Accidental Investigator: How I Fell Into A Career of Predicting Outcomes

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CME ACCREDITED UPDATES IN MEDICINE ELEARNING SERIES

COURSE NAME:

Medicine RSS eLearning Modules

CME eLEARNING ACTIVITY NAME:

Accidental Investigator: How I Fell Into A Career of Predicting Outcomes

PROGRAM DESCRIPTION, EDUCATIONAL GOAL AND RATIONALE:

Evidence based guidelines are constantly changing and being updated for several core areas of Internal Medicine throughout the year. It is important for physicians to practice the most up-to-date standard of care in all specialties to promote patient health and well-being. Our series of lectures at the medicine regularly scheduled series promotes continuing education for the practicing internist and highlights important updates in medical practice in these core areas. Physicians in general practice often and do not have the time to keep themselves up-to-date with medical advances as they are busy seeing patients in the clinical setting. The Medicine Regularly Scheduled Series gives these physicians the opportunity to learn these advances in an academic setting.

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TARGET AUDIENCE:

Physician Partners and Premium Network
community-based providers

LEARNING OBJECTIVES:

Upon successful completion of this activity, participants should:
Define Clinical Prediction Rules (CPR)
Identify the development process of a CPR
Assess the hierarchy of evidence when applying a CPR

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FACULTY PRESENTER/AUTHOR:

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ACCREDITATION:

Northwell Health is accredited by the Accreditation Council for Continuing Medical Education to provide Continuing Medical Education for physicians.

CREDIT DESIGNATION:

Northwell Health designates this Continuing Medical Education activity for a maximum of ***1 AMA PRA Category I credits*** ***TM.*** Physicians should only claim credit commensurate with the extent of their participation in the activity

METHOD OF PHYSICIAN PARTICIPATION:

To receive credit the participants must:

Read/view the entire educational activity.

Input name and credentials to gain CME credit.

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COURSE HOST:

Department of Medicine

Northwell Health

ESTIMATED TIME TO COMPLETE ACTIVITY:

90 minutes

ACKNOWLEDGEMENT OF COMMERCIAL SUPPORT:

An announcement of program support will be made to all attendees at the beginning of each educational activity.

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DISCLOSURE POLICY:

Northwell Health adheres to the ACCME's Standards for Commercial Support. Any individuals in a position to control the content of a CME activity, including faculty, planners, reviewers or others are required to disclose all relevant financial relationships with commercial interests. All relevant conflicts of interest will be resolved prior to the commencement of the activity.

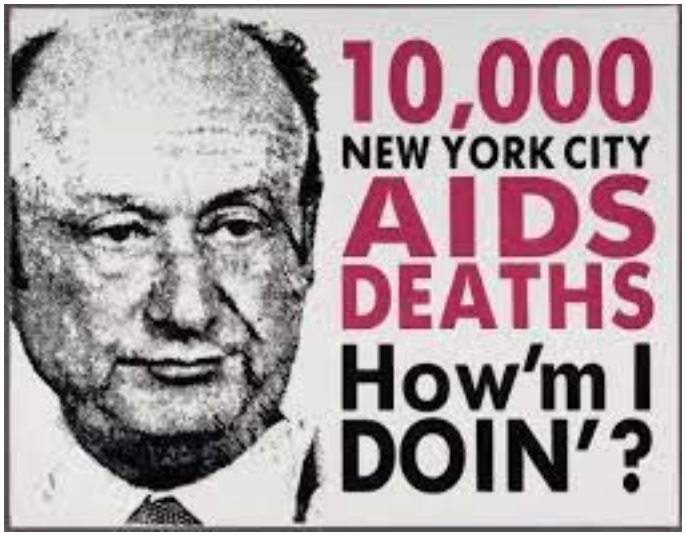
FACULTY DISCLOSURES:

Drs. Thomas McGinn, Dr. Sandy Balwan, George Boutis, John Raimo and Sean LaVine have nothing to disclose.

RELEASE DATE:	1/21/19
REVIEW DATE:	1/21/19
PROGRAM EXPIRATION:	7/30/19

Outline

- The Accidental Researcher: Career Path
- Define Clinical Prediction Rules (CPR)
- An RCT of CPRs: Systematic integration of evidence
- The future of prediction models



JACOBI Hospital
1993

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PROBLEM NUMBER 1

Problem #1
JACOBI Hospital
1993
3 monitored Beds!

SYNCOPE UNKOWN ETIOLOGY

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?

SYNCOPE UNKOWN ETIOLOGY

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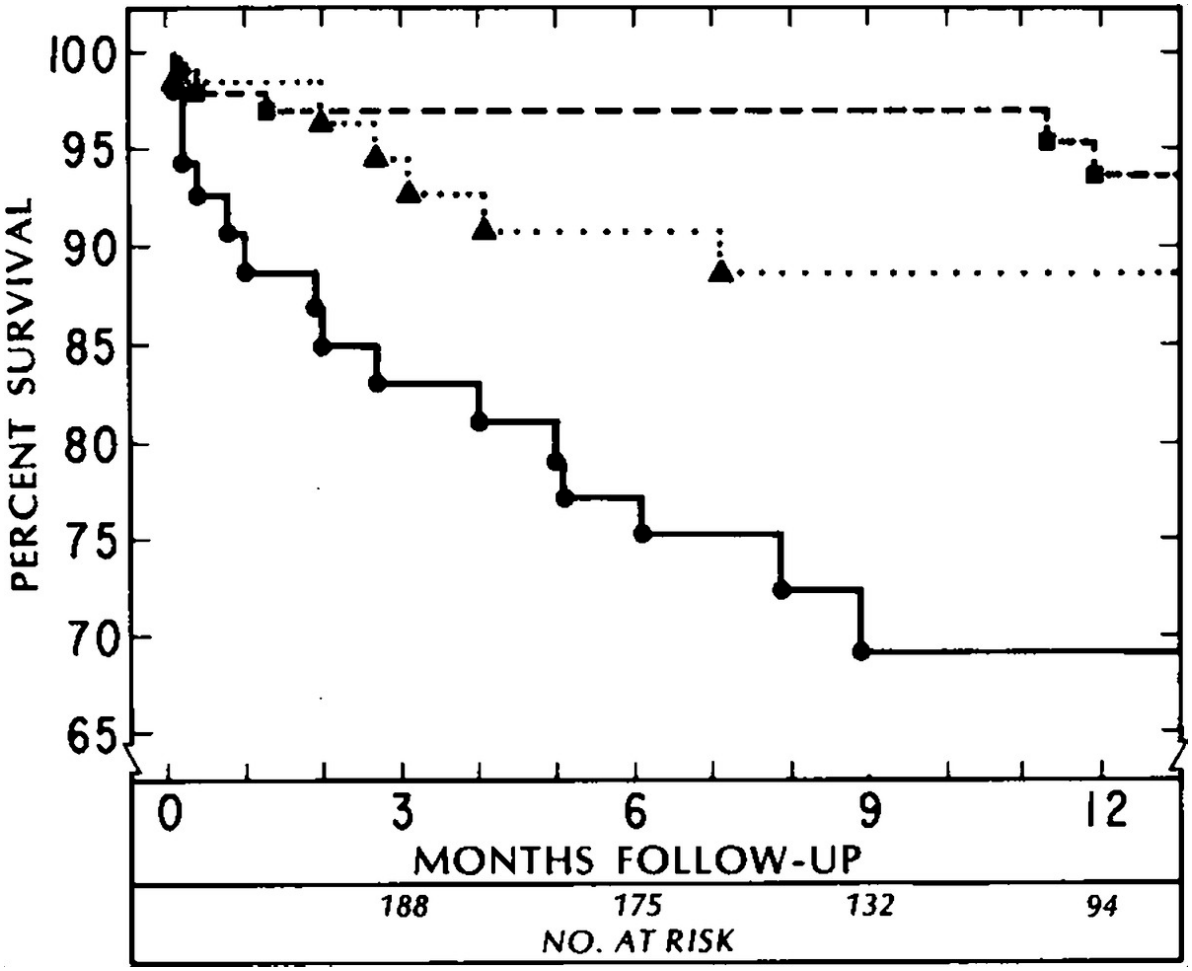

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Could I predict (CPR) which syncope patients upon presentation who had no obvious cause, would have a "bad" event?

JACOBI Hospital
1993 - 1995

Answer: **NO**

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What is a Clinical Prediction Rule?

Case 1

A case is being presented at the empty bedside of the pt, who is down getting her V/Q scan to R/O a PE.

- The pt is a 45 year women on estrogen replacement therapy.
- The pt has no sig PMH. She presented at 4 a.m. with the sudden onset of chest pain and SOB. The chest pain lasted seconds but her feeling of SOB lasted for several hours, prompting her to come to the ED.
- Her pulse ox was 95%, PR 98, other wise nl PE. CXR was clear. She was started on heparin, admitted, and sent for a test.
  ✓Write down your PTP for PE

Case 1

A case is being presented at the empty bedside of the pt, who is down getting her V/Q scan to R/O a PE.

- The pt is a 45 year women on estrogen replacement therapy.
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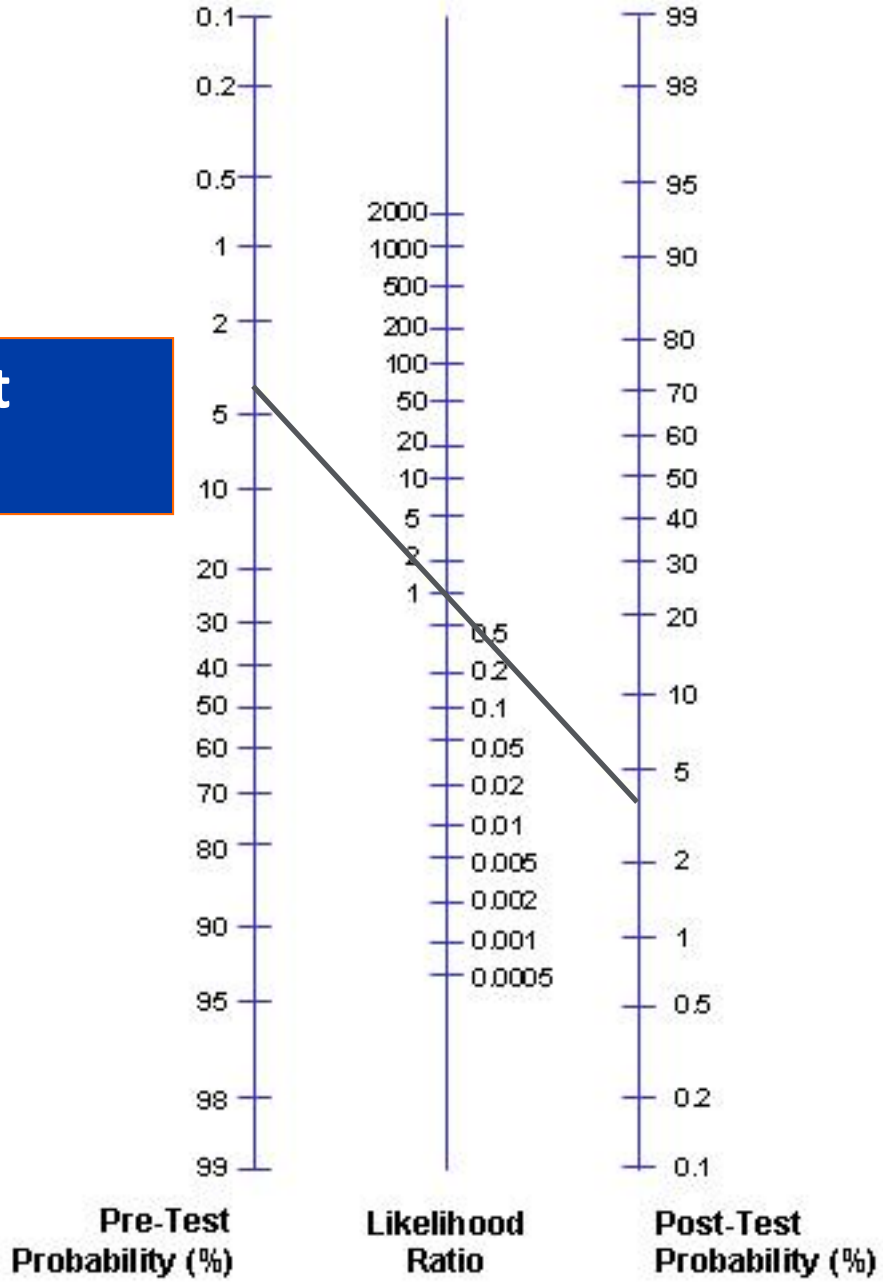
- Her pulse ox was 95%, PR 98, other wise nl PE. CXR was clear. She was started on heparin, admitted, and sent for a test (?).
  - ✓Write down your PTP for PE
  - ✓Assume a CTA was performed and was low prob, now what would you do?

Pre Test Probability

- 0-20%
- 21-40%
- 41-60%
- 61-80%
- >80-

Low Pre Test Guess



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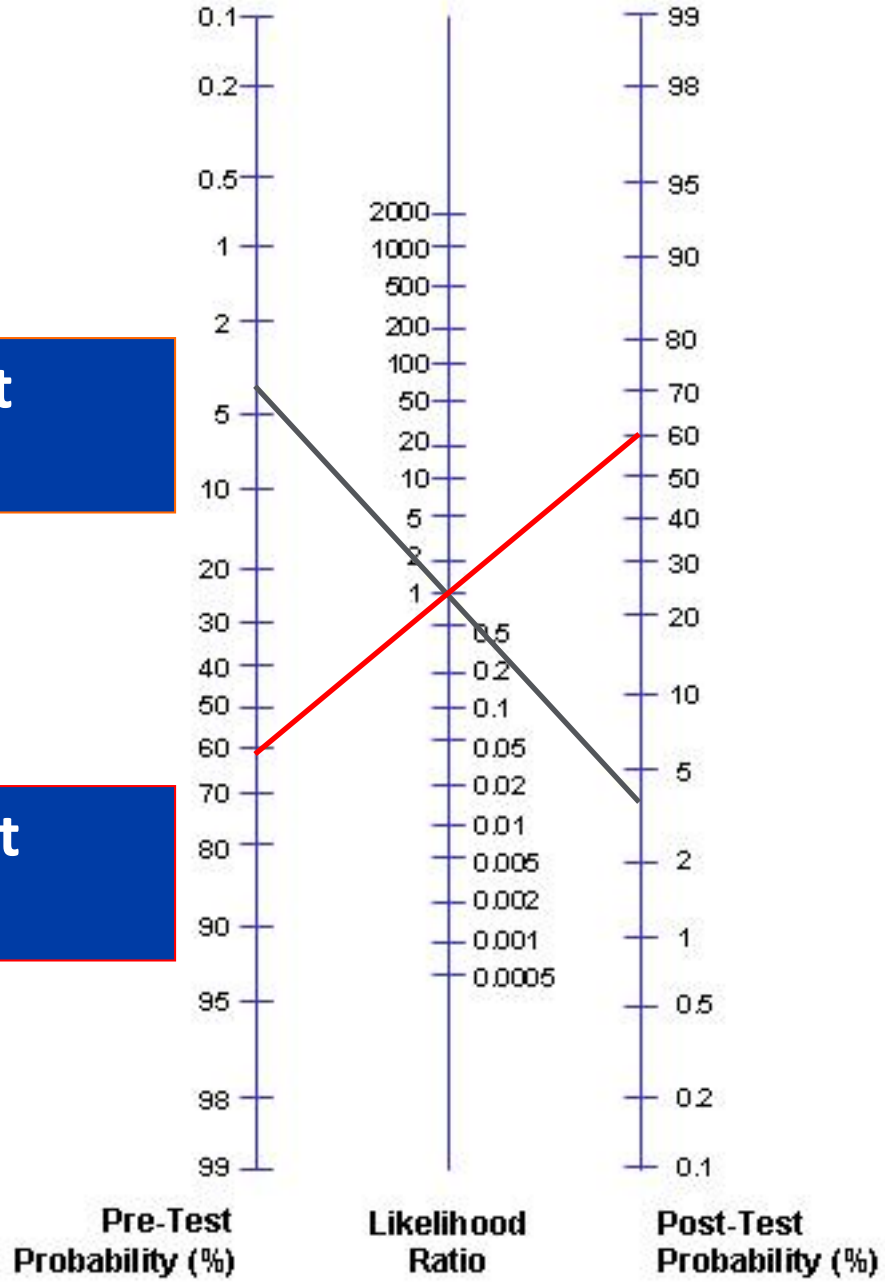
Low Pre Test Guess

High Pre test Guess



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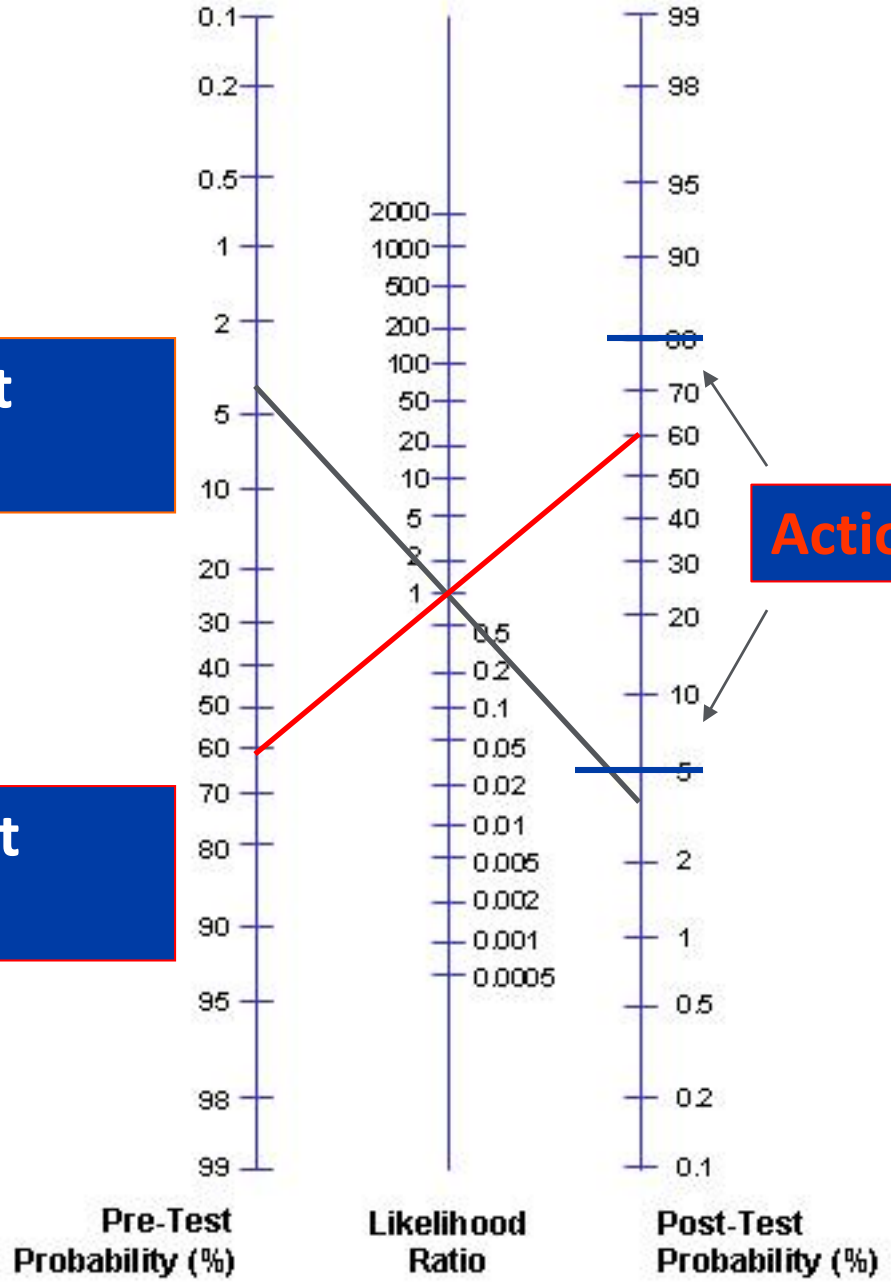
Low Pre Test Guess

High Pre test Guess



Action Thresholds

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Is Pretest Probability Important?

Low Prob VQ and Low Pre Test Prob 

discharge home?

Low Prob VQ and Int/high Pre Test Prob 

further diagnostic tests?

TAKE HOME MESSAGE
clinical assessment determines pre-test probability which determines management

Low Prob VQ and Low Pre Test Prob
discharge home? →

Low Prob VQ and Int/high Pre Test Prob
further diagnostic tests? →

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Simplified Wells

Clinical signs/symptoms of DVT (leg swelling and pain with palpation of deep veins of leg)
No alternate diagnosis as likely or more likely than PE
Heart reate > 100 beats/min
Immobilization or surgery in last 4 weeks
Previous history of DVT or PE
Hemoptysis
Cancer actively treated within the last 6 months

Probability categories: low <2, moderate 2-6, high>6

Resolution of Case

- The pt is a 45 year women on **estrogen replacement** therapy.
- The pt has no sig PMH. She presented at 4 a.m. with the sudden onset **of chest pain** and SOB. The chest pain lasted seconds but her feeling of SOB lasted for several hours, prompting her to come to the ED.
- Her **pulse ox was 95%, PR 98,** other wise nl PE. CXR was clear. She was started on heparin, admitted, and sent for a test .

After reviewing the CPR you feel more confident about your PTP.

Clinical Prediction Rules: a definition

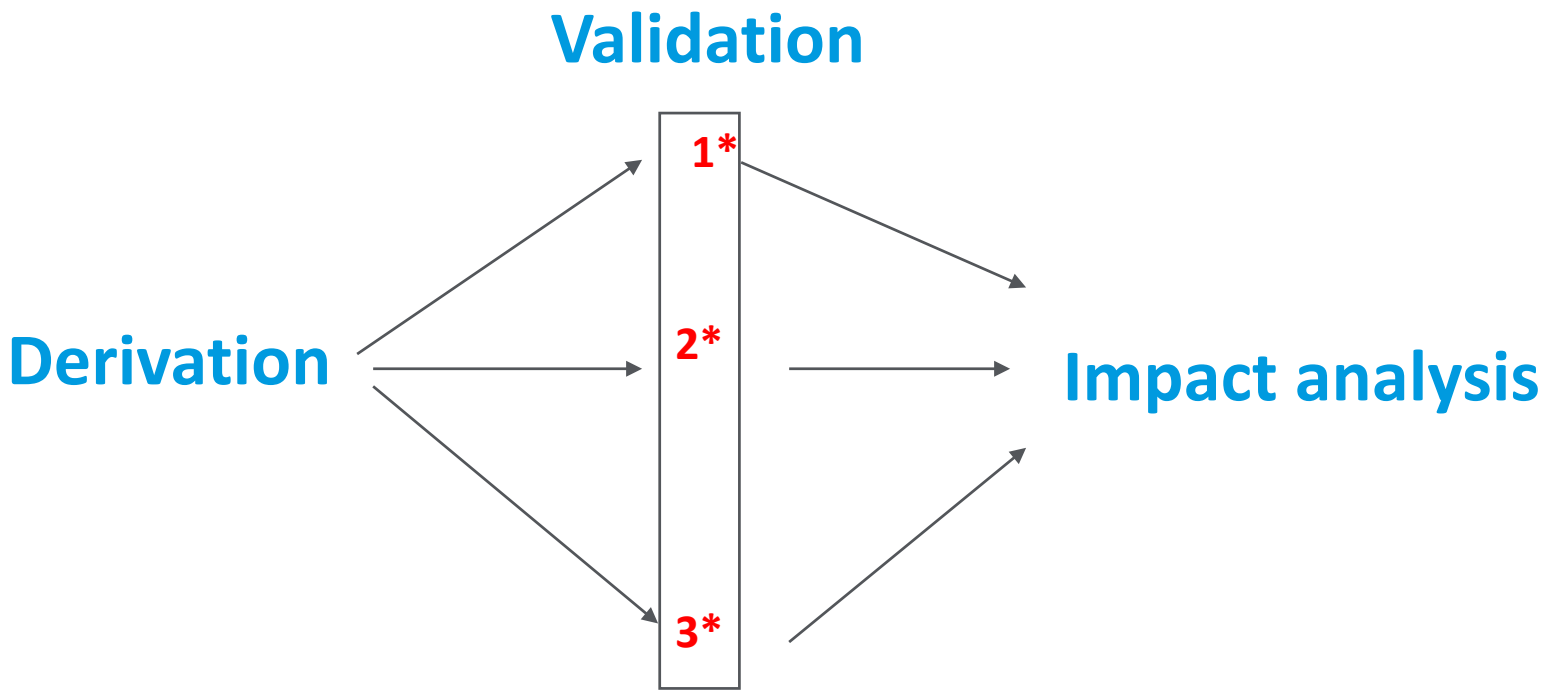
- Decision aid that brings together various components of the hx, PE, and other easily obtainable lab data and "quantifies" them as to their ability to predict certain outcomes.

- They are typically developed to help with quick "frontline" decisions in clinical care.

Development of a Clinical Prediction Rule

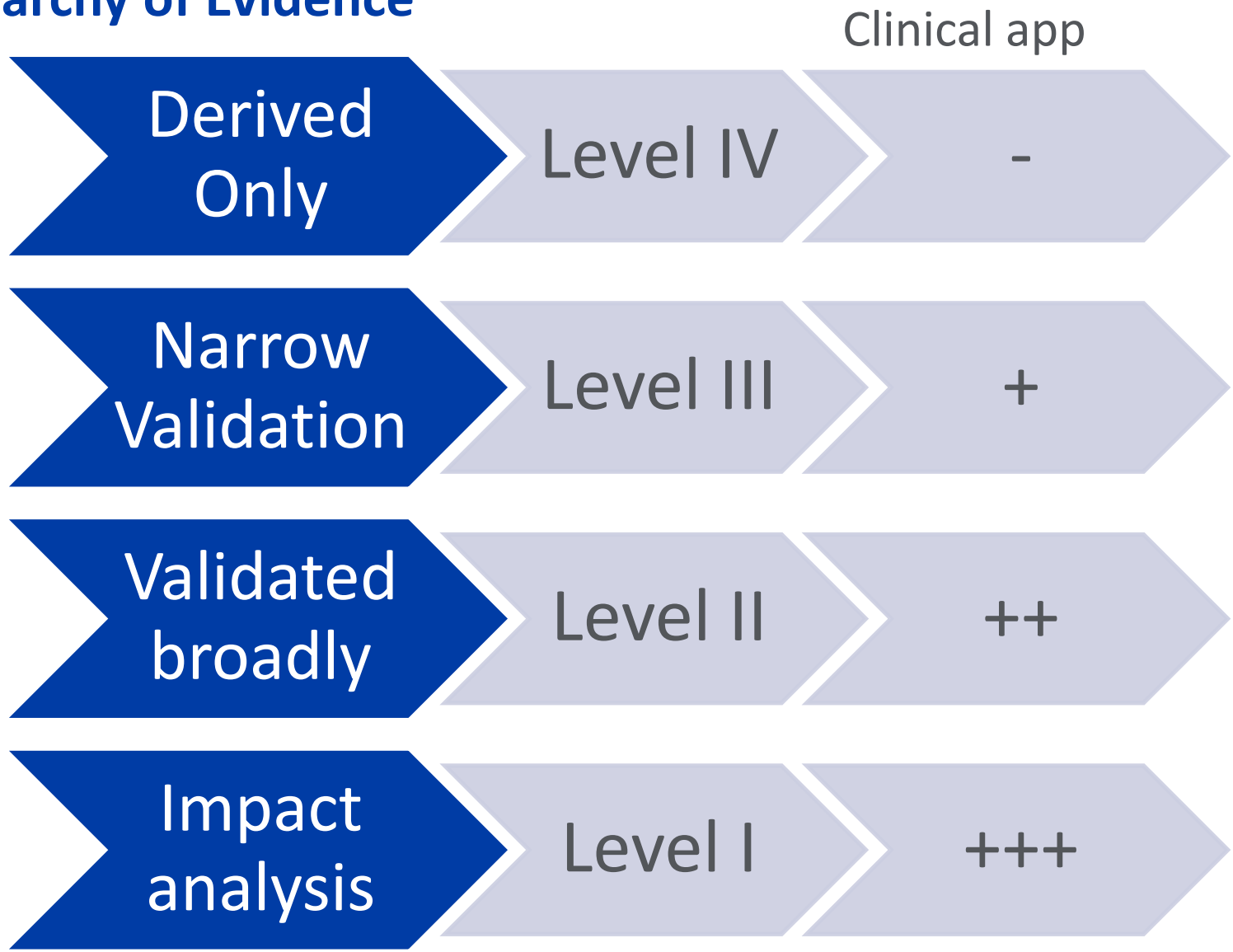
- The Derivation : the creation of the rule
- The Validation (multiple): testing the accuracy of the rule
- Impact Analysis : does the rule change clinical outcomes/physician behavior

Development of a Clinical Prediction Rule (CPR)



*different site and prevalence of outcome

Hierarchy of Evidence



JAMA July 2000, McGinn, Guyatt, Wyer, Stiel, Naylor

A Lifetime Theme

- Over testing/treatment is rampant
- Over testing/treatment causes waste and harm
- We have the tools(EHRs) and the evidence (CPRs)to reduce waste
- Find areas of over testing then create and implement CPRs to reduce waste

Luck and Opportunity

Luck and Opportunity

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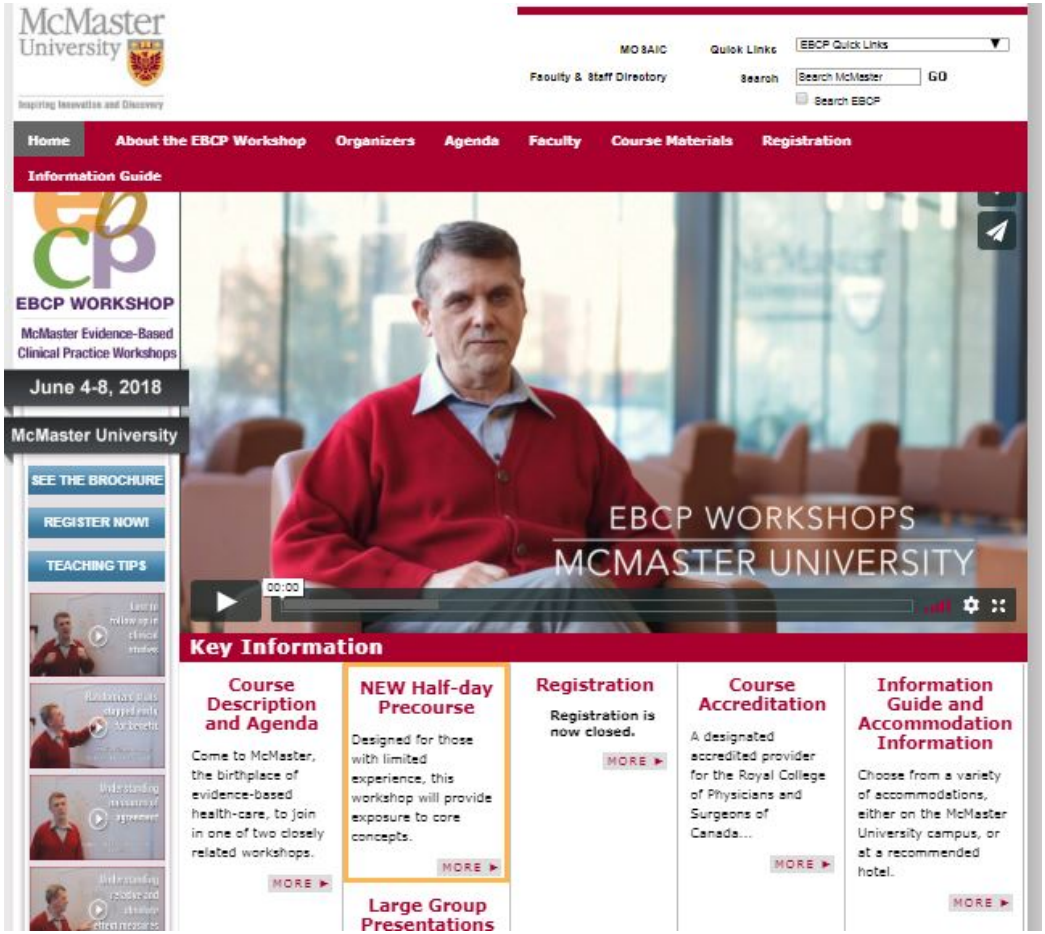

Luck and Opportunity

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ACP Journal Club®
ARCHIVES

< PREVIOUS ARTICLE IN THIS ISSUE

Editorials

Clinical prediction guides

ACP J Club. 1998 Jan-Feb;128:A14. doi:10.7326/ACPJC-1998-128-1-A1

Prediction is central to most of our actions as clinicians. We are faced wi
examinations, and laboratory results when we diagnose, prognosticate, c
patient with pain radiating down her left arm having a myocardial infarcti
pain radiates only to her right shoulder? What is the risk for an embolic s
fibrillation? What degree of benefit can a man with symptomatic 90% ca

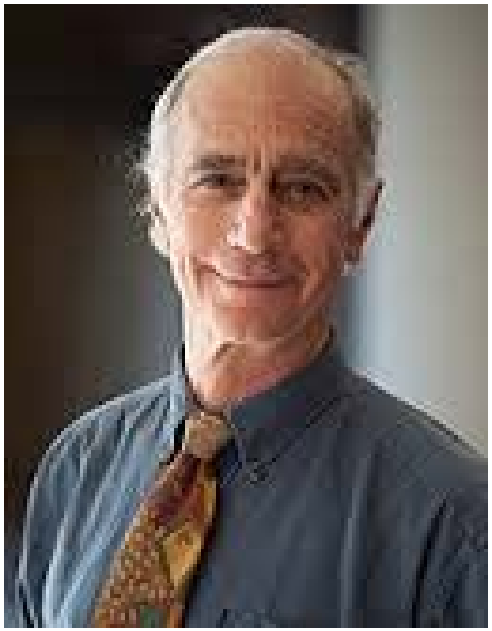
It is important to note that CPGs are n
can be very helpful tools for practicing
even when a patient is pressuring then

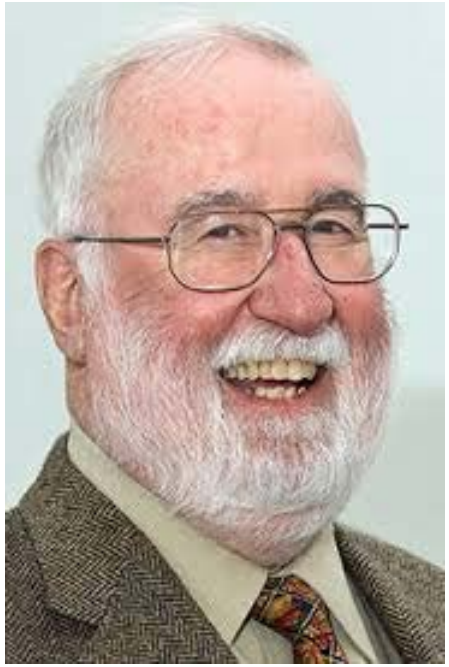
Because well-derived and validated CI
expanded attention from us all.

Thomas McGinn, MD
Adrienne Randolph, MD
Scott Richardson, MD
David Sackett, MD

References

1. **Sackett DL, Richardson SR, Rose**





MENTOR:

"Mentoring is a long term relationship that meets a development need, helps develop full potential, and benefits all partners, mentor, mentee and the organization"

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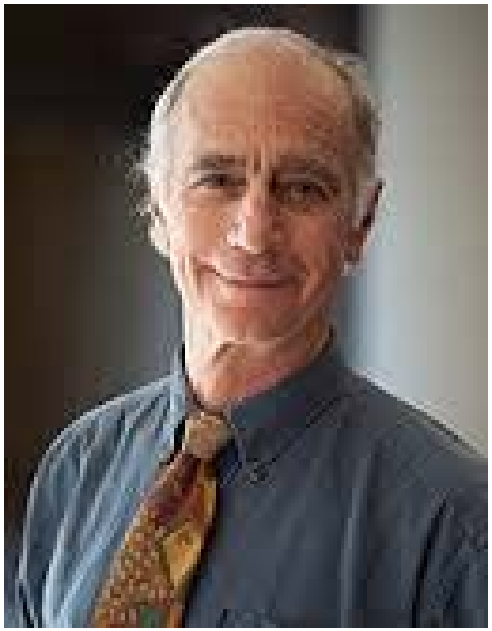

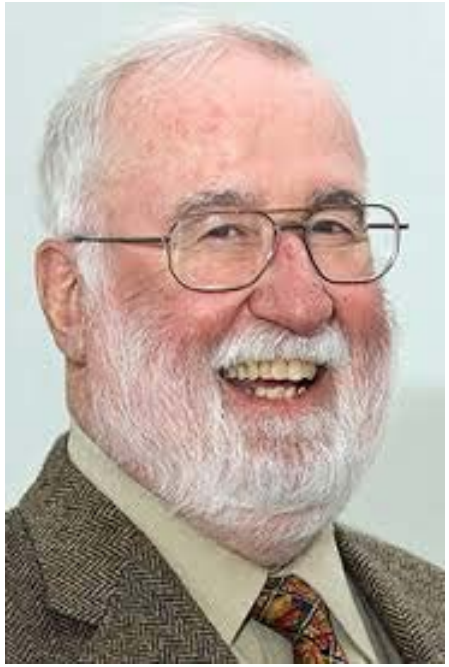

You have make the opportunity/ mentorship happen

MENTOR:

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Problem #2
Who to Isolate for suspected TB?
2004

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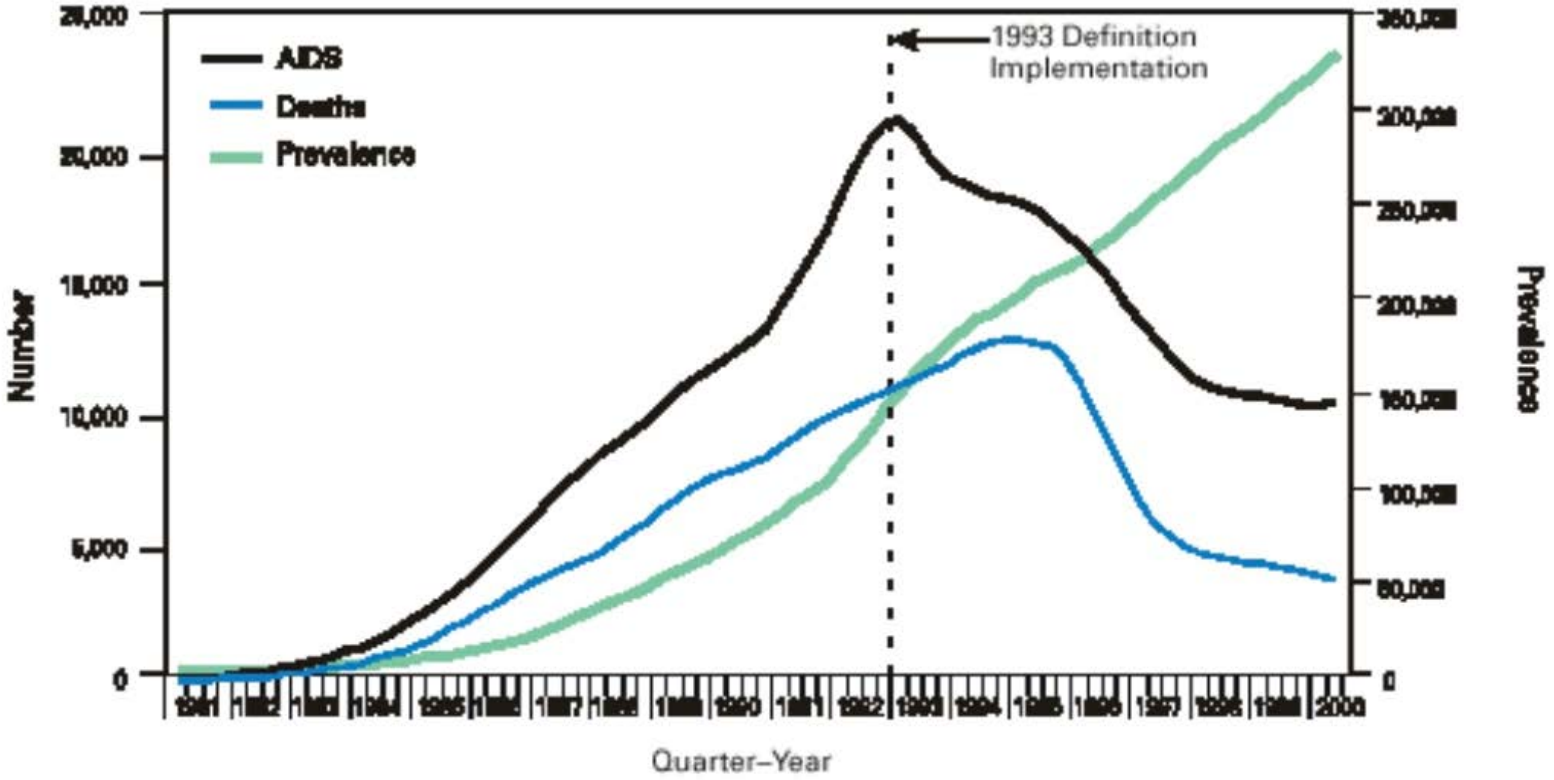
TB and the AIDS Epidemic

FIGURE 1. Estimated AIDS incidence*, deaths, and prevalence, by quarter-year of diagnosis/death — United States, 1981–2000



* Adjusted for reporting delays.

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Who to Isolate?

- Isolation Policies decrease the rate of TB transmission
- Delayed recognition and isolation of patients with active TB can lead to spread
- Clinicians vary in their experience with and ability to recognize TB
- Guidelines have resulted in many patients at low risk for TB being isolated unnecessarily

Who to Isolate?

- IN 2004 the incidence of TB in the United States was on the decline
- Excessive isolation became even more significant
- Generating unnecessary expenses for hospitals, throughput delays, and patient frustration

Could we consistently accurately predict (CPR) who needs isolation?

Mentor or Mentee

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Table 1. Clinical Prediction Rule and Point Scoring System*

Variable	Points Assigned
Tuberculosis risk factors or symptoms	4
Positive PPD tuberculin test results	5
Shortness of breath	–3
Fever, °C	
<38.5	0
38.5-39.0	3
>39.0	6
Crackles on physical examination	–3
Upper lobe consolidation on chest radiographs	6

Abbreviation: PPD, purified protein derivative.
*Patients with a score of –6 to 0 are not isolated; those with a score of 1 to 21 are isolated.

Arch Intern Med. 2000;165(4):453-457. doi:10.1001/archinte.165.4.453

Mentor or Mentee

MENTOR:
"Mentoring is a long term relationship that meets a development need, helps develop full potential, and **benefits all partners, mentor, mentee and the organization**"

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AHRQ funded Prospective Validation of TB CPR

- Prospective cohort of 516 individuals, who presented to 2 New York City Hospitals
- Isolated on admission for clinically suspected TB
- Face-to-face interviews were conducted to determine the presence of clinical variables associated with TB in the prediction model

Table 2. Comparison of Demographic, Clinical, and Laboratory Data in Patients With and Without Tuberculosis (TB)

Variable	Patients With TB (n = 19)	Patients Without TB (n = 497)	*P* Value
Demographics			
Age, mean ± SD, y	45.8 ± 9.6	46.3 ± 11.4	.80
Sex, M/F, No.	12/7	273/224	.50
History and physical examination			
TB risk factors, No. (%)	15 (79)	300 (60)	.10
Hemoptysis, No. (%)	5 (26)	116 (23)	.80
Positive PPD tuberculin test result, No. (%)	9 (47)	50 (10)	.001
Shortness of breath, No. (%)	8 (42)	344 (69)	.01
Body temperature, mean ± SD, °C	37.9 ± 1.1	38.0 ± 6.1	.60
Oxygen saturation, mean ± SD, %	98.3 ± 1.2	95.6 ± 5.3	.001
Crackles noted during examination, No. (%)	3 (16)	146 (29)	.20
Laboratory data			
White blood cell count, mean ± SD, /μL	7500 ± 1200	11 300 ± 2700	.70
CD4 cell count, mean ± SD, /μL	114.1 ± 41.7	187.8 ± 14.2	.30
Clinical impression and treatment			
Admitting diagnosis of TB, No. (%)	4 (21)	31 (6)	.04
Treatment for TB, No. (%)	2 (10)	8 (2)	.005

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Abbreviation: PPD, purified protein derivative.

Validation of TB CPR

- Results: 516 patients, 19 were found to have TB (prevalence, 3.7%)
- The prediction rule had a sensitivity of 95% and a specificity of 35%
- Using a prevalence of TB of 3.7%, the positive predictive value was 9.6% and the negative predictive value was 99.7%.
- Reduce unecssary isolation by 35%

“At best 50% of clinical practice appears to be based on sound evidence from research”

David Sackett father of EBM 1990

But what about when there is evidence that is not applied?

-McGinn Today!

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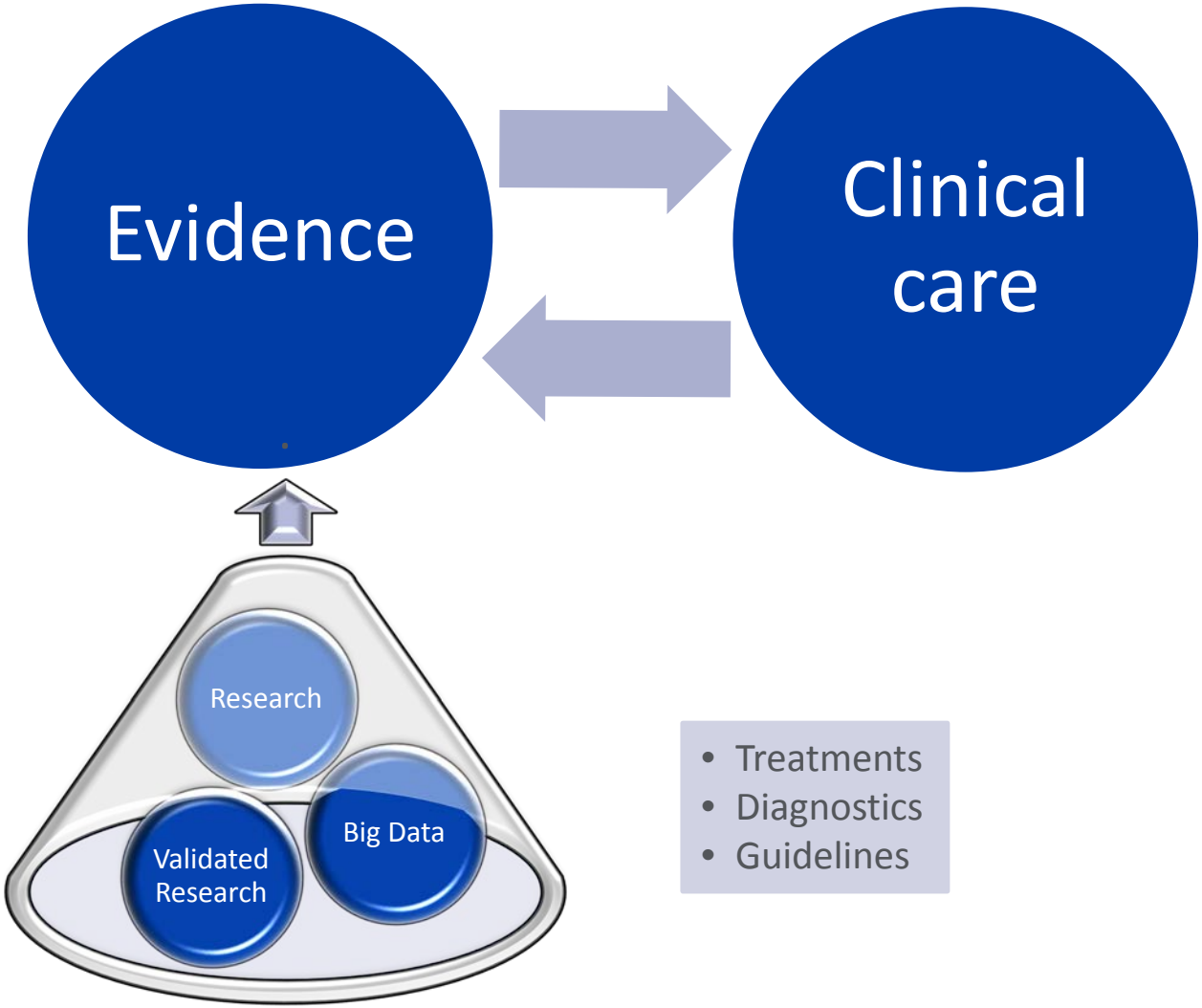
Many well validated and underused Clinical Prediction Rules (CPRs)?

The Evidence Gap



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The Evidence Gap

Validated Research

Maybe Clinical Prediction Rules (CPRs) can help close the gap?

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AHRQ


AHRQ

INTEGRATED CLINICAL PREDICTION RULES

Case Study: Integrated Clinical Prediction Rules (iCPR) RCT Trial

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Clinical Prediction Rules

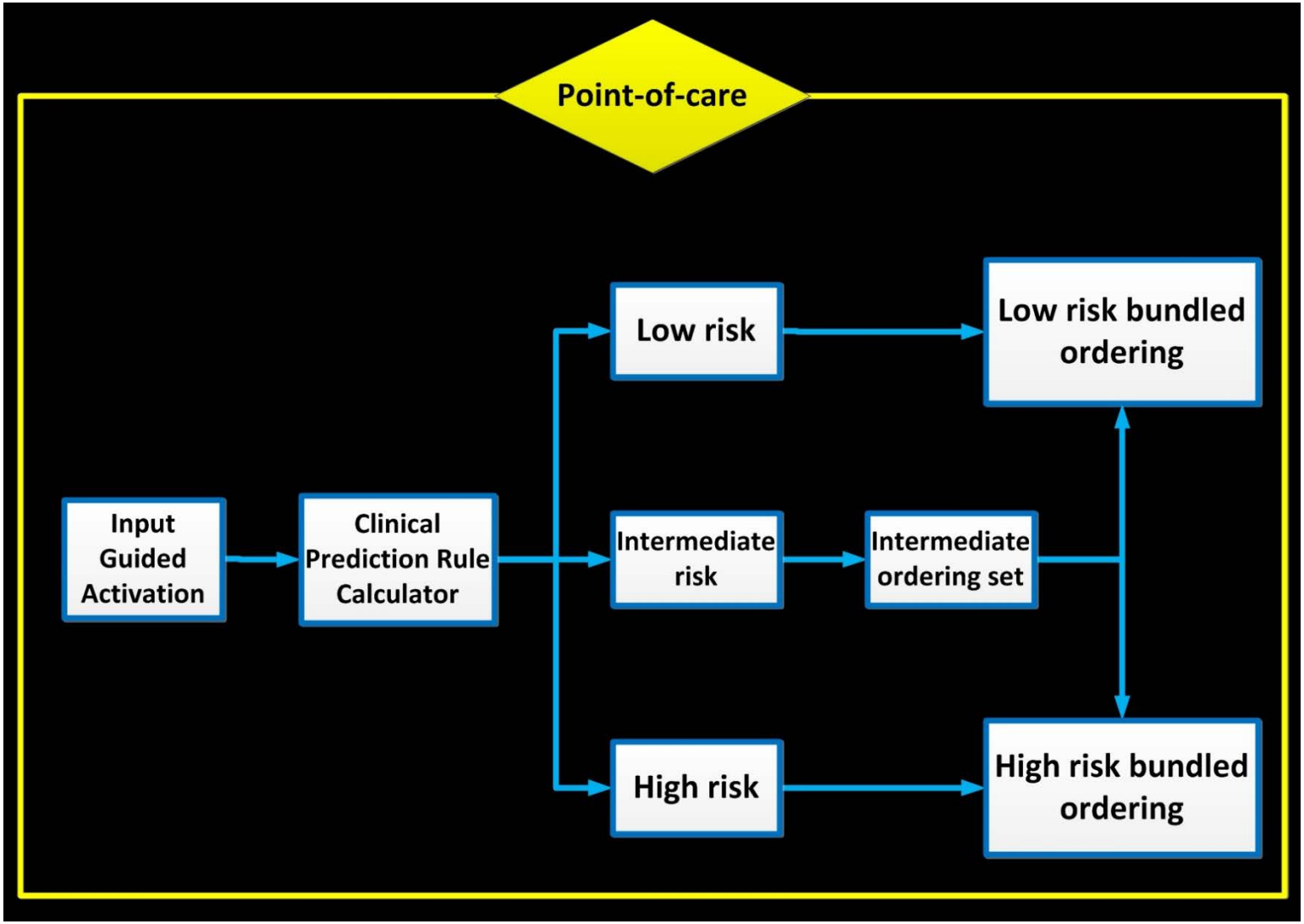
Walsh clinical prediction rule for Streptococcus pharyngitis

- Recent cough (-1)
- Strep exposure (+1)
- Tonsilar exudates (+1)
- Enlarged, tender cervical nodes (+1)
- Fever >100.8F (+1)

Heckerling clinical prediction rule for Pneumonia

- Fever >100.8F (+1)
- Tachycardia (+1)
- Rales (+1)
- Decreased breath sounds (+1)
- No asthma (+1)

Tool Development



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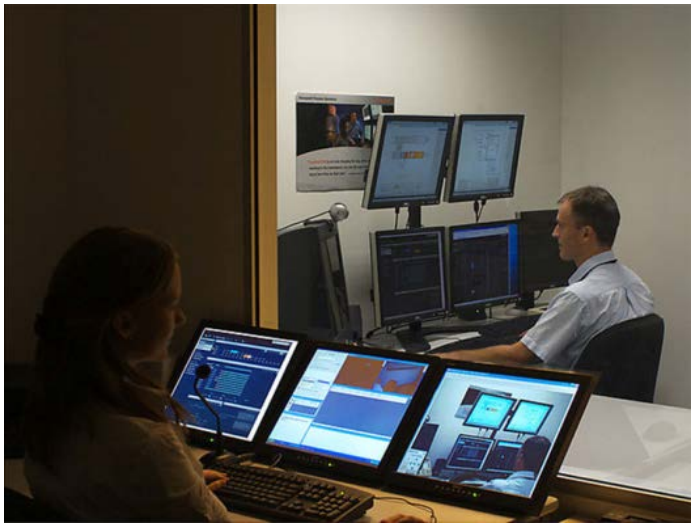
Usability Testing

Phase 1: Scripted walkthroughs

- Think aloud
- Thematic protocol analysis

Phase 2: Clinical simulations

- “Near-live”
- Timeline analysis



Code & annotate transcripts

- Screen capture

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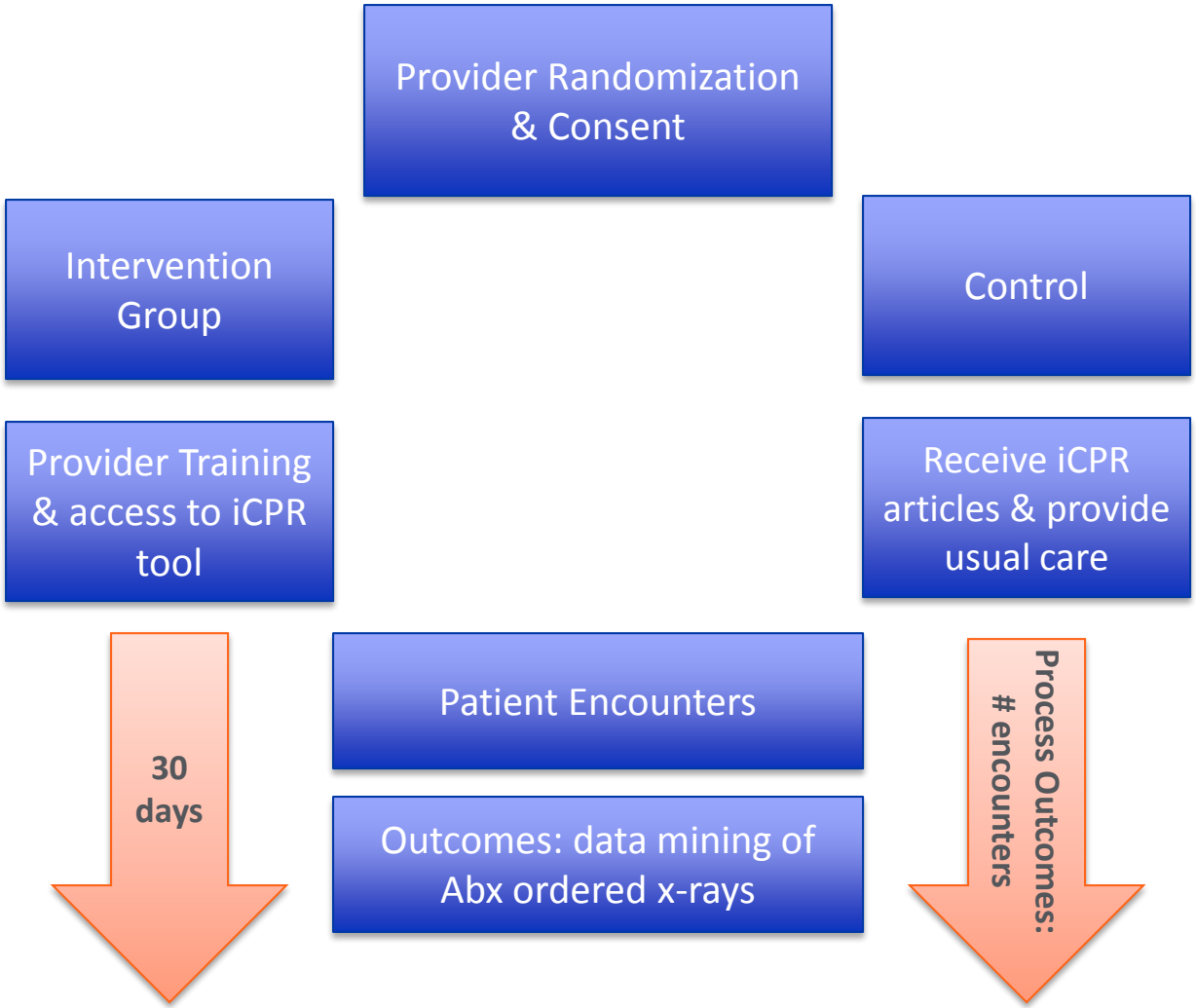
Study Design



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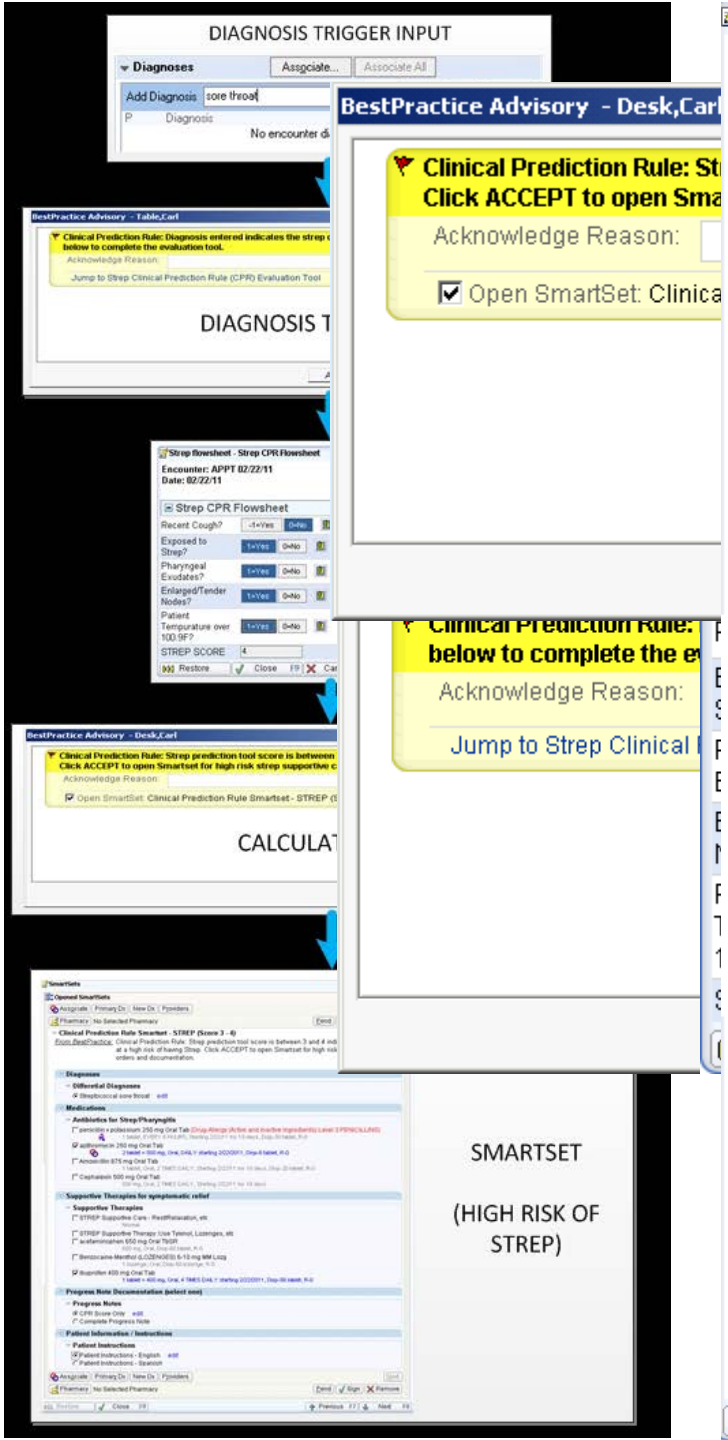

SmartSets

Opened SmartSets

Associate | Primary Dx | New Dx | Providers | Next

Pharmacy | No Selected Pharmacy | Pend | Sign | Remove

Clinical Prediction Rule Smartset - STREP (Score 3 - 4)

From BestPractice: Clinical Prediction Rule: Strep prediction tool score is between 3 and 4 indicating the patient is at a high risk of having Strep. Click ACCEPT to open Smartset for high risk strep supportive care orders and documentation.

Diagnoses

Differetial Diagnoses

- (•) Streptococcal sore throat edit

Medications

Antibiotics for Strep/Pharyngitis

- [ ] penicillin v potassium 250 mg Oral Tab {Drug-Allergy (Active and Inactive Ingredients) Level 3 PENICILLINS}
  1 tablet, EVERY 6 HOURS, Starting 2/22/11 for 10 days, Disp-30 tablet, R-0
- [x] azithromycin 250 mg Oral Tab
  2 tablet = 500 mg, Oral, DAILY starting 2/22/2011, Disp-6 tablet, R-0
- [ ] Amoxicillin 875 mg Oral Tab
  1 tablet, Oral, 2 TIMES DAILY, Starting 2/22/11 for 10 days, Disp-20 tablet, R-0
- [ ] Cephalexin 500 mg Oral Tab
  500 mg, Oral, 2 TIMES DAILY, Starting 2/22/11 for 10 days

Supportive Therapies for symptomatic relief

Supportive Therapies

- [ ] STREP Supportive Care - Rest/Relaxation, etc
  Normal
- [ ] STREP Supportive Therapy :Use Tylenol, Lozenges, etc
- [ ] acetaminophen 650 mg Oral TbSR
  650 mg, Oral, Disp-60 tablet, R-0
- [ ] Benzocaine-Menthol (LOZENGES) 6-10 mg MM Lozg
  1 lozenge, Oral, Disp-60 lozenge, R-0
- [x] ibuprofen 400 mg Oral Tab
  1 tablet = 400 mg, Oral, 4 TIMES DAILY starting 2/22/2011, Disp-56 tablet, R-0

Progress Note Documentation (select one)

Progress Notes

- (•) CPR Score Only edit
- ( ) Complete Progress Note

Patient Information / Instructions

Patient Instructions

- (•) Patient Instructions - English edit
- ( ) Patient Instructions - Spanish

Associate | Primary Dx | New Dx | Providers | Next

Pharmacy | No Selected Pharmacy | Pend | Sign | Remove

Restore | Close F9 | Previous F7 | Next F8

Results: Process Measures

Study Sample: 166 primary care providers

- 87 Intervention, 79 Control
- 66% residents

Intervention Arm Encounters	Strep N (%)	PNA N (%)
Tool Activated	374	212
Provider Accepts Calculator	278 (74)	90 (43)
Provider Signs Bundled Orders	189 (51)	57 (27)

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Results: Primary Outcome

	Intervention (n=586)	Control (n=410)		
	N (%)	N (%)	OR (95% CI)	P value
Antibiotic orders from all encounters	**171 (29)**	**156 (38)**	**0.64 (0.46-0.90)**	**.01**
Strep encounters	56 (15)	46 (20)	0.72 (0.46-1.13)	.15
Pneumonia encounters	115 (54)	110 (62)	0.58 (0.35-0.99)	.04
X-ray orders from pneumonia encounters	45 (21)	37 (21)	0.86 (0.46-1.59)	.63
Rapid strep orders from strep encounters	109 (19)	97(42)	0.64 (0.43-0.95)	.03

Dissemination of iCPR

Five year NIH Funded RCT with one year of design and usability

New York (NYU-Mann) (NWH-McGinn), Wisconsin (UW-Feldstein), Utah (UU-Berger), Boston (BU-Mishuris)

70-80 Primary Care sites

- Family Medicine
- Internal Medicine
- ANP

PROBLEM THREE

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Deciding Whether to Screen for Abusive Head Trauma: Do We Need a Clinical Decision

Rachel Berger, MD, MPH
Department of Pediatrics
Children's Hospital of Pittsburgh of UPMC
Pittsburgh

Thomas I
Departmer
Hofstra N
Manhasse

in which the stakes for missing t
have been derived for a variety of
In this issue of *Pediatric Critical*

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Article Navigation

Development of an electronic medical record–based child physical abuse alert system

Rachel P Berger ✉, Richard A Saladino, Janet Fromkin, Emily Heineman, Srinivasan Suresh, Tom McGinn

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Using Computer Alert Systems in the Emergency Room to Screen for Child Abuse

This project has results

Public Abstract

Professional Abstract

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What was the research about?

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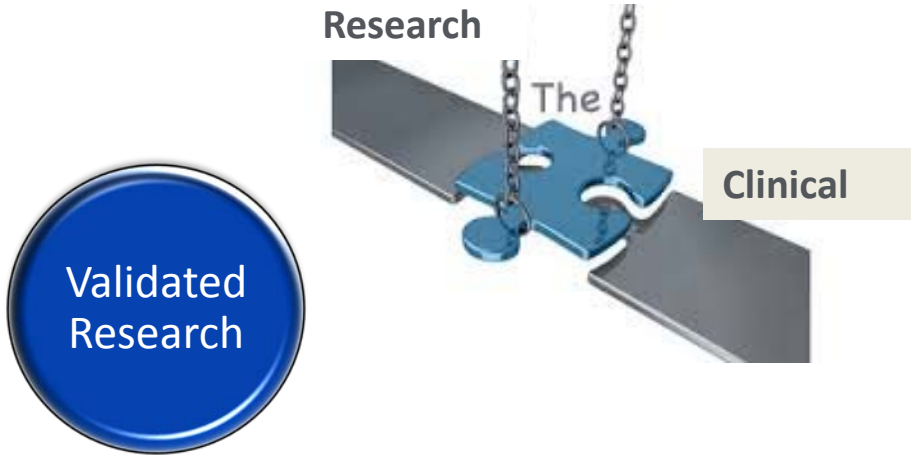
The Evidence Gap



Maybe Clinical Prediction Rules (CPRs) can help close the gap?

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The Evidence Gap

CPRs

- STREP
- PNUEMONIA
- DVT
- PE
- Child Abuse
- Anti-COAG
- Ankle Fracture

The Evidence Gap

CPRs

- STREP
- PNUEMONIA
- DVT
- PE
- Child Abuse
- Anti-COAG
- Ankle Fracture

- Reduce Waste
- Reduce Harm
- Increase Health Care Coverage

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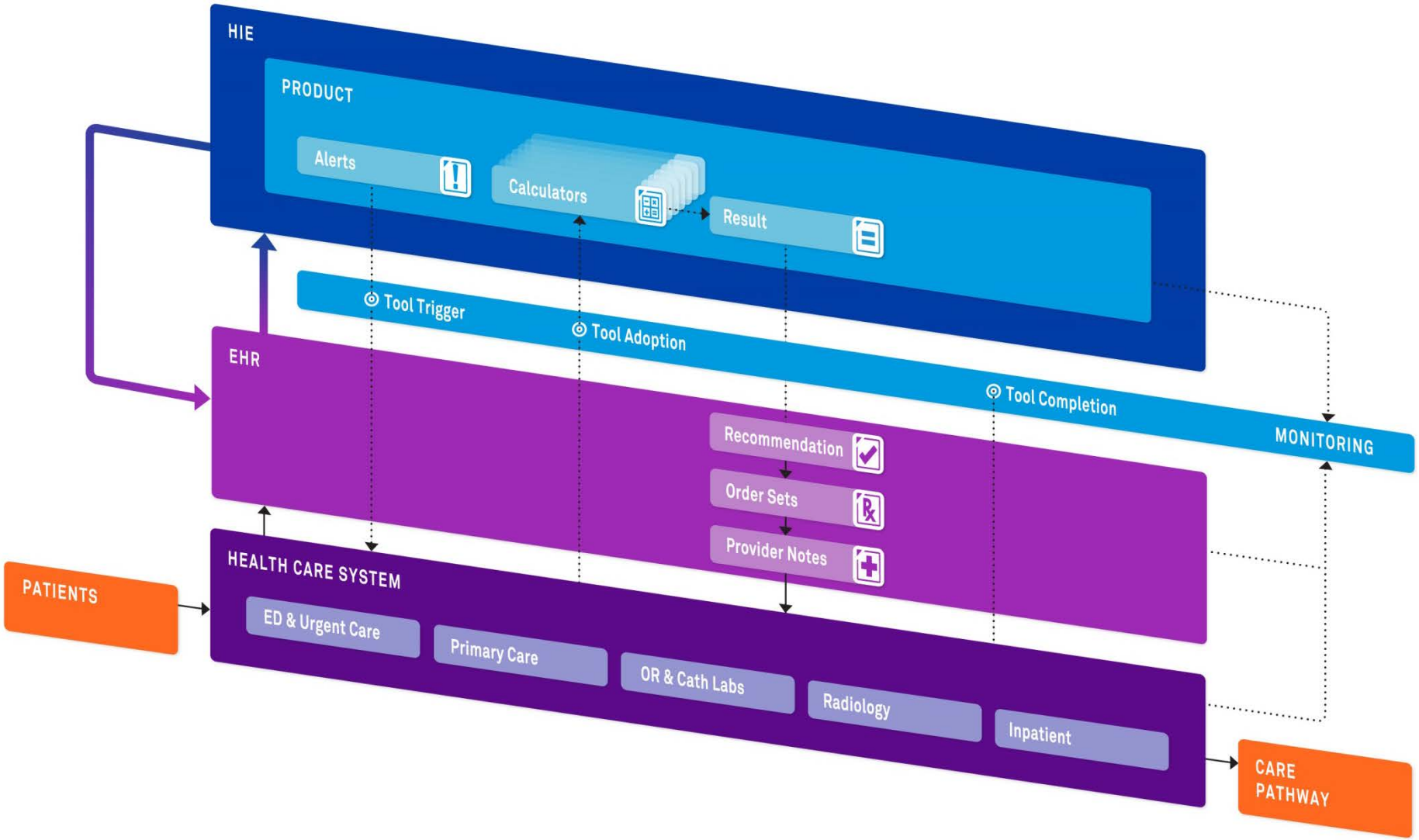
OUR DREAM: CDS Universal Platform



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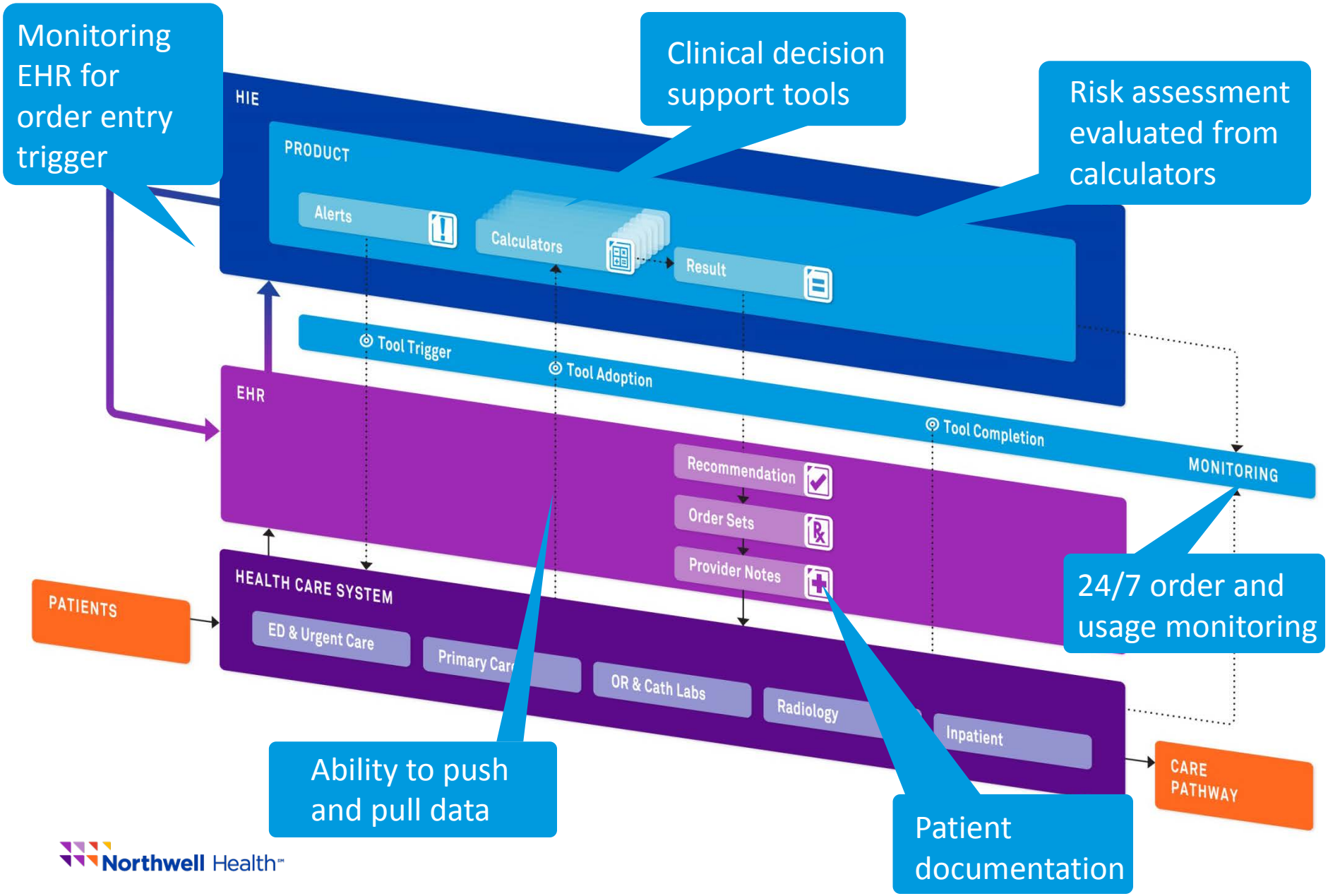
CDS Universal Platform



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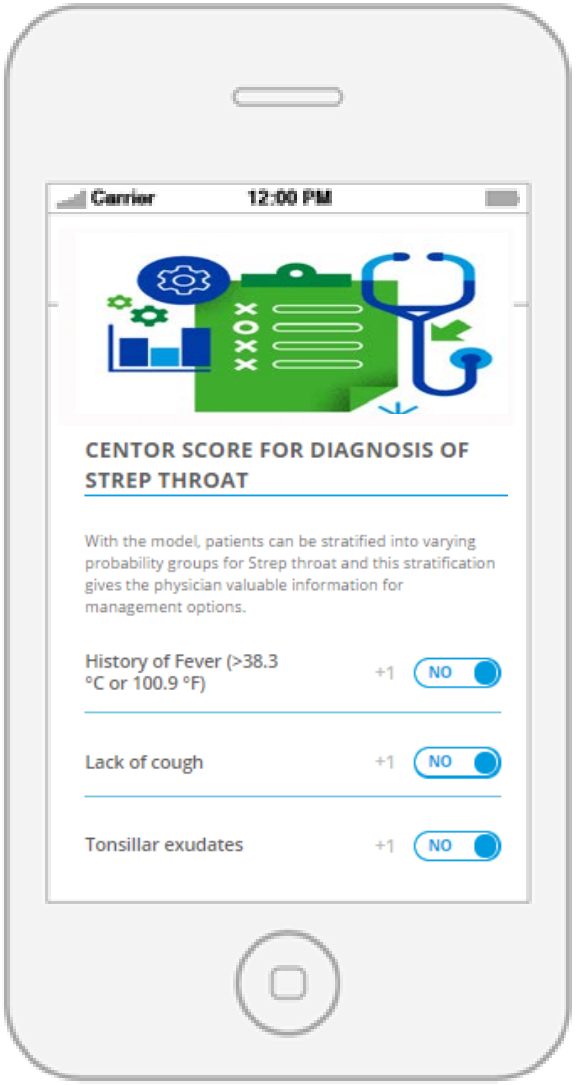
Product Demonstration



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To Summarize

OPPORTUNITY

LUCK

MENTORS MENTEES

CURIOSITY

A GREAT TEAM

Team work

Sundas Khan
Devin Mann
Lauren Mccullagh
Safiya Richardson
Jeff Solomon
David Feldstein
Rachel Berger
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University of Wisconsin
SCHOOL OF MEDICINE
AND PUBLIC HEALTH

The University of Utah
School of Medicine

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Thank You

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