

Considering Key Components of Clinical Diagnosis



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Disclosures

- I have no financial or non-financial conflicts of interest
- However, I do sport a southwestern drawl honed in West Texas ...
- My passion past 30yrs: Create learning opportunities for resident/fellow physicians to be better than their faculty



Raygun
Unpaid Advertisement



Wagons from Kocs, Hungary



Today's Road Map Objectives

- Inspire us to explore – & pursue mastery – in clinical diagnosis
- Practice Simple Math & English
- Practice Avoiding Formulas
- Enjoy **Fun** Interaction

**A Case for Demystifying
Clinical Diagnosis for
(Ourselves) & Our Learners**

A 45 year old female ...

Presents to ER c/o severe upper abdominal pain & N/V

- Pain is diffuse, 6/10 non-radiating
- Family reports pain started after 2 days of binge drinking
- PMH significant for 2 prior ETOH-related admissions (Inebriation with N/V)
- Exam:
 - Afeb BP 150/90, RR18, Pulse 100
 - Inebriated and in mild distress due to abd pain
 - Moderate diffuse abd tenderness, no rigidity, guarding, or rebound

A 45 year old female ...

Labs are ordered:

- Serum ethanol – 110 mg/dl
- CBC – Hct 31; Hb 11.0; WBC 13,000; plat 180,000
- Amylase 380; lipase 40; LFTs nl
- Abdominal Xray – No abnormalities

Think Out Loud with Me

A 45 year old female ...

**She's admitted to Internal Medicine
Diagnosis – Alcoholic Pancreatitis**

- Kept NPO
- IV pain meds and IV fluids started
- Monitored on ETOH withdrawal scale

A 45 year old female ...

**CT scan of the abdomen:
Ruptured ectopic pregnancy!**

What Happened!!!

Why was the ectopic pregnancy misdiagnosed?

- Clouded sensorium & reported pain was epigastric
- We **loved** our initial (mis)diagnosis
- Low suspicion for pregnancy in a 45y/o
- Therefore NO suspicion for ectopic pregnancy

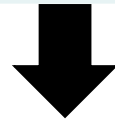
What Types of Diagnostic Information Could Help Minimize Diagnostic Error ?

- Background info on ectopic pregnancy
- Clinical presentation of ruptured ectopic pregnancy (clinical manifestations)
- Disease probability for differential diagnosis
- Risk factors for rupture
- Is there a clinical prediction rule to estimate risk for ectopic pregnancy or rupture??? (nope)

Humbling ... Minimal Found

TRUTH

		Ruptured Ectopic	Non-Ruptured
Hemoperitoneum	+	66%	
	-	34%	



**Only Ruptured
Patients**

Ruptured Tubal Pregnancy: Population-based study in France. Am J ObGyn, 1999

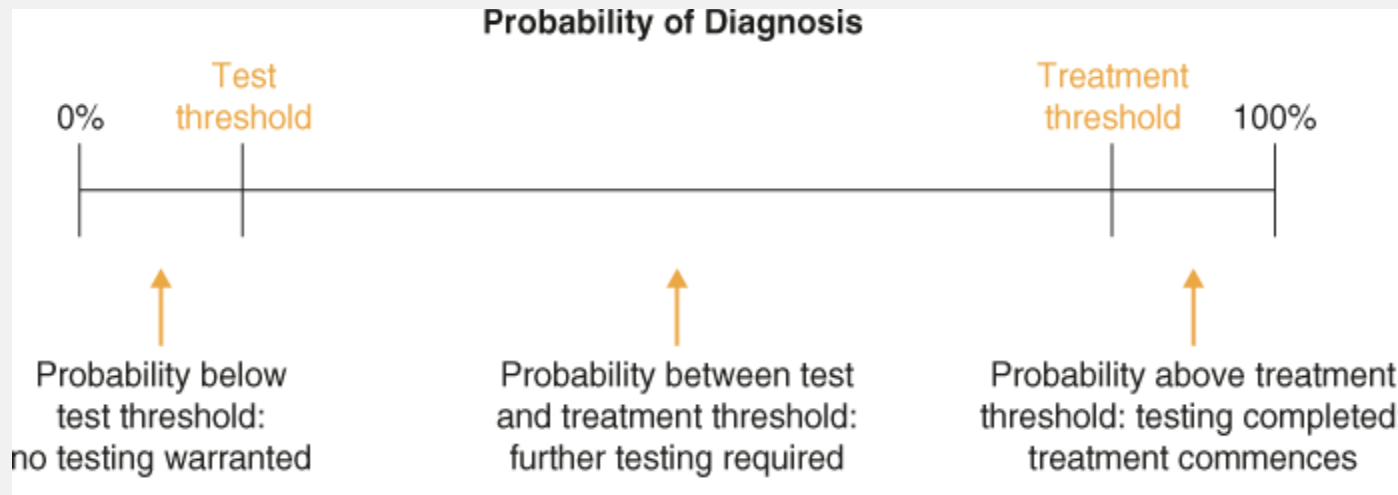
When Considering Ddx

Is Differential Diagnosis ...
a List or an Active Process?

	'Possibilistic' List	'Probabilistic' Reasoning
Physician Effort	Memorize all possibilities	Thoughtfully & sequentially regard the list based on ...
Type of Thinking	Consider all known causes	<u>Actively reorder</u> list based on: <ul style="list-style-type: none">• Patient Context• Probabilistic• Prognostic• Pragmatic

Intersection of Diagnosis & Therapy

Probabilities & Thresholds



Richardson, Wilson. 'The Process of Diagnosis' Users' Guides to Medical Literature 3rd ed 2015

Why Testing Threshold Slides

Factor	<u>Lowers</u> Test Threshold	<u>Raises</u> Test Threshold
Prognosis of Disorder	Serious if left undiagnosed	Less serious if missed
Effectiveness of Rx	Treatment is effective	Treatment is less effective
Test Safety	Low or zero-risk test	Higher risk (e.g. invasive)
Test Cost	Low cost	Higher cost
Test Acceptability to Patients	High acceptability	Lower acceptability

The 2 X 2 Table

TRUTH (D_z)

Present

Absent

Pos

Dx Test

Neg

**From what perspective do Docs
get to gaze into this box?**

The 2 X 2 Table

Neurohormone SAD levels
in 200 dazed Cleveland
Cavalier Fans (Down 3-0)

Depression

Present

Absent

>150

50

5

SAD Level

≤150

40

105

	Present	Absent
>150	50	5
≤150	40	105

The 2 X 2 Table

Neurohormone SAD levels
in 200 dazed Cleveland
Cavalier Fans (Down 3-0)

Depression

Present **Absent**

SAD Level		Depression	
		Present	Absent
>150	50	5	PPV = 50/55 91%
≤150	40	105	NPV =

Sen =
50/90=56%

Spec =
105/110=95%

The 2 X 3 Table

Neurohormone SAD levels
in 200 dazed Midwest folk
hungering for Spring

Depression

		<i>Depression</i>	
		Present	Absent
SAD Level	>150	50	5
	100-150	25	20
	<100	15	85

**We Need a 2nd Generation
Diagnostic Test Performance
Measure ...**

The Noble Likelihood Ratio

Chief Resident Cohorts

APDIM EBM Workshops

	2003	2007	2015
Sample Size	119	174	107
4th Yr Chief	87%	85%	89%
Univ-Based	56%	56%	56%
Female	50%	47%	43%
Subspecialty Plans	67%	75%	67%

Confident to Explain Concepts

	2003 (n=119)	2007 (n=174)	2015 (n=107)
Likelihood Ratio	23%	23%	34%
Relative Risk Reduction	30%	35%	47%
Absolute Risk Reduction	33%	36%	50%
Confidence Interval	41%	49%	68%
Pretest Probability	46%	46%	63%
Number Needed to Treat	49%	51%	58%

2nd Generation Measure ... LR

(No Formulas; just these 2 tenets)

1. LRs are the Doctor's Friend
2. LRs are just a Ratio of Likelihoods

**You're Cranking Out
Notes on the Wards ...**

A Tired Lady:



- 71F, ↑fatigue,
↓exercise tolerance
- Pale conjunctivae
- Cough, sput, fever
- RLL crackles
- Hgb 8.7 g/dL
- Does she have iron deficiency anemia?

**What was Helpful that
You Could Try in Your
Own Teaching?**

Mr. Cox – 80y/o

- Exasperated daughter brought to ED because “he hurts all over and can’t hardly move”
- Doctors & PT not helping with his C3-4 spinal stenosis (mod to severe) or known bilat rotator cuff disease
- Hgb 11; Na 126; LFTs nl, but Alb 2.2
- ESR = 120
- RF = 774 IU/ml
- ED also got Anti-CCP = 300U/ml (nl <3)

Mr. Cox – 80y/o

- New Rheum Fellow called by ED ...
“**Sounds like he’s got RA; we’ll see him in consult**”
- **Overnite Admitting Assessment:** RA, needs NHP
- **At 7:30am:** Diffuse aches, especially in shoulders and some hips; Fell on ice & broke left humerus; managed with immobilization; Declining, especially past 2months
- Retired machinist for John Deere; Lives alone; HTN; DM; No h/o periodic joint swelling

Mr. Cox – 80y/o

- **40# wt loss past 6mon**
daughter wonders maybe: “**cause he can’t barely feed himself**”
- Difficulty raising hands out of lap; hurts to gently shake hands; some thenar wasting; Dupuytren contracture
- Moderate tenderness across shoulder muscles, but NT with gentle passive ROM; no effusions or warmth
- **No other joint warmth, swelling, or chronic changes of RA; DTRs 2+**
- **We started therapeutic trial 15mg pred/d; CXR; & requested outside cervical MRI**

Mr. Cox – 80y/o

Rheum Evaluation: Believes all from spinal stenosis, rotator cuff, fracture, immobility. Agrees no synovitis, but **“worried about the high Anti-CCP so consider starting hydroxychloroquine”**. **“Doubt PMR.”**

Results of Therapeutic Trial of Steroids

- **Next morning:** Best night of sleep in long time. Helped feed self. Participated with PT evaluation
- **Following morning:** bright affect and feeds self; can raise hands to shoulders without pain
- **Following days – while awaiting Rehab placement – eating like a horse; takes laps in hallways with walker**
- Daughter tearfully exclaims: “It’s a miracle”

Mr. Cox – 80y/o

Think Out Loud with Me ...

WHY was it so hard for our rheum colleagues to let go of RA?

What aspects of diagnostic reasoning in this case would you teach about?

Mr. Cox – 80y/o

- **Anti-CCP has a sensitivity of 58% and specificity of 96%**
- **LR(+) = 14.5**
- **Remember LR > 10 Result in large changes in post-test probability**

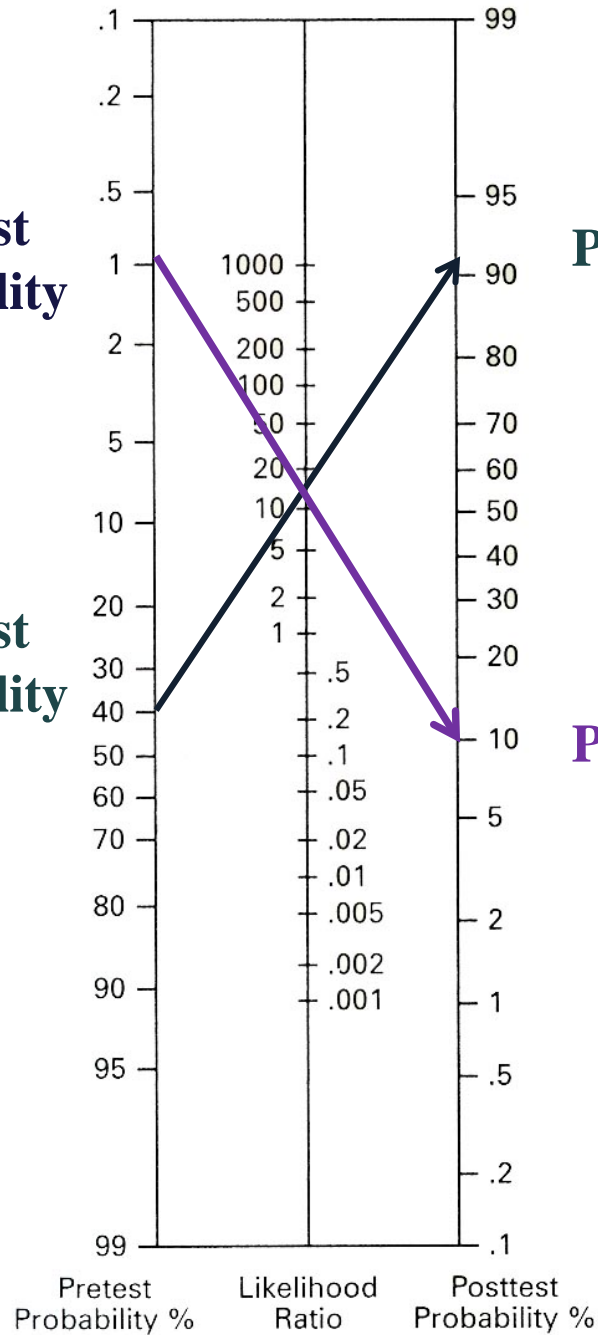
*Systematic Review: Accuracy of Anti-CCP for Diagnosing RA
Ann Int Med 2010; 152:456-464*

**Pre-test
probability
1%**

**Pre-test
probability
40%**

Post-test probability >90%

Post-test probability ~10%



Wagons from Kocs, Hungary



Coach Etymology

The Word 'Coach'

Arises from horse-drawn wagons or carriages

- 1830s Oxford

- 1860s Athletic Coaches appeared

- To help take or move someone from *where they are to where they want to be*
- It's a guiding process to improve performance
- Focused on specific skills/tasks/capabilities

Key Take Home Messages

1. Various types of research evidence can inform clinical diagnosis
2. Ddx should be an active process
3. Orient 2x2 box; Know Doc's perspective
4. For Sen/Spec/PPV/NPV ...
name denominator first
5. LRs are the Doctor's friend
6. LR are just a ratio of likelihoods

Savor Your EBM Learning & Teaching in Tasty Slices

