

Clinical Problem Solving

Module 5: Mistakes! Why they occur and how to find them.



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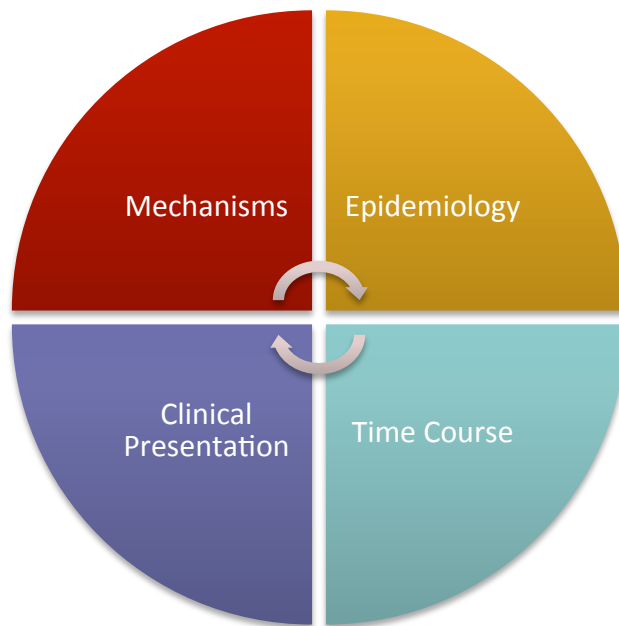
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 - Judy Bowen, MD
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 - Matt Roosevelt, MD

A brief review of Modules 1 – 4

Disease Illness Script



Patient's Illness Script

Epid
Time Course
Syndrome
Other PMHx

Prioritized Differential Diagnosis

- Tier I Possibility: CLINICALLY HIGH LIKELIHOOD
 - Disease explains all of patient's major findings
 - Patient has all major manifestations of the disease.
 - They have no rejecting features and may have a key feature
- Tier II Possibility: CLINICALLY MODERATE LIKELIHOOD
 - Disease explains most of the patient's findings
 - Patient lacks some of the usual manifestations of the disease
 - They have no rejecting features
- Tier III Possibility: CLINICALLY LOW LIKELIHOOD
 - Patient has single or few features of the disease in question
 - Patient has a rejecting feature of the disease in question.



Tiering clarifies pretest probability

Tier	Categorical Probability	Numerical Probability	Comment
I	VERY LIKELY	> 90%	Defining Feature(s)
	LIKELY	67-90%	
II	UNCERTAIN	34-66%	
III	UNLIKELY	10-33%	Rejecting Feature
	VERY UNLIKELY	< 10%	

A Heuristic

- In general, good tests are able to move likelihood of diseases up or down one category (i.e. from uncertain to likely or from uncertain to unlikely)
- Special Cases:
 - If you need to rule out a disease, find a test with a sensitivity $> 99\%$
 - If you need to rule in a disease, find a test with a specificity of $> 99\%$
- Tests are generally not necessary for very likely or very unlikely possibilities. If tests are indicated for very unlikely or very likely conditions (for example, high risk treatment or high risk diagnosis), you may need more than one test.

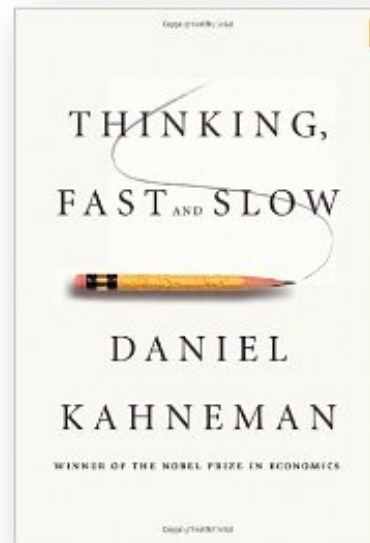
New Content: Module 5

Goals for Module 5

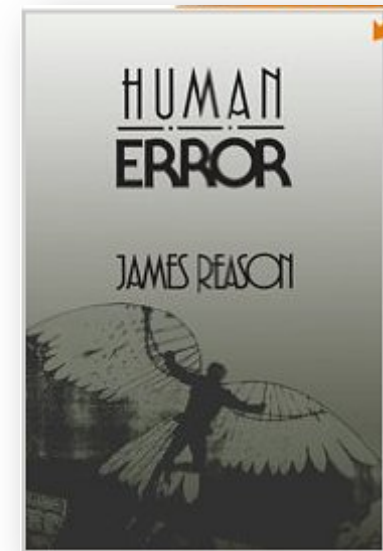
- Review a case of test interpretation error
- Describe several reasons diagnostic errors occur
- List several causes of cognitive biases
- Demonstrate “problem mapping”: a method for finding and eliminating or learning from diagnostic error

New References for those interested

- *Human Error*, James Reason
- *Thinking Fast and Slow*, Daniel Kahneman



Ferrar, Straus, Giroux
2011



Cambridge Univ Press
1990

Mrs. Triglioni, a new problem

Mrs. Triglioni is admitted to the hospital with a diagnosis of pulmonary embolism. Approximately 30 hours after the admission, in the middle of the night. Mrs. Triglioni got up to use the commode, strained to have a bowel movement and became acutely **short of breath** and **dizzy**. She describes the dizziness as the room spinning continuously, worse when she opens her eyes or turns her head. No position feels better. When she opens both of her eyes, she sees double. In addition, she says that her right arm feels “wobbly” and unable to support her weight when she tried to reposition herself after returning to bed.

Physical Exam:

- BP: 160/100, HR 110 RR 28, Pulse oximetry: 85% saturation, up to 91% with supplemental oxygen
- She is continuously retching and holds her right eye closed, because when she opens it she has double vision.
- Lungs: pleural rub is audible in the left posterior lung field
- CV: PMI is non displaced. normal S1. S2 has an increased P2 component audible. No murmurs are present.
- Abdomen: soft and non tender with no masses
- Left leg is markedly swollen to the level of the thigh with dependent rubor; evidence of recent knee surgery is present with a clean, dry wound present that is partially healed.
- Eye exam is difficult, but upward beating nystagmus is present in both eyes.
- Visual acuity and visual fields cannot be assessed because of her discomfort
- Cranial nerves V, VIII, IX, X, II, XII appear to be intact. Cannot assess VII because of symptoms. A right pronator drift is present.
- Reflexes are intact in arms and legs
- She is unable to walk because of her immobilized leg but when she sits on the side of the bed, she falls to the right side.

Processed Problem List

- Acutely worsening hypoxia
- Pulmonary hypertension
- Vertigo
- Diplopia
- Nystagmus
- Monoparesis, right arm
- Truncal ataxia
- Evidence of DVT

Marie Triglioni: Pre Test Probability?

Patient Illness Script

Epidemiology: 48 yo woman with DVT and PE

Time Course: Acute

Syndrome Statement: hypoxia and pulmonary hypertension, central nervous syndrome characterized by vertigo, diplopia, nystagmus, monoparesis and truncal ataxia

Other History: Surgery 3 weeks ago

Tier 1

Recurrent PE with Paradoxical Embolus and Brain Stem Stroke

Tier II

Tier III

Benign Positional Vertigo
Meniere's Disease

Clinical Approach

- The cross cover resident sees the patient can believes she has had a paradoxical embolus and brainstem stroke. She orders an MRI of the Brain and a transthoracic echo to check for a patent foramen ovale.
- The next day, the primary team checks the TTE results and finds them to be negative for a PFO.
- The Resident calls you and says “Good news! She didn’t have a paradoxical embolus.”

Mrs. Triglioni and the TTE

- Pre test probability: **Very Likely**
- Sensitivity and Specificity of TTE for Paradoxical Embolus: 60% and 99%

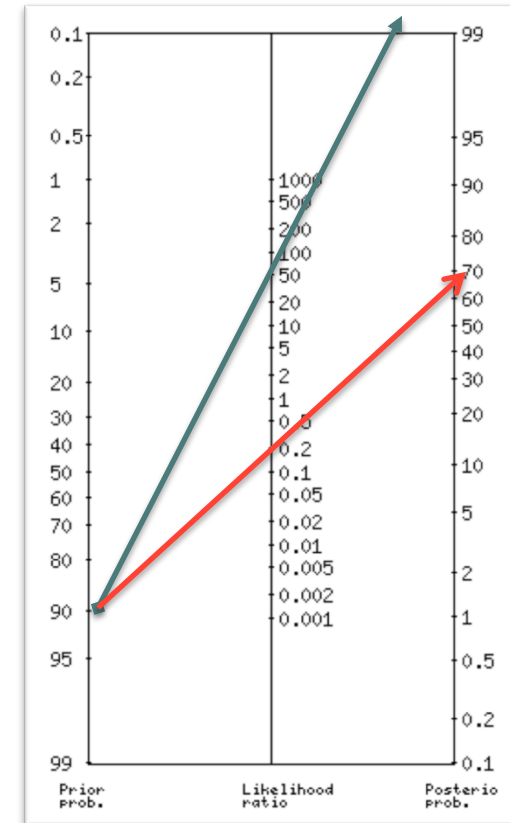
Quiz 5.1

Given the Sen/Spec of TTE and using the EBM Heuristic, the result of a negative test for PFO would change our pretest probability from **very likely** to:

1. Very unlikely
2. Unlikely
3. Uncertain
4. Likely

Mrs. T, the TTE & Fagan Nomogram

- LRs: the likelihood that a test comes from someone with a disease rather than someone without the disease:
- TTE LR+ = 67 [sen/(1-spec)]
- TTE LR- = .3 [(1-sen)/spec]
- Is the resident correct???



Another resident....

- Given the negative TTE, another resident sees the patient, does an Eppley maneuver (Dix-Hall Pike) and declares it positive for BPV.
- Our pretest probability for BPV was 20% or lower
- The sensitivity/specificity for the Eppley is 75%/75%

Quiz 5.2

- Using the pretest probability of 20% with the sensitivity and specificity described, the post test probability of BPV for a Positive test is:
 1. Very likely
 2. Likely
 3. Uncertain
 4. Unlikely

Mrs. T, the Eppley & Fagan Nomogram

- LRs: the likelihood that a test comes from someone with a disease rather than someone without the disease
- Pretest: 20%
- TTE LR+ = 3 [sen/(1-spec)]
- TTE LR- = .3 [(1-sen)/spec]
- Does she have BPV?

