experience of disease. 2) disease.
- Incidence – frequency of occurrence
- Medicine – 1) *modern*: the science of diagnosing, treating, or preventing disease and other damage to the body or mind, 2) *archaic*: the practice of curing illness

- Odds ratio – a ratio measuring the degree of association applicable to all types of studies using nominal data but usually applied to case-control and cross-sectional studies; the odds of having the risk factor if the condition is present divided by the odds of having the risk factor if the condition is not present
- P value – the probability of obtaining data at least as extreme as the data obtained if there were no true difference (true null hypothesis)
- Placebo – an inert substance given for psychological effect to satisfy the patient
- Predictive value of a negative test – the proportion of individuals with a negative test who do not have the condition as defined by the gold standard
- Predictive value of a positive test – the proportion of individuals with a positive test who actually have the condition as defined by the gold standard
- Prevalence – the total number of cases of a disease in a given population at a specific time
- Prognosis – a prediction of the probable course and outcome of a disease.
- Randomized clinical trial – an investigation where patients are assigned to study and control groups by a process of randomization
- Relative risk – a ratio of the probability of developing the outcome with the risk factor present divided by the probability of developing the outcome if the risk factor is not present.
- Relative risk reduction – the relative amount by which the risk is reduced
- Science – the observation, identification, description, experimental investigation, and theoretical explanation of phenomena.
- Scientific method – the totality of principles and processes regarded as characteristic of or necessary for scientific investigation, generally taken to include rules for concept formation, conduct of observations and experiments, and validation of hypothesis by observation or experiments
- Sensitivity – the probability that a person having a disease will be correctly identified by a clinical test; equal to the number of people with disease identified as having disease divided by the total number of people with disease
- Specificity – the probability that a person who does not have a disease will be correctly identified by a clinical test; equal to the number of people without disease identified as being without disease divided by the total number without disease
- Sign – objective evidence of disease, ie that perceived by examining physician
- Symptom – any subjective evidence of disease or of a patient's condition as perceived by patient; does not necessarily implicate an underlying problem or physical etiology
- Syndrome – a complex of symptoms indicating the existence of an undesirable condition or quality
- True negative – an individual who does not have the condition as defined by the gold standard, and has a negative test result
- True positive – an individual who has the condition as defined by the gold standard, and has a positive test result

Rhett Mays  
April 26, 2006  
Science in Medicine

### **Preliminary Instructions for Paper Assignments**

- \* I reserve the right to change writing requirements and grading format given sufficient notice prior to the second and third assignments

#### Basics

All papers should be single spaced, size 12 font, with preset, standard borders (Microsoft Word). The specific font does not matter so long as it is legible. Paper length requirements are given in the syllabus. You may take liberties with the paper length in either direction so long as the paper serves to answer the assigned topic well (i.e. within reason) Papers should be written with both the instructor and your classmates as the intended audience. The paper should end with References Cited.

#### Grading

Thesis- 25%- Does the author attempt to address the assigned topic?

Use of Evidence- 25%- Does the author provide evidence to support their argument or thesis? Are references appropriate sources and are they cited appropriately

Writing Skills-25%- grammar, spelling, mechanics

Design/Construction- 25%- Does the paper flow well, and in a logical sequence? Are statements and points made clearly? This is the least tangible part of a paper But essentially grades how "good" the writing is.

Handwritten notes and scribbles on the right side of the page, including numbers and symbols:

- 25
- 20
- (24)
- 7
- 14
- 5
- 7
- 819
- 16
- 18
- (17)
- 10
- 1