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Patients and Populations

Medical Decision-Making: Uncertainty

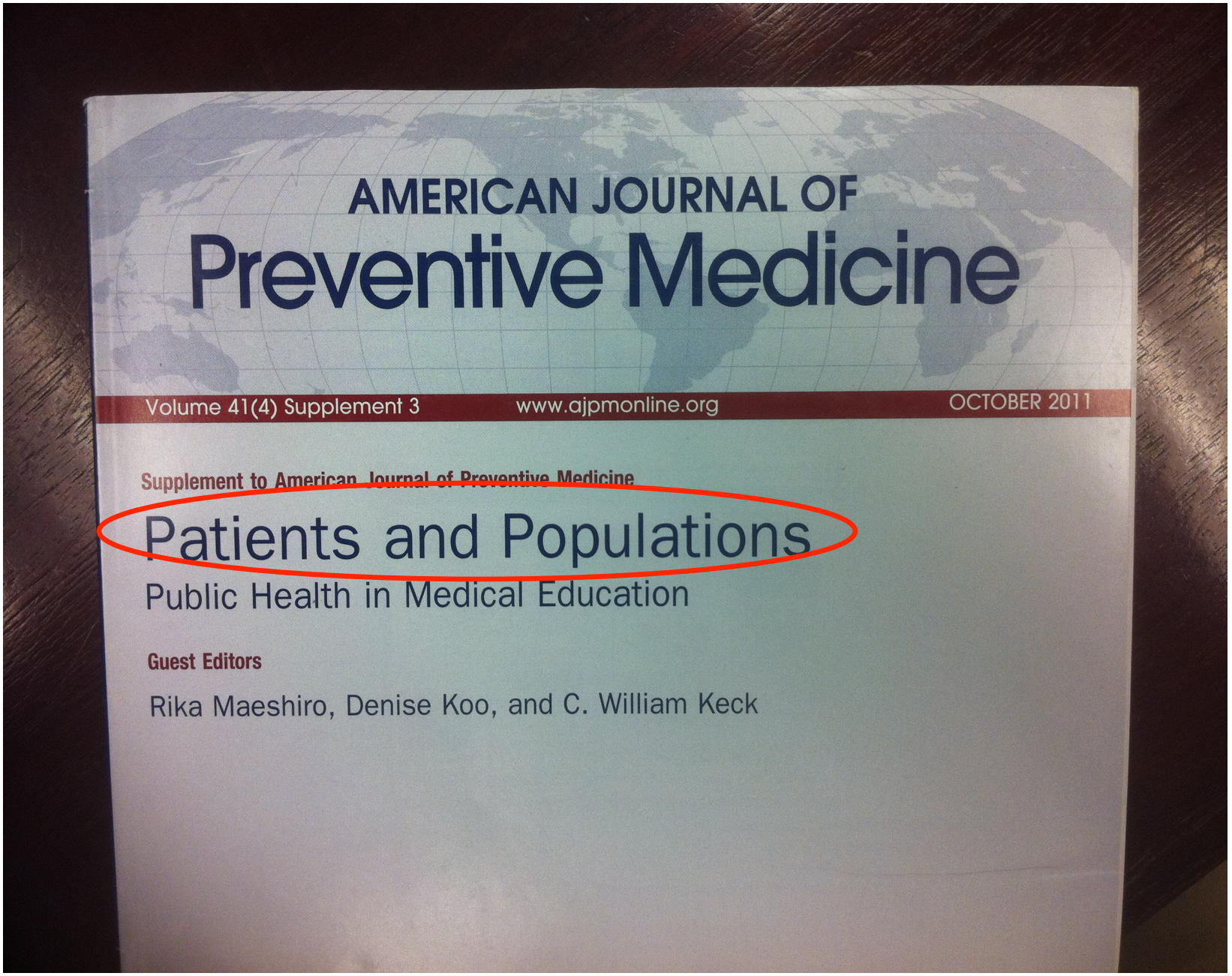
Rajesh S. Mangrulkar, M.D.
University of Michigan
Department of Internal Medicine
Division of General Medicine

Relationships with Industry

UMMS policy requires that faculty members disclose to students and trainees their industry relationships in order to promote an ethical & transparent culture in research, clinical care, and teaching.

- I have no outside relationships with industry.
- Currently, I do not serve as the PI on any industry supported research projects.

Disclosure required by the UMMS Policy on Faculty Disclosure of Industry Relationships to Students and Trainees.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Patients and Populations
Public Health in Medical Education
Guest Editors
Rika Maeshiro, Denise Koo, and C. William Keck

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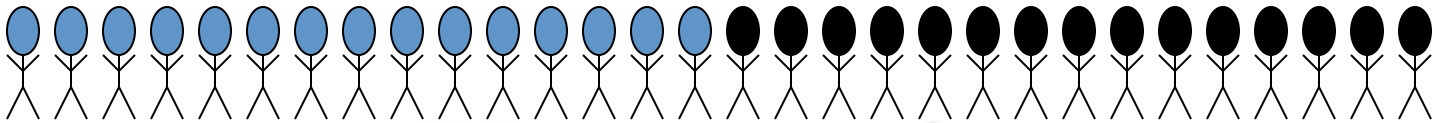
Patients and Populations

Patient view

- Disease manifestations
- Inadequate healthcare access
- Focus on treatment

Population view

- Disease burden
- Persistent health disparities
- Focus on complex care management, disease prevention



Uncertainty

Pierre Louis (1787-1872)

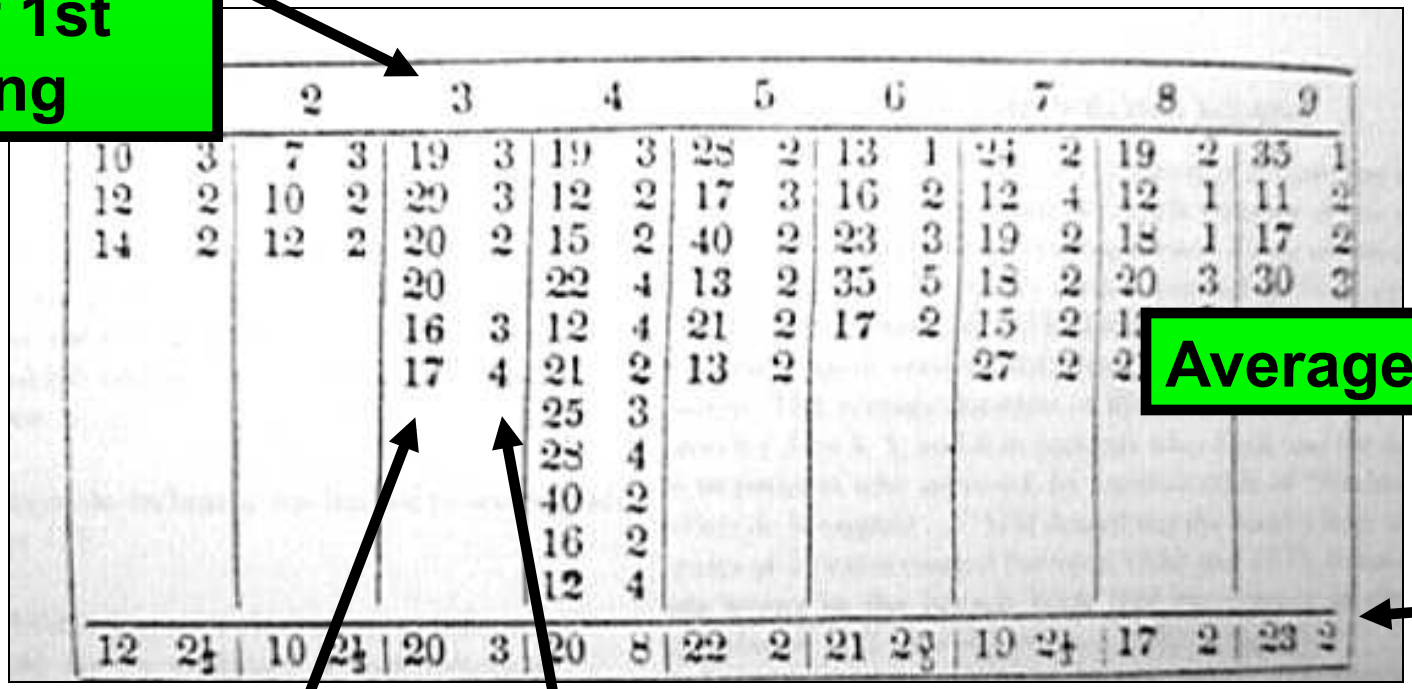
Inventor of the “numeric method” and the “method of observation”

BY-NC Maurin, Wellcome Images

Bloodletting: standard of care for hot, moist diseases

PD-EXP Medieval Cookbook, wikimedia commons

Louis' Study of Bloodletting



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PD-INEL

Day of 1st bleeding

Averages

Duration of illness

Number of bleedings

Pierre Louis (1787-1872)

Inventor of the "numeric method" and the "method of observation"

BY-NC Maurin, Wellcome Images

Discovered in 1828 that patients who were bled early did *worse* than those who weren't

- Died at a higher rate
- Those that survived, recovered earlier

The CAST Study

- Class I Antiarrhythmics: standard of care for asymptomatic ventricular arrhythmias in the 1980's in the U.S.

- Cardiac Arrhythmia Suppression Trial: discovered in 1989 that patients who were treated did *worse* than those who weren't.

HERS and Women's Health

- Standard of care prior to 2000
  - Promotion of hormone replacement therapy for post-menopausal women

- HERS study, Women's Health Initiative (2001, 2002)
  - Use of estrogen replacement therapy led to higher rates of cardiovascular complications, early in treatment.

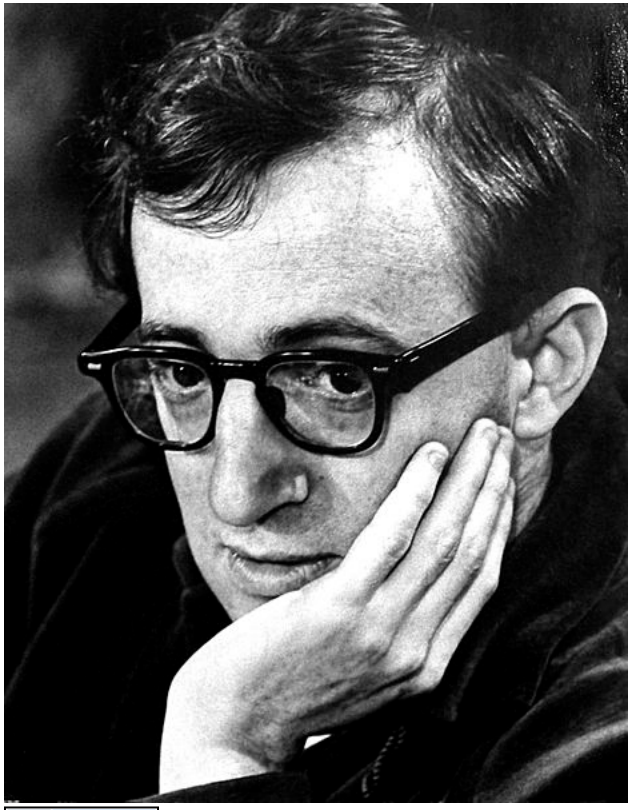
Haynes B, Haynes GA. What does it take to put an ugly fact through the heart of a beautiful hypothesis? *ACP Journal Club.* 2009;150(3):JC3-2 to JC3-3.

Course Objectives

- To understand, appreciate and begin to develop tools that handle the uncertain world within which medical facts, attitudes and decisions reside.
- To understand that skills development in this domain require nurturing and continuous application over time (usually a lifetime).
- To ask questions.

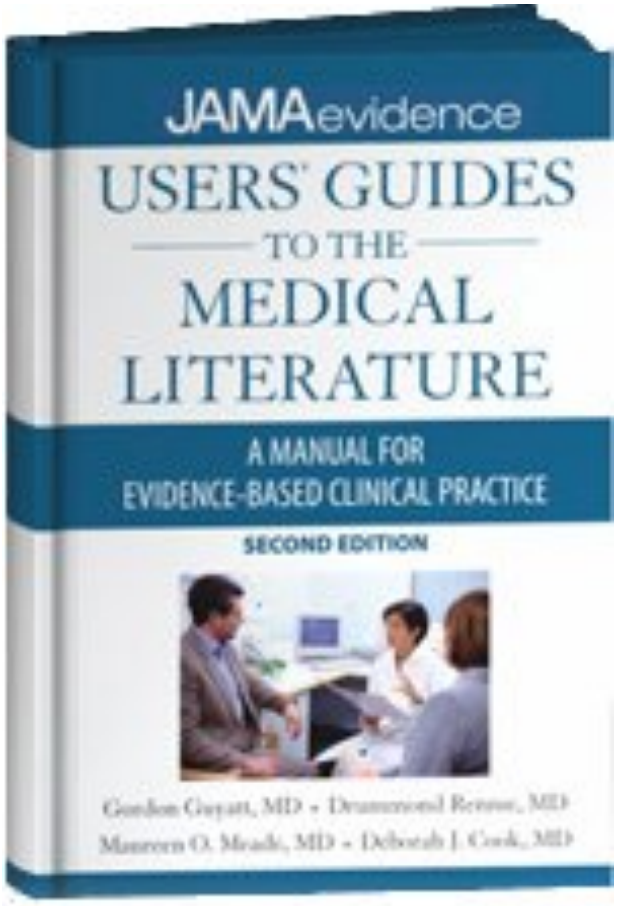
Housekeeping: Grading

- Stated in the syllabus
- Assignments (35%)
- Attendance (15%) – Despite
- Final Exam (50%)



PD-EXP Woody Allen - Kup, wikimedia commons

Housekeeping: Recommended Textbook



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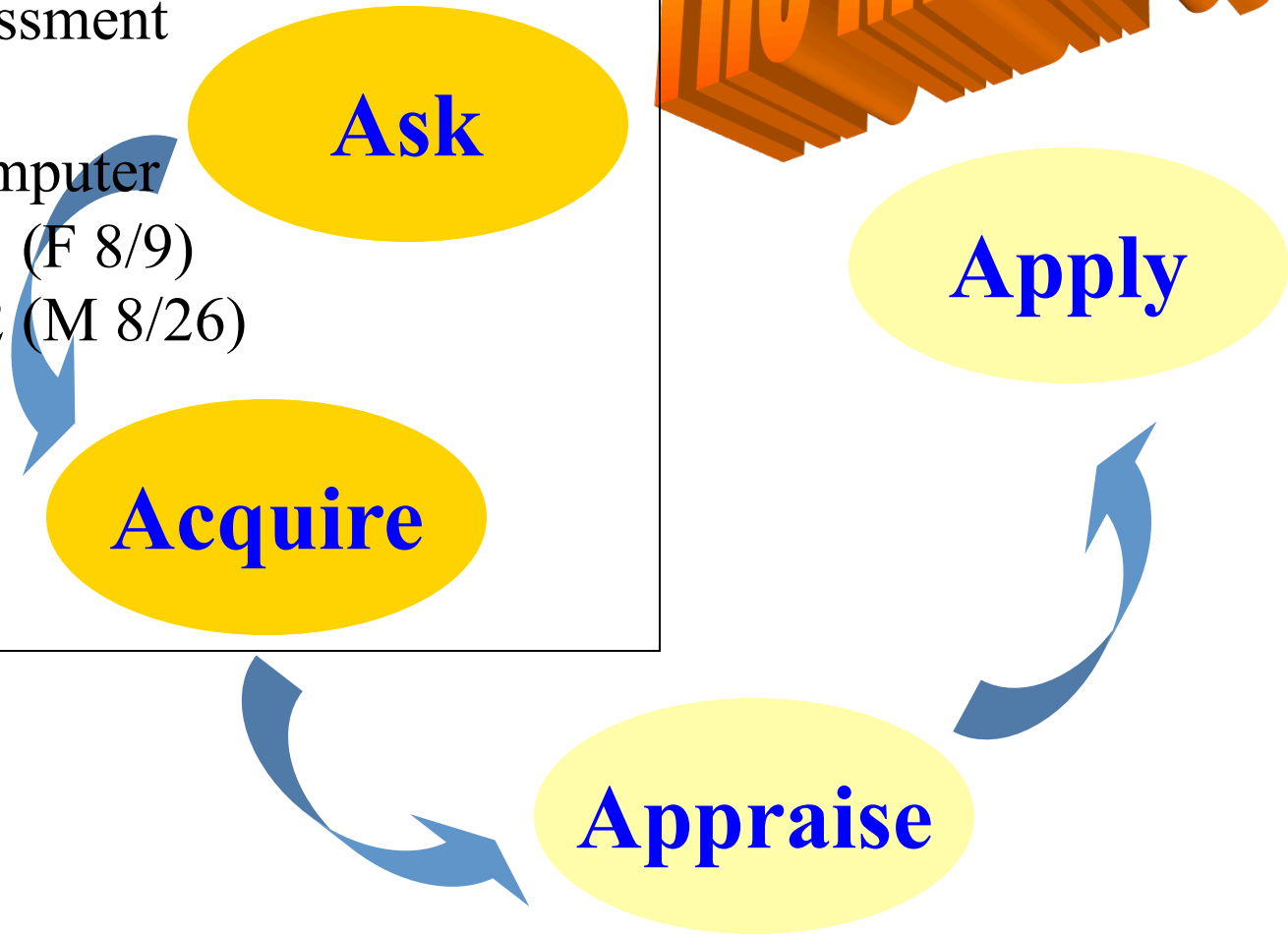
- Compiled from JAMA series
- Created and compiled by leaders in clinical epidemiology, biostatistics, medical decision-making and medical education
- An excellent reference tool for clinical practice
- Will be referred to during all 4 years of medical school

Online: www.lib.umich.edu
Search: JAMAEvidence under "Databases"

The MDM Cycle

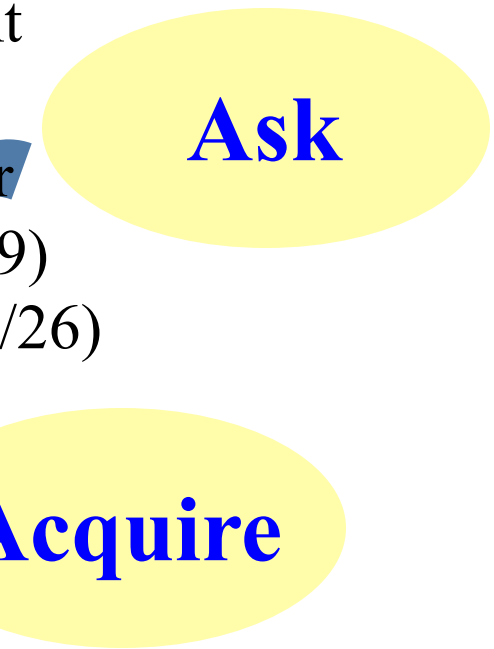
Thread 1: Information Retrieval
Mini Lec – Fri 8/9
Self-assessment
quiz
Opt* Computer
Session 1 (F 8/9)
Session 2 (M 8/26)



Optional Computer Sessions #1 and #2
Friday August 9 and Monday August 26

- Session #1 – 8/9
  - Available by signup (outside lecture hall)
  - Content - Introduction to Information Resource environment (E-Books, E-Journals), Basic MEDLINE searching
- Session #2 – 8/26
  - Available by signup later
  - Content – Information resources needed for Social and Behavioral Issues in Medicine Course
- Online demo modules available
- 2 Assignments – deadline Wednesday, August 21
  - Assignment #1
  - Self Assessment Quiz

The MDM Cycle



Thread 1: Information Retrieval
Mini Lec – Fri 8/9
Self-assessment quiz
Opt* Computer Session 1 (F 8/9)
Session 2 (M 8/26)

Thread 3: Diagnostic Reasoning
Lecs (F 8/9 and M 8/19)
SG 2 (T 8/20) and SG 3 (W 8/28)

Thread 2: Clin Epi, Biostats, Public Health
Lecs (M 8/12, T 8/13, W 8/14)
SG 1 (Th 8/15)

Learning Objectives for Today

- By the end of this lecture, you will…
  - summarize how new medical knowledge is created and applied
  - describe how common diagnostic testing can lead to uncertainty in diagnostic reasoning
  - summarize how uncertainty in diagnostic reasoning interacts with trust of the practitioner.

An Analogy to provide relevance
The Odyssey: A Tale

- The case: A 1998 Honda Odyssey with 68,000 miles, no significant past maintenance history, presents with a buzzer problem.
- Description of the problem: When driving, even when all doors and the trunk are closed, the door ajar buzzer (but not light) sometimes comes on. Only turning off the automatic sliding side door control will turn off the buzzer.

The Odyssey: Mechanic Intake

- He asks you about other things you may have noticed about the car.
- Other symptoms:
  - Trunk latch sometimes stuck in the past, not now (active recall on the latch)
  - Automatic side door control replaced as per recall 2 years ago.

The Odyssey: First steps

- What is the mechanic thinking?
  - He generates a *differential diagnosis*
  - Series of possibilities with associated probabilities

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The Odyssey: First Steps

- What does the mechanic tell you?
  - The most likely problem is the trunk latch. It is under recall anyways, so let's fix it.
- What does he do?
  - He replaces the trunk latch. He drives your car, and notices no triggering of the buzzer.
- What are the potential problems with his reasoning?

The Odyssey: First Steps

- Diagnostic reasoning defects
  - failure to entertain all possibilities, tendency to do what's convenient
  - failure to elicit and pay careful attention to description of symptoms
  - failure to perform specific diagnostic tests
  - failure to inform customer

availability,
problem representation,
anchoring,
description detail,
order effects*

*Elstein, Schwartz, BMJ. 2002 March 23; 324(7339): 729–732.

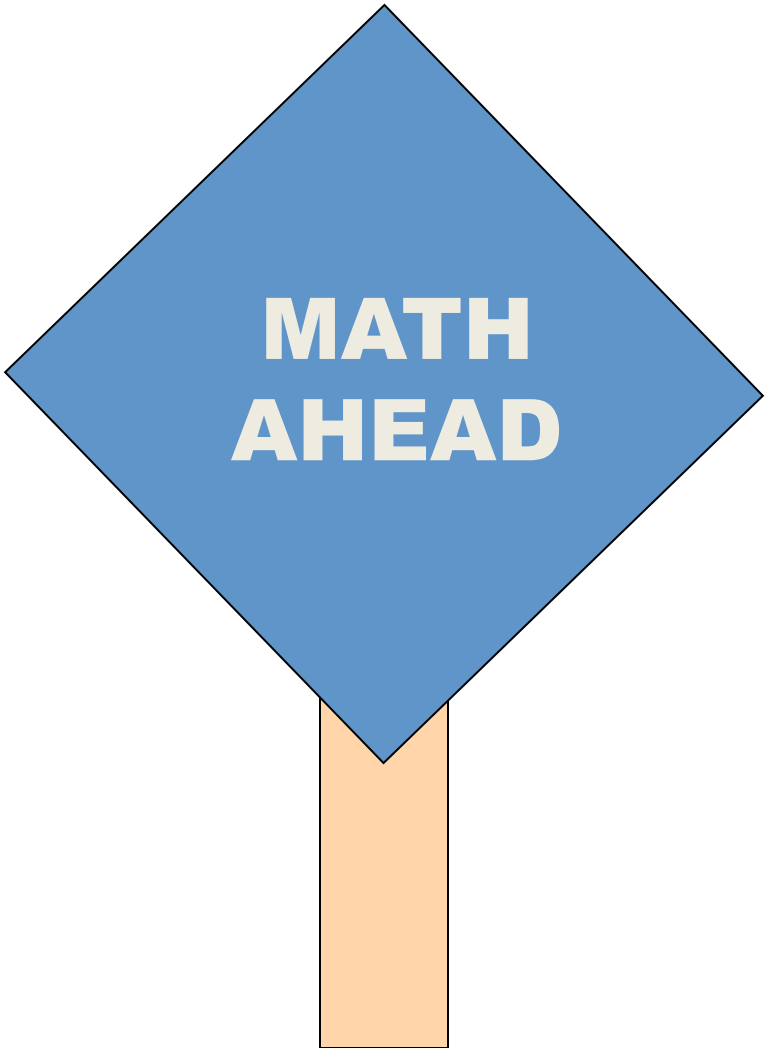
The Odyssey: What happens next

- One hour after driving the minivan, the inappropriate buzzer returns.

- Place yourself in my position:
  - What do I do next?
  - Do I return to the mechanic?

I turn around
and
go back…

TOOLS



First...A Clinical Tale

- 20 year-old woman presents for genetic testing
- Mother had breast and ovarian cancer, likely has the BRCA gene (autosomal dominant)
- With this assumption, the patient's likelihood of having the gene is…

Diagnostic Reasoning: Probabilistic Reasoning

Probability: The likelihood of the occurrence of an event.

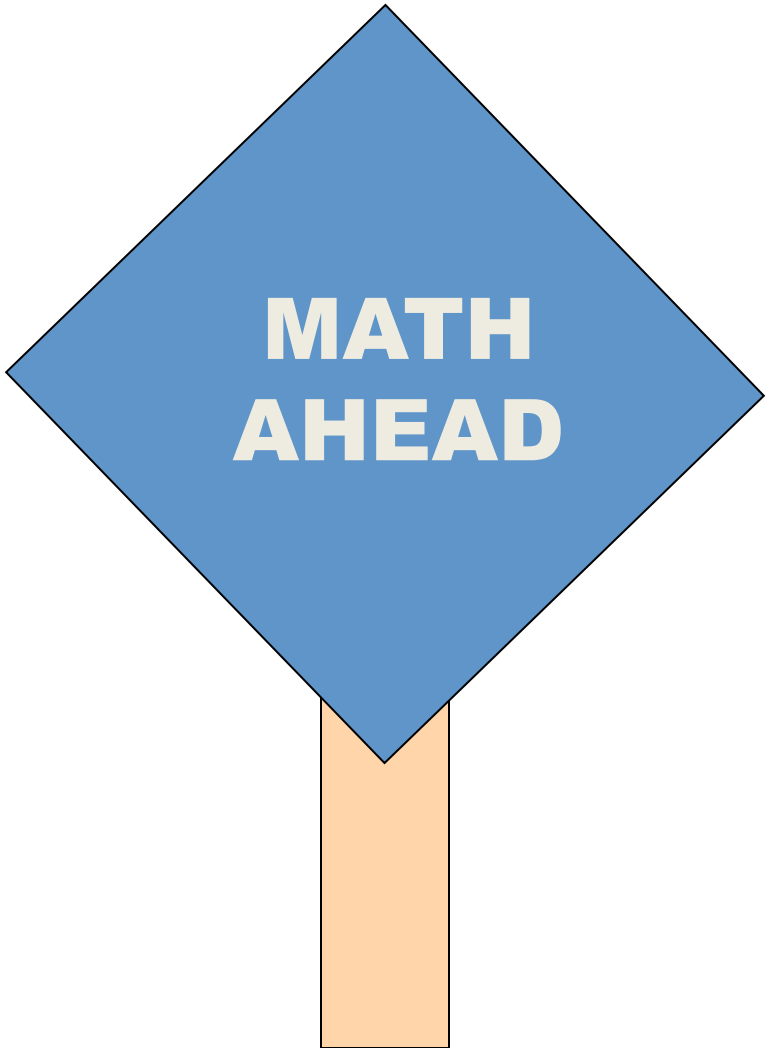
- P (X) = the probability of event X

- P(BRCA) = the probability that a patient carries the BRCA gene

Prior Probabilities

- Based on many factors:
  - Clinician experience
  - Patient demographics
  - Characteristics of the patient presentations (history and physical exam)
  - Previous testing
  - Genetic knowledge (in this case)
- P(BRCA) =

THE STORY CONTINUES…

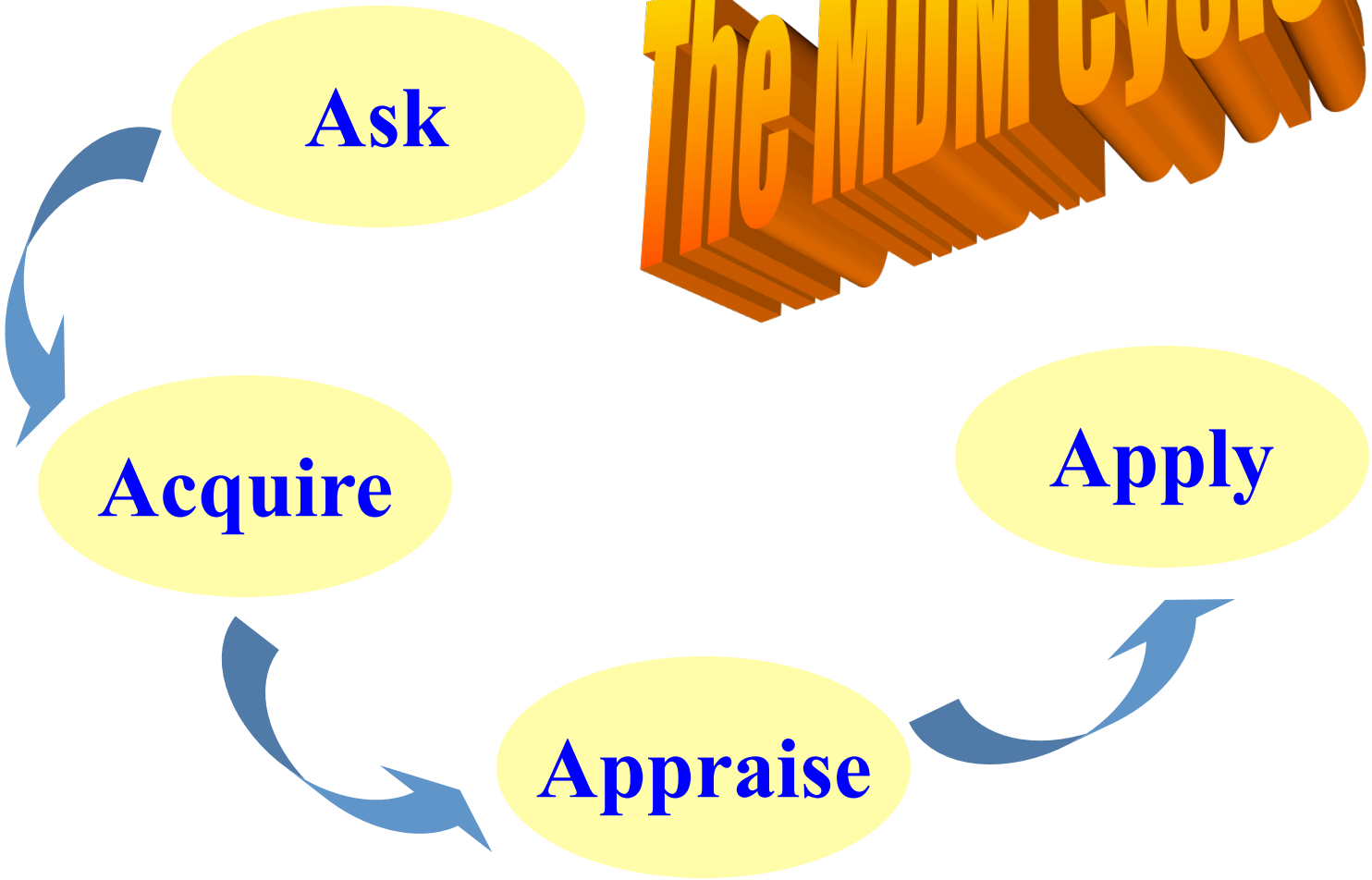


The Tale Continues…FFwd

- At age 75 she has not been diagnosed with breast or ovarian cancer.
- For next lecture (Friday) think about:
  - Is her probability of having the BRCA gene different at age 75 than it was at age 20?
  - If yes, is it higher or lower?

…to be continued…

The MDM Cycle



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