Addressing Diagnostic Error
It's a Team Sport

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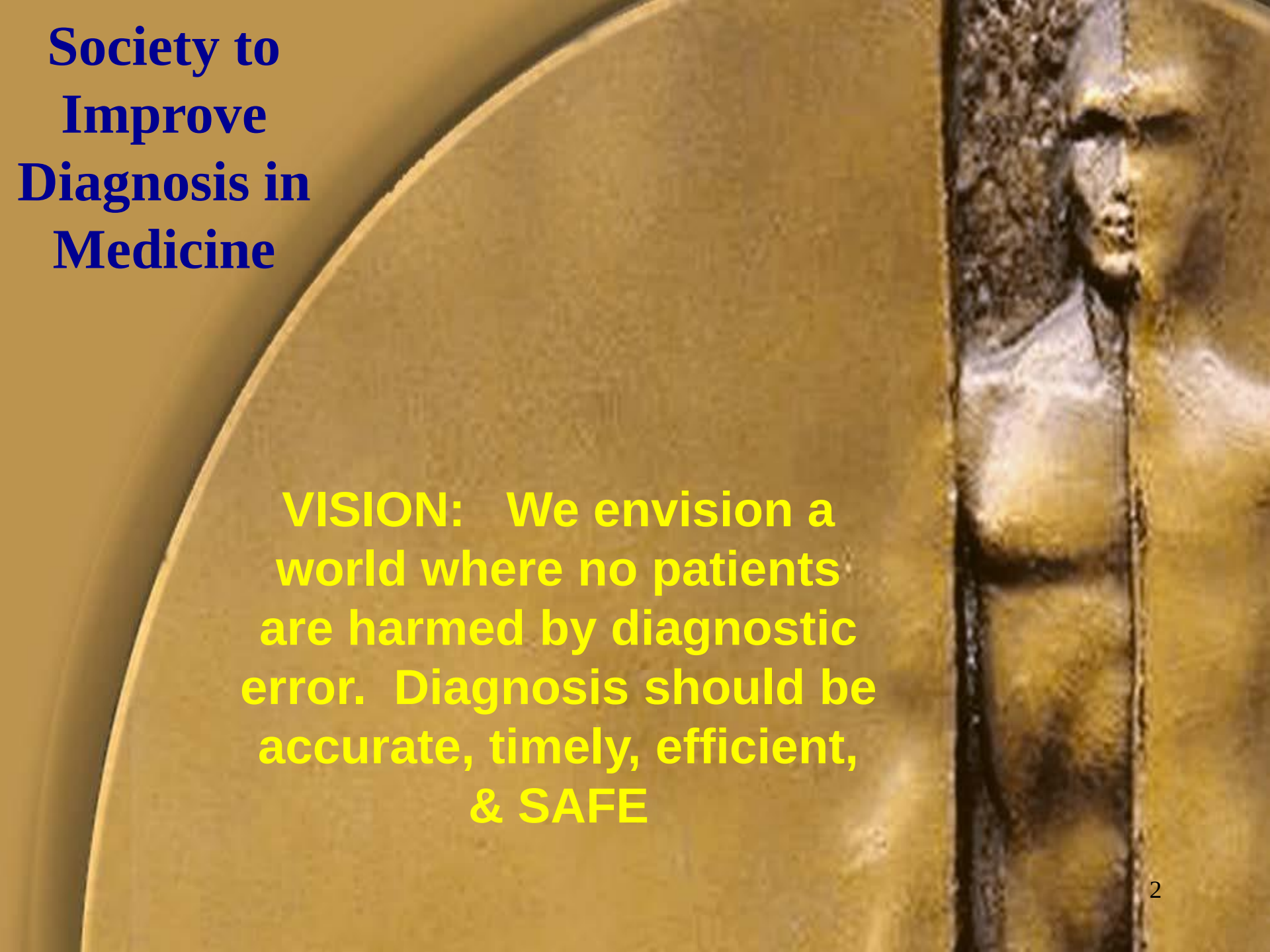
Society to Improve Diagnosis in Medicine



VISION: We envision a world where no patients are harmed by diagnostic error. Diagnosis should be accurate, timely, efficient, & SAFE

Objectives

How likely is diagnostic error?

What are the major causes?

(How do doctors think?)

Errors are the problem; Teams are the solution

Rory Staunton

Wednesday:

3 days earlier: Scraped arm

Wakes from sleep: Fever, chills, vomiting

Thursday

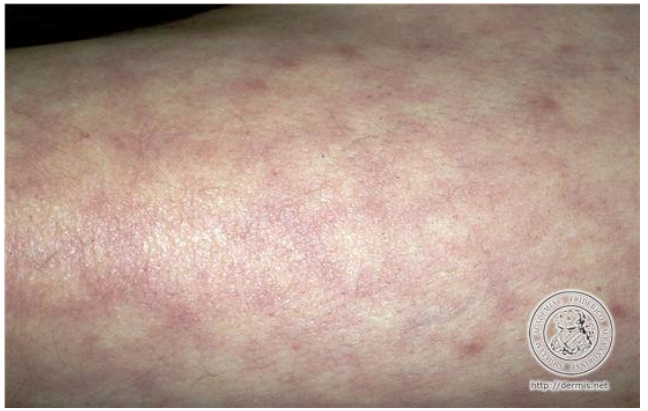
Worse; Pediatrician:

T102; HR 140; RR36; BP 100/60

Skin: mottled; Abd benign

ASSESSMENT: Gastroenteritis

Call made to ER



Thursday, 9 PM – Emergency Dept

PE: T 100; HR 143; RR 20; BP 94/46

Abd benign; No skin exam documented

ASSESSMENT: Gastroenteritis

PLAN: ondansetron, NS IV 1 L, home

LABS: (Return after discharge):

WBC 14.7; 53% bands

Friday:

- Worse; Skin sensitive to touch, turning splotchy and blue with red spots
- Family calls pediatrician multiple times: Advised acetaminophen

Saturday:

- Returns to ER, admitted to ICU;
- Dx = Streptococcal sepsis.

Sunday: Dies in the ICU

Diagnosis – It's Important !

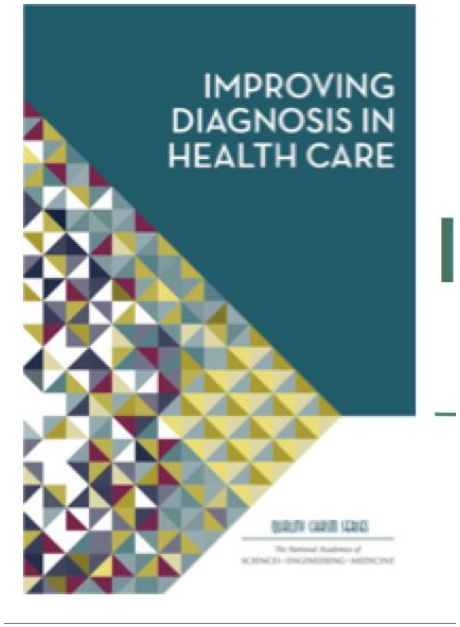
"The number 1 concern of patients engaging the health care system is the possibility of a diagnostic error"

Kaiser Family Foundation Survey

"The most critical of a physician's skills. It is every doctor's measure of his abilities; it is the most important ingredient in his professional self image."

Sherwin B Nuland 1994 in "How we Die"

Knowing is not enough, we must apply
Willing is not enough, we must do



All of Us

Recommendations

Practice Improvement

Diagnosis - So important, but …

Diagnostic errors are COMMON
Many are associated with HARM
Most healthcare organizations are NOT addressing the problem

So what do we know and what can we do?

Definition of Diagnostic Error

The failure to:

(a) establish an accurate and timely explanation of the patient's health problem(s)

or

(b) communicate that explanation to the patient

> **The single biggest problem in communication is the illusion that it has taken place.** ***George Bernard Shaw***

What Is the Incidence of Diagnostic Error?

What would you estimate the diagnostic error rate to be in your own practice ?

A. 10% or more (weekly)
B. 1% (monthly)
C. almost never

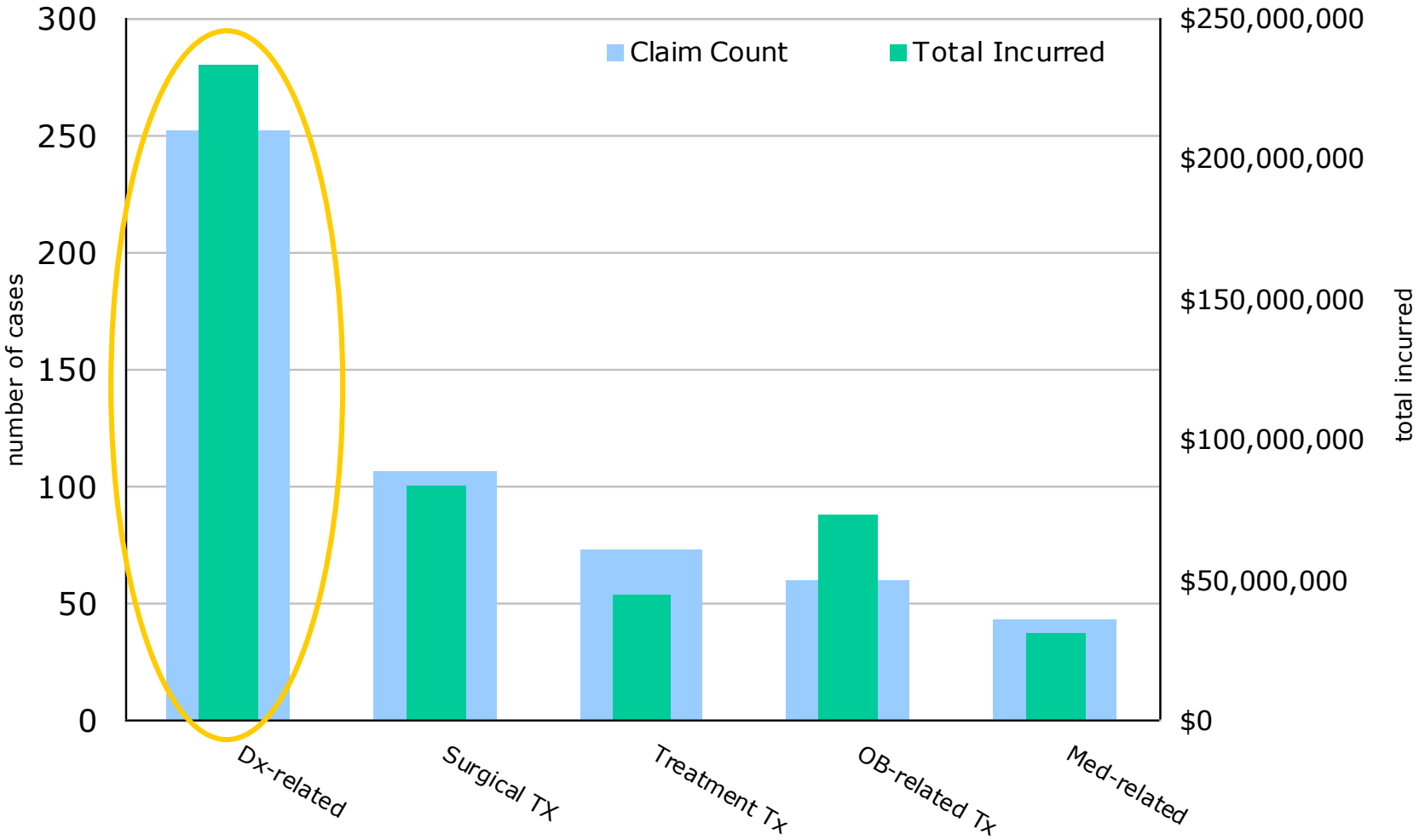
Think about yourself and your family:

Can you recall when a diagnosis you were given was wrong?

Can you recall when a diagnosis could have been made much earlier?

Is there someone with a medical condition that is still causing symptoms but hasn't been diagnosed?

Claims Data: High-severity Cases
Top allegation category: Diagnosis Error



N=584 high-severity PL cases asserted 1/1/02-8/31/07.
Total Incurred-aggregate of expenses, reserves, and payments on open and closed cases.

Estimates - Diagnostic Error Rate

Evidence Source	Findings
Surveys	1 in 5 pts have experience with medical error - most are dx errors
Standard Patients	Internists misdiagnosed 13% of patients with common conditions
Chart Review	1 in 20 PC pts – dx error every year
Autopsies	Major unexpected findings: 10-20%

Visual specialties	Radiology, Pathology: 2-5% missed findings
Internal Medicine	10 - 15%
Med Specialties	????

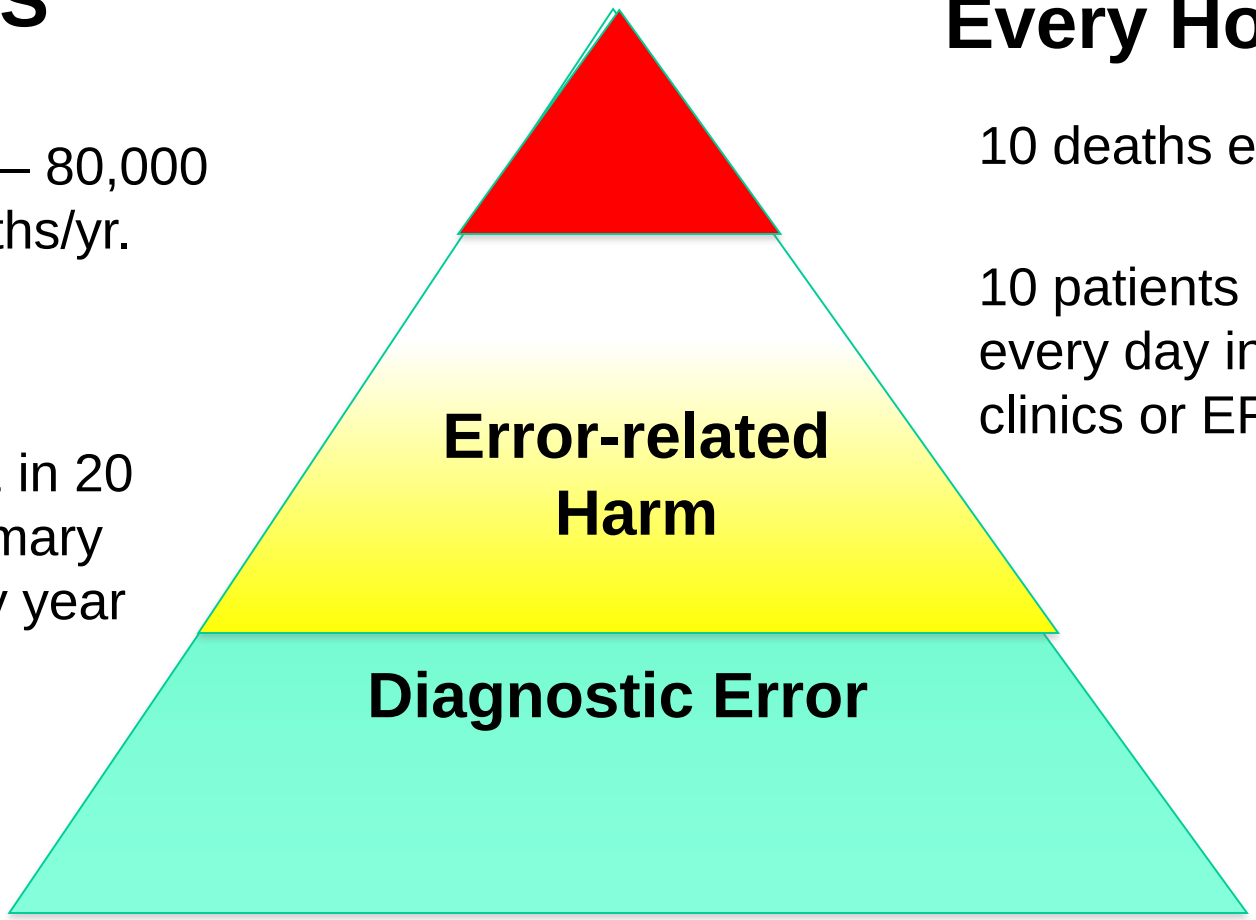
Graber ML. The incidence of diagnostic error in medicine. 2013 BMJ Qual Saf
Singh et al. Frequency of diagnostic error in ambulatory care. 2014 BMJ Qual Saf

The toll of Dx Error

US

40,000 – 80,000 deaths/yr.

Dx error: 1 in 20 pts in primary care every year



Every Hospital

10 deaths every year

10 patients harmed every day in your clinics or ER

Leape et al. JAMA 288:2405, 2002
Singh et al. BMJ Qual Safety 21: 93-100, 2012

IOM:

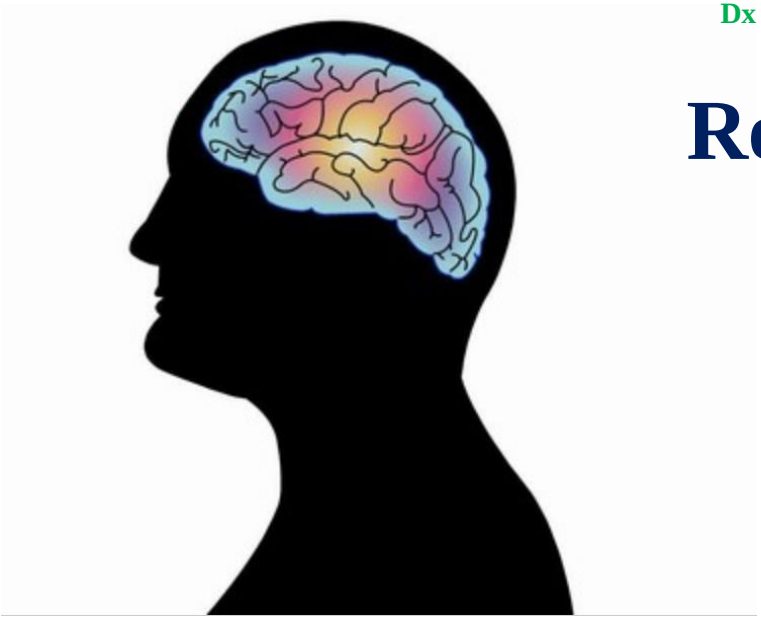
“It is likely that most of us will experience at least one diagnostic error in our lifetime, sometimes with devastating consequences.”

Dx Dx Dx Dx Dx Dx Dx Dx Dx Dx Dx Dx Dx Dx

?

Dx Dx Dx Dx Dx Dx Dx Dx Dx Dx Dx

Me

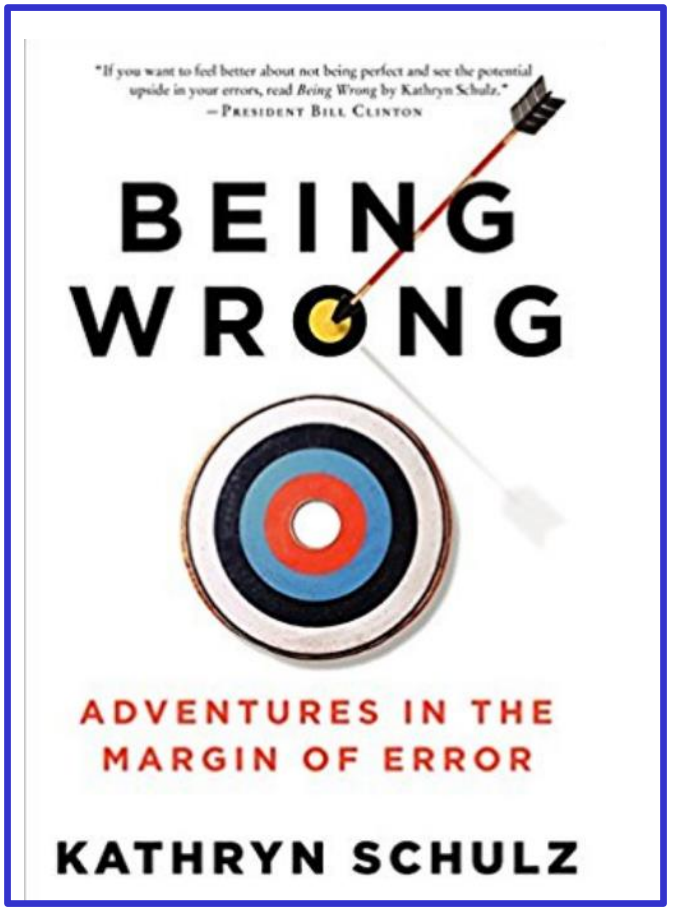


Reality

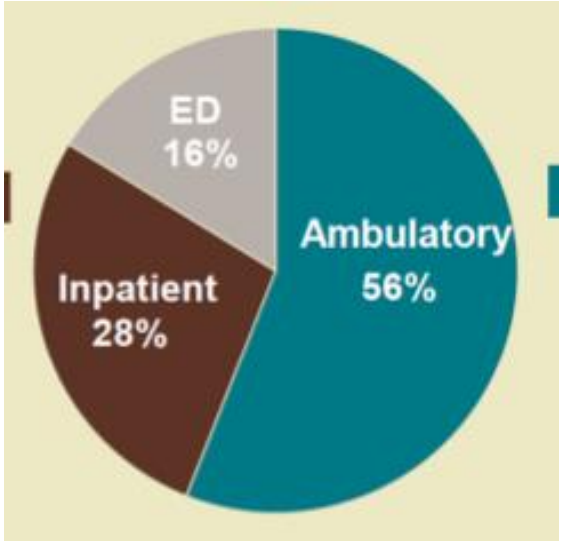
Why we are overconfident

No more autopsies
Our colleagues don't tell us about errors they find
Patients we harm go somewhere else
Its human nature – we overestimate our skills

What Does it Feel Like to be Wrong?



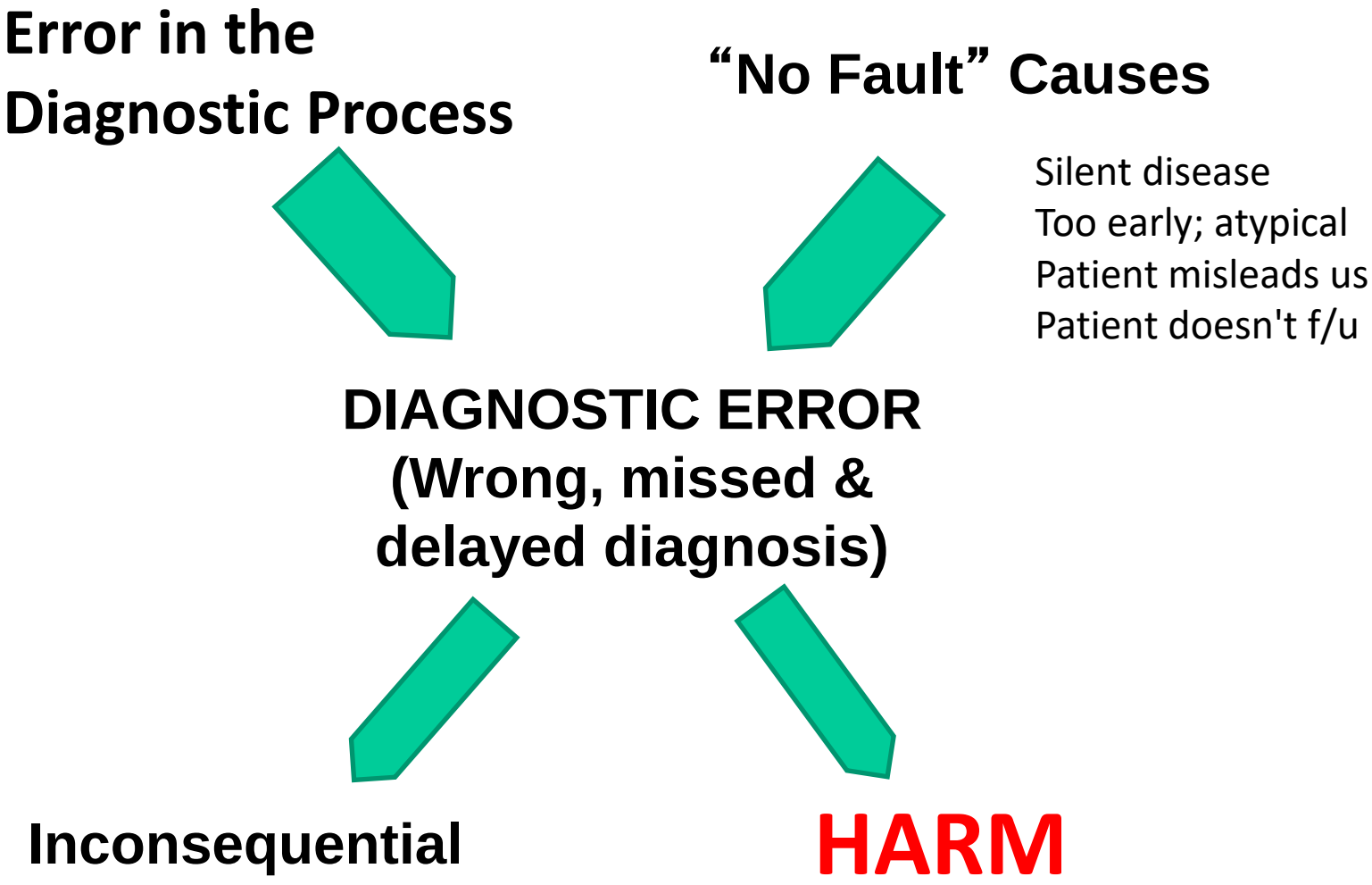
Where do they happen?



CRICO - Analysis of 4519 claims related to diagnostic error

Ambulatory care clinics—it's NOT just rare conditions. Dx errors are COMMON in patients with anemia, asthma, COPD

What Is the Cause of Diagnostic Error ?


Error in the Diagnostic Process
"No Fault" Causes
Silent disease
Too early; atypical
Patient misleads us
Patient doesn't f/u
DIAGNOSTIC ERROR (Wrong, missed & delayed diagnosis)
Inconsequential
HARM

Diagnosis is HARD!

PATIENT VARIABLES

- Stage of disease
- How it manifests
- How it is perceived
- How it is described
- When help is sought

SYSTEM COMPLEXITY

- Disjointed care
- Communication barriers
- Production pressure
- Tight coupling
- Access to care & expertise

PHYSICIAN VARIABLES

- Knowledge and experience
- Access to patient data, tests, consults
- Skill in clinical reasoning
- Stress, distractions, mood, time to think

How Many Diseases Are There?

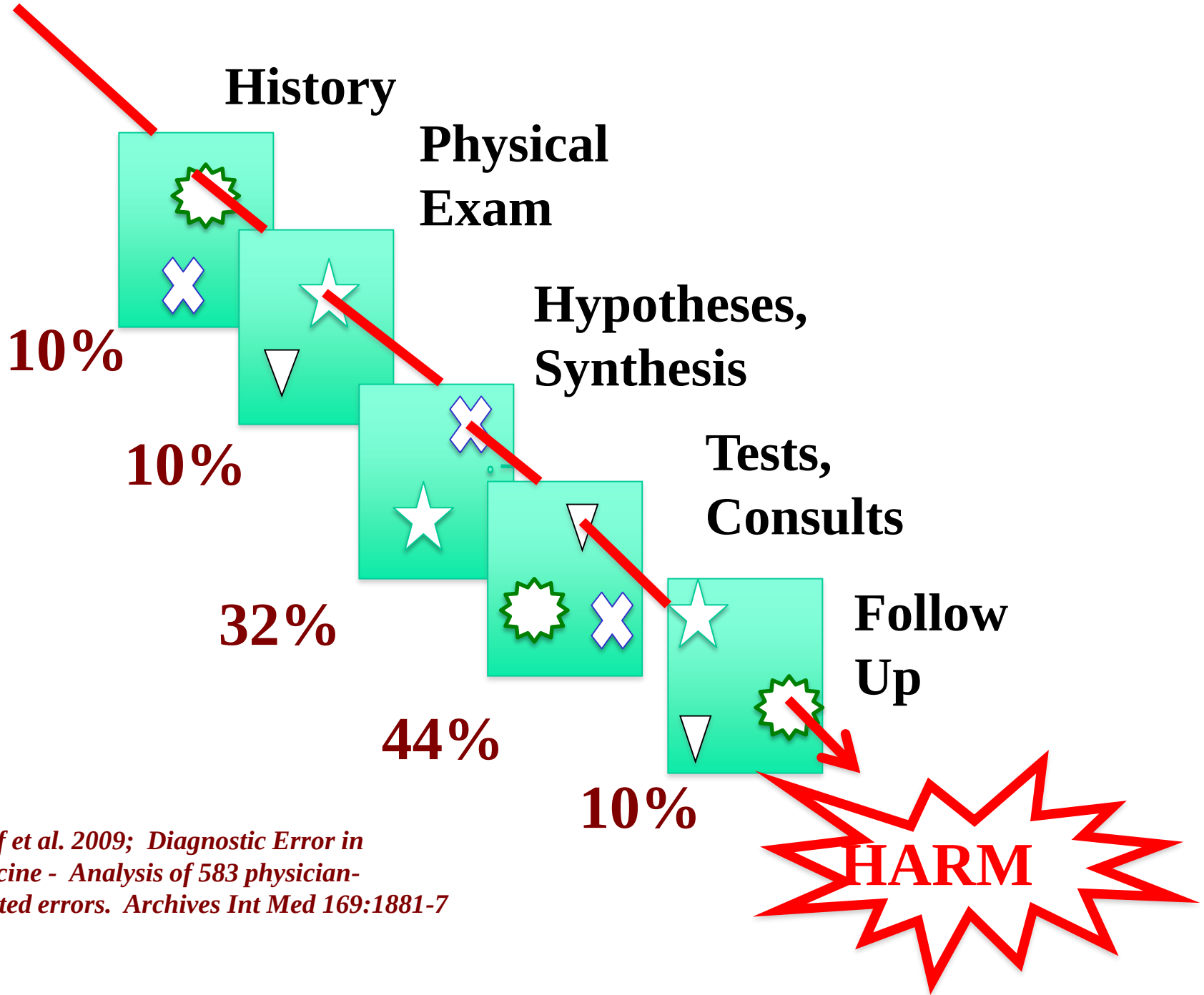
World Health Organization:

– ICD 1	1893	161
– ICD 8	1965	1000+
– ICD 9	1979	8000?
– ICD 10	1999	12,420

NLM:

8000 MESH terms

Growing - 200+/year

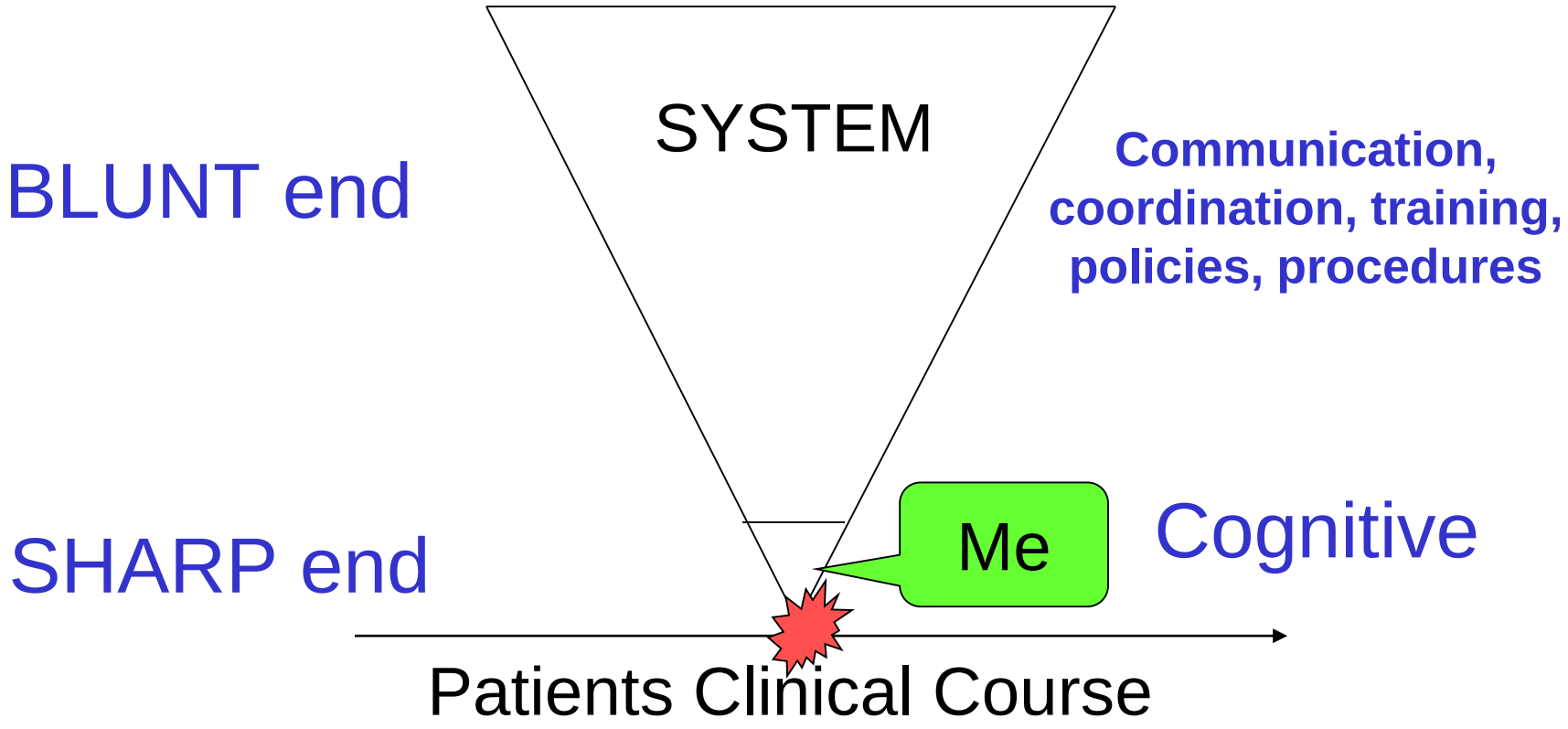


Schiff et al. 2009; Diagnostic Error in Medicine - Analysis of 583 physician-reported errors. Archives Int Med 169:1881-7

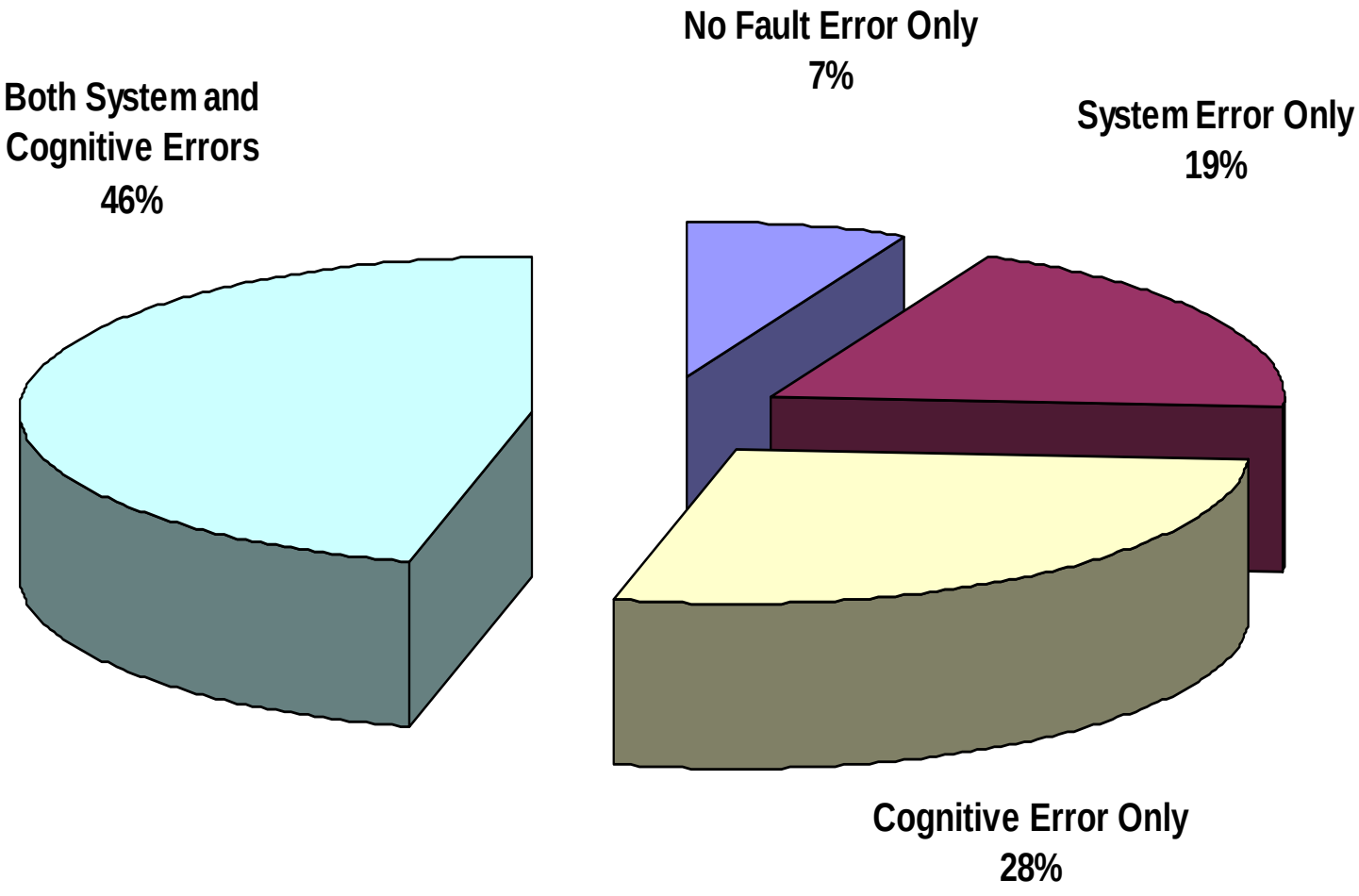
“Root cause analysis”

NPSF study: 100 cases – 535 root causes

Graber et al. Arch Int Med 165:1493-9, 2005



Etiology of Diagnostic Error

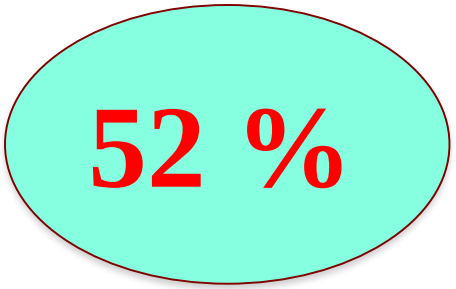


Of all system errors (n = 215), the most common were:

TYPE	EXAMPLE
Communication	Critical lab abnormality lost
Coordination of care	Medical records aren't available
Expertise available	No radiologist on nights
Culture of safety	No system to find dx errors
Supervising trainees	Trainee errors on weekends
Workload, stress, distractions	Short exam: missed a key finding
Reliability of lab, X-rays	Small lung nodule missed on X-ray
Staff – training, dedication, competency, compatibility	Residents mis-read chest X-ray on PACS system

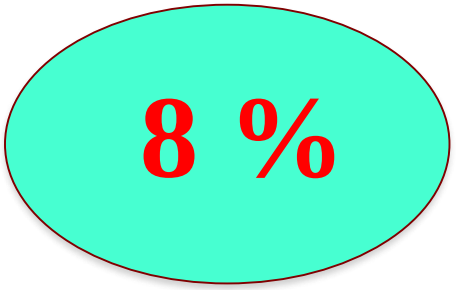
Normalization of deviance

Low Hanging Fruit: Test Result Communication



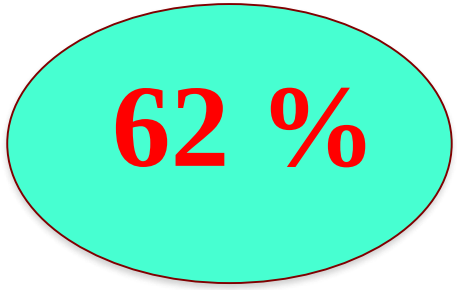
NO system to track tests ordered

Poon, et al. Arch Intern Med. 2004;164(20):2223-2228



Critical lab abnormalities never followed up

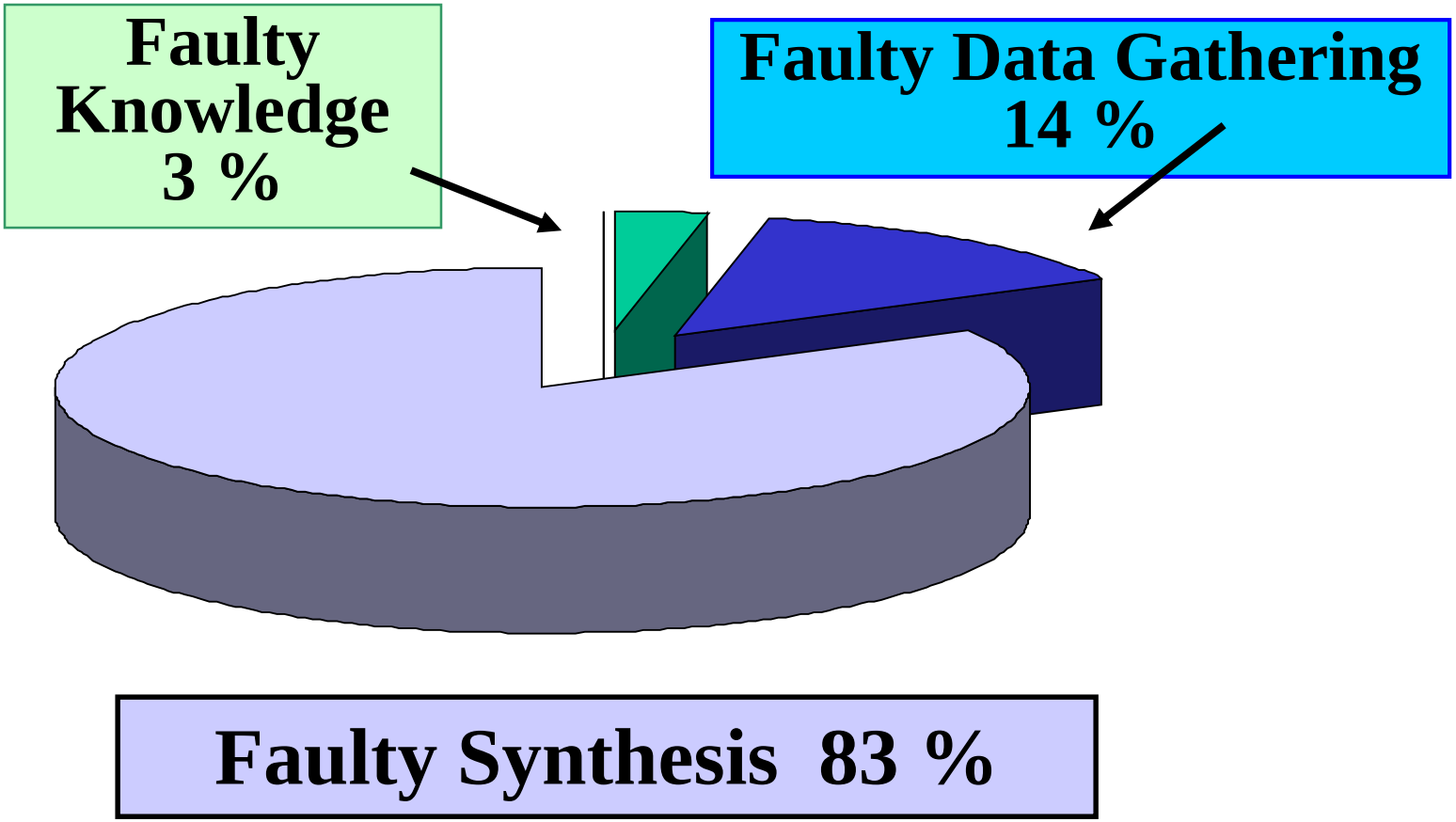
Singh et al. Arch Intern Med 2009;169(17):1578-86.



Unaware of tests results that return after discharge

Roy et al Ann Intern Med. 2005;143(2):121-8.

Cognitive Errors: 320

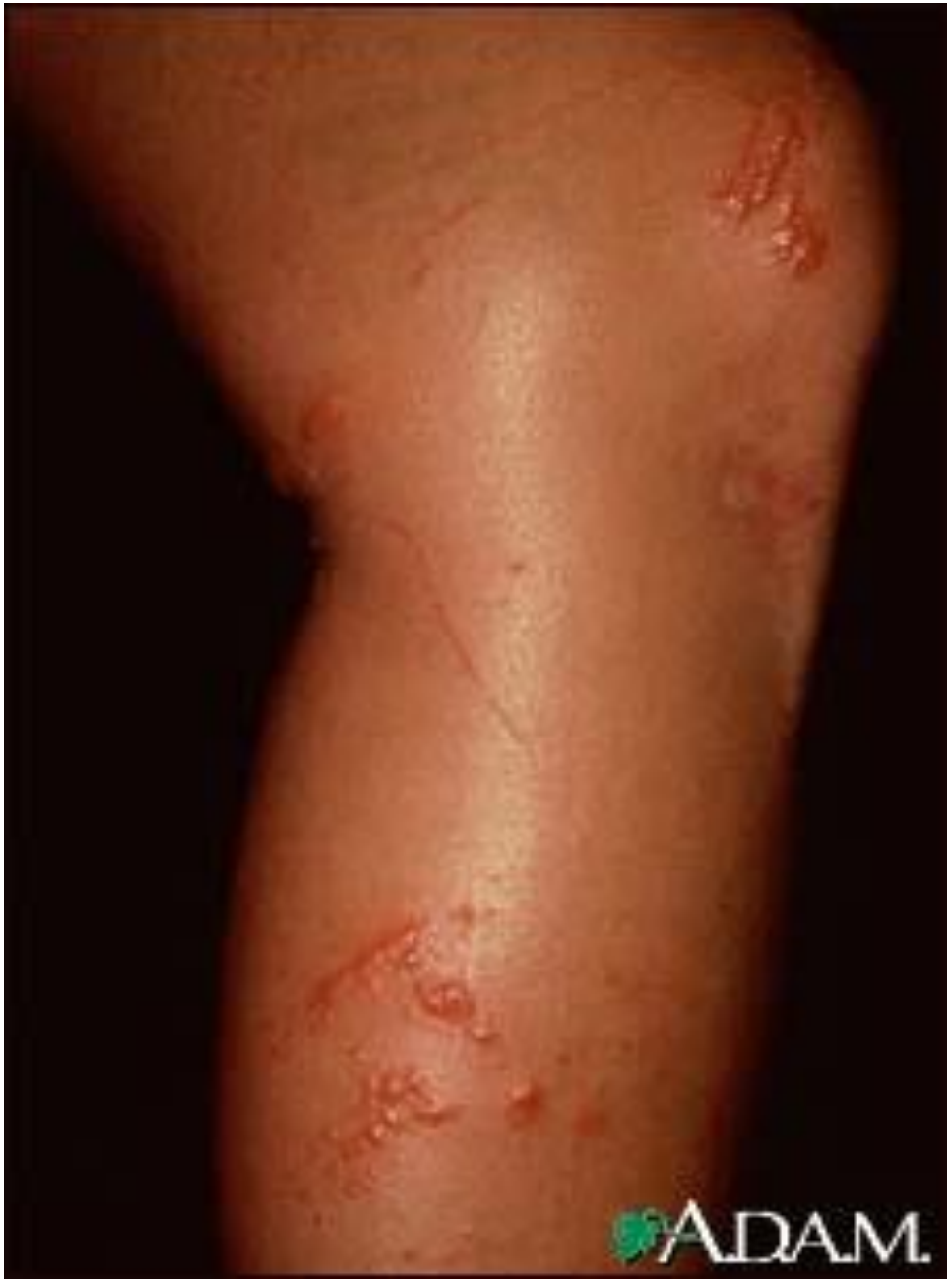


The #1 Reason for Missing the Dx:

I just didn't think of it

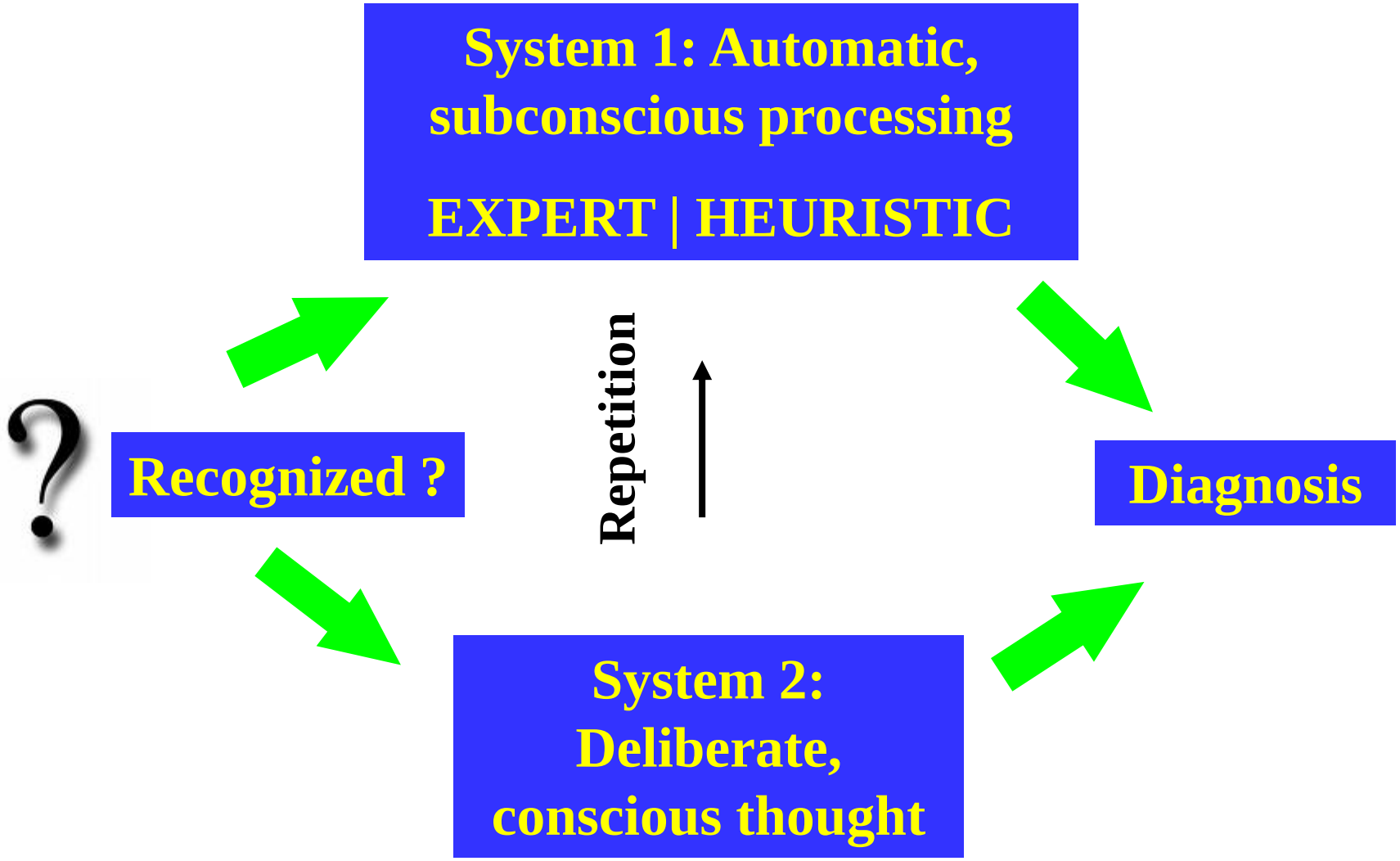
How Do Doctors Think?

How Do Doctors Think?

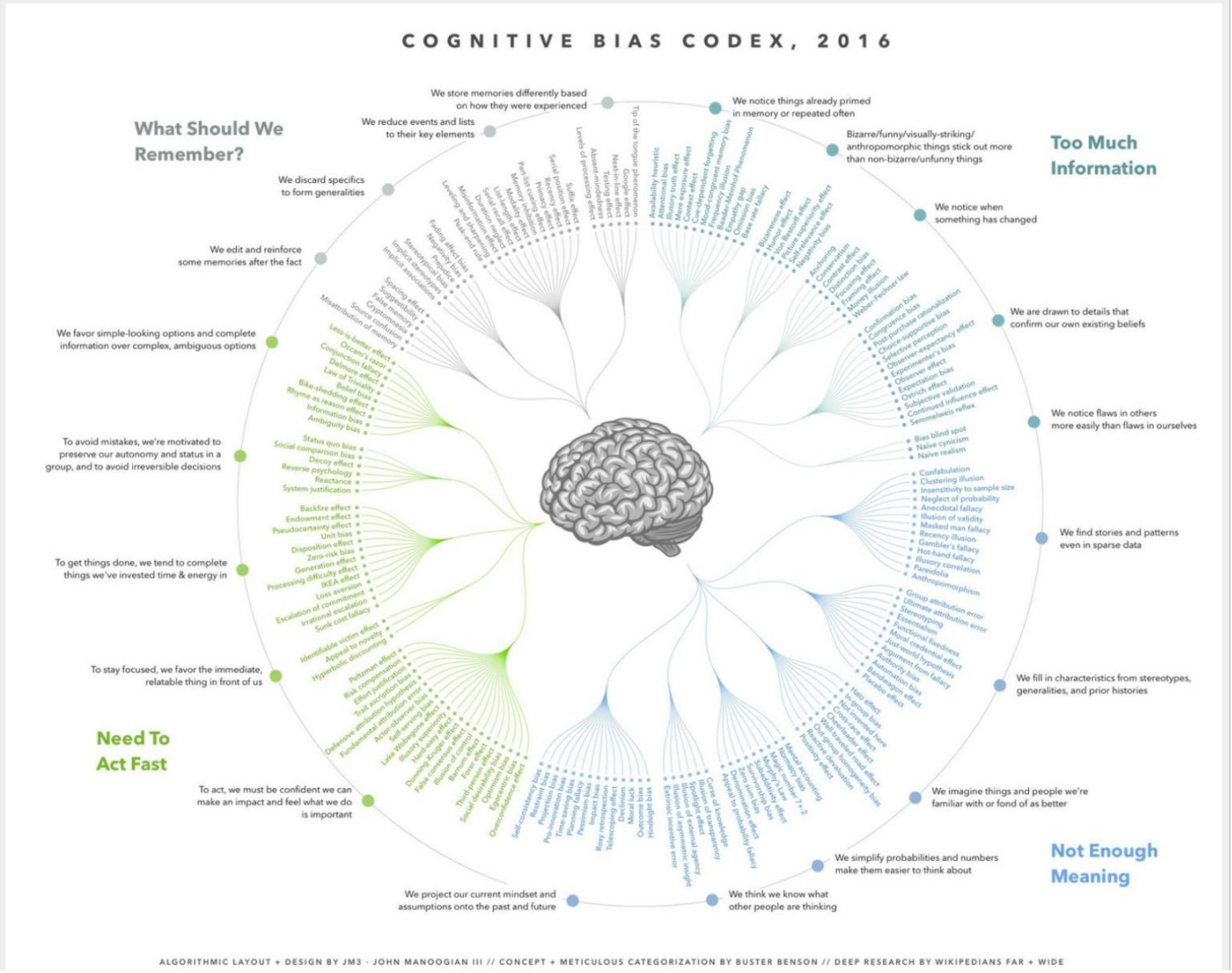


This past weekend the patient was clearing brush from his back yard, wearing shorts. He now has a very itchy rash: vesicles, linear, just where his skin was exposed.

1. **Morphea**
2. **Chicken pox**
3. **Poison Ivy**
4. **Pemphigoid**


System 1: Automatic, subconscious processing
EXPERT | HEURISTIC
Repetition
Recognized ?
Diagnosis
System 2: Deliberate, conscious thought

Heuristics = Intuition



Availability Heuristic

- **The Benefits**
  - **Fast, effortless**
  - **Approximates the base rate of disease**
  - **Very often correct**
- **The Drawbacks**
  - **Discourages the consideration of a broad differential**
  - **Our experience is limited**
  - **Available does not necessarily mean correct**

Think about the letter “R.” Which is more common?

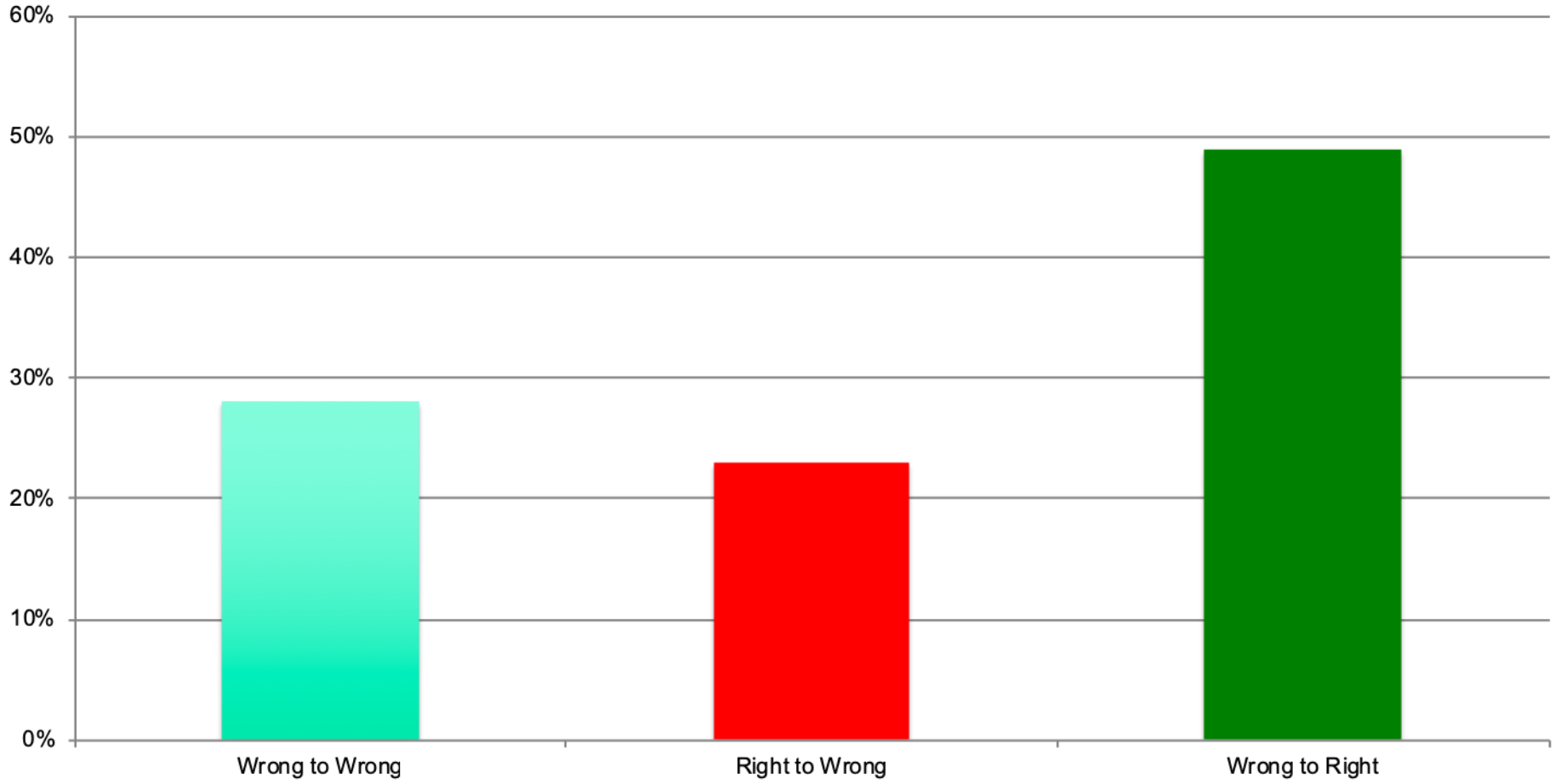
A. R as the FIRST letter of a word?

B. R as the THIRD letter of a word?

What advice did you receive to get the best score on multiple choice tests?

A. Trust your intuition

B. At the end of the test, go back and reconsider the questions you weren't sure about



Wrong to Wrong

Right to Wrong

Wrong to Right

							% of answers changed		
AUTHOR	YEAR	SETTING	# Students		Total Questions	% Changed	**Wrong to Wrong**	**Right to Wrong**	**Wrong to Right**
Davis	1929	College Education Courses	28	MC	22000	2.50%	**26%**	**21%**	**53%**
Shahabudin	1929	Not stated	> 262	T\F	21903	2.90%		**34%**	**66%**
Bath	1967	College Psychology Courses	77	MC	7700	4.30%	**20%**	**20%**	**60%**
Mathews	1975	1st & 2nd Year Medicine Courses	188	MC	11630	5.40%	**22%**	**20%**	**58%**
Lowe and Crawford	1983	2nd Year Med Students: Physiology	353	MC	39380	4.60%	**32%**	**22%**	**46%**
Fabry and Case	1985	National boards: Ob\Gyn	692	Mix	123,175	3.80%	**29%**	**23%**	**48%**
ABIM	**2012**	**National boards: Internal Med**	**500**	**MC**	**40,000**	**12.00%**	**28%**	**23%**	**49%**

Q2: How do doctors think?

A: For the most part, using our "intuition"= subconscious, automatic, thinking

This works extremely well, but it's not perfect, and MANY diagnostic errors arise from errors in these processes.

Diagnosis is too important a process to rely solely on intuition

Delayed Diagnosis of Sepsis

Cognitive Errors

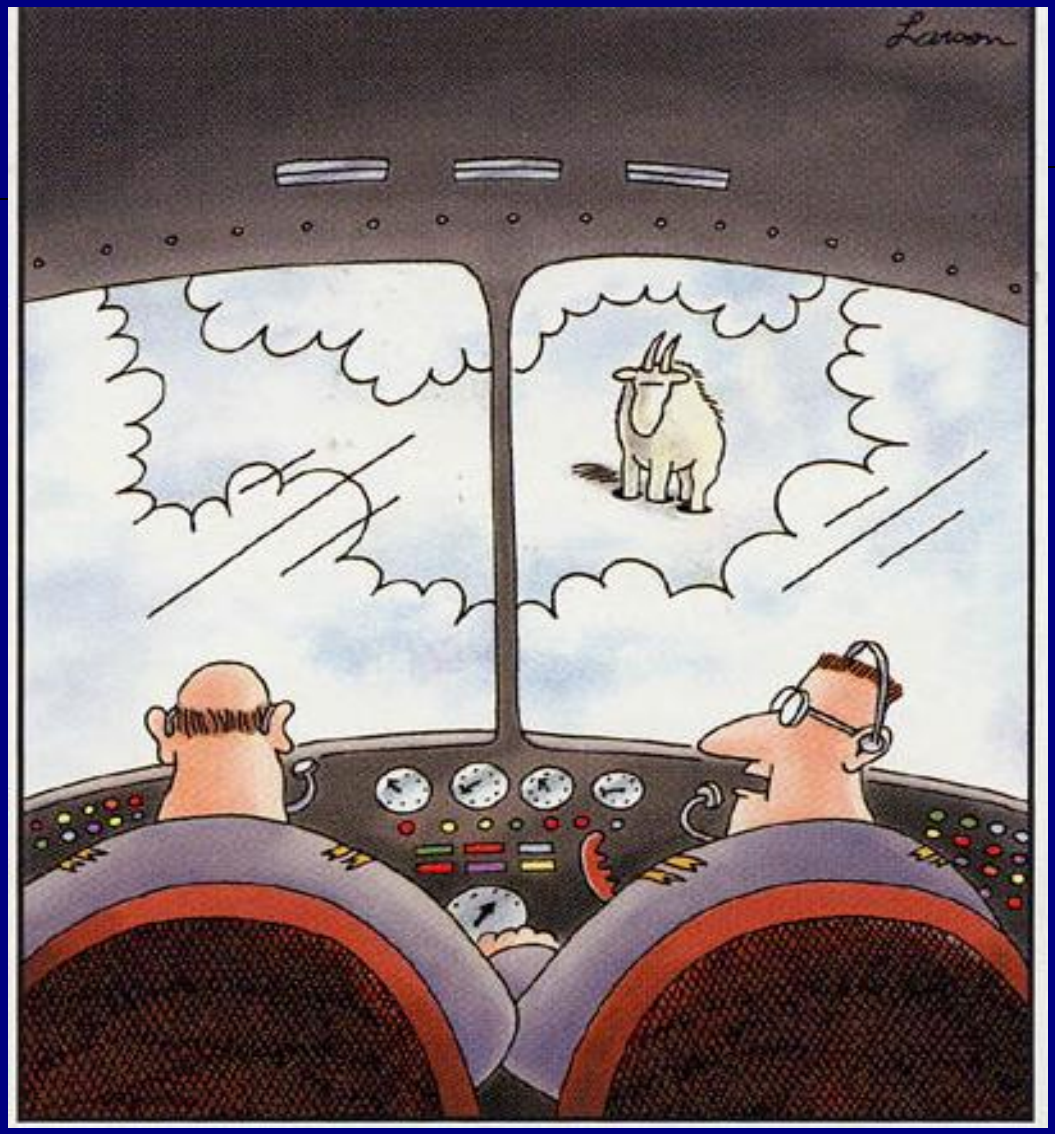
- **Knowledge: OK?**
- **Data collection: Incomplete**
- **Synthesis: Faulty**

Wrong context; Premature closure

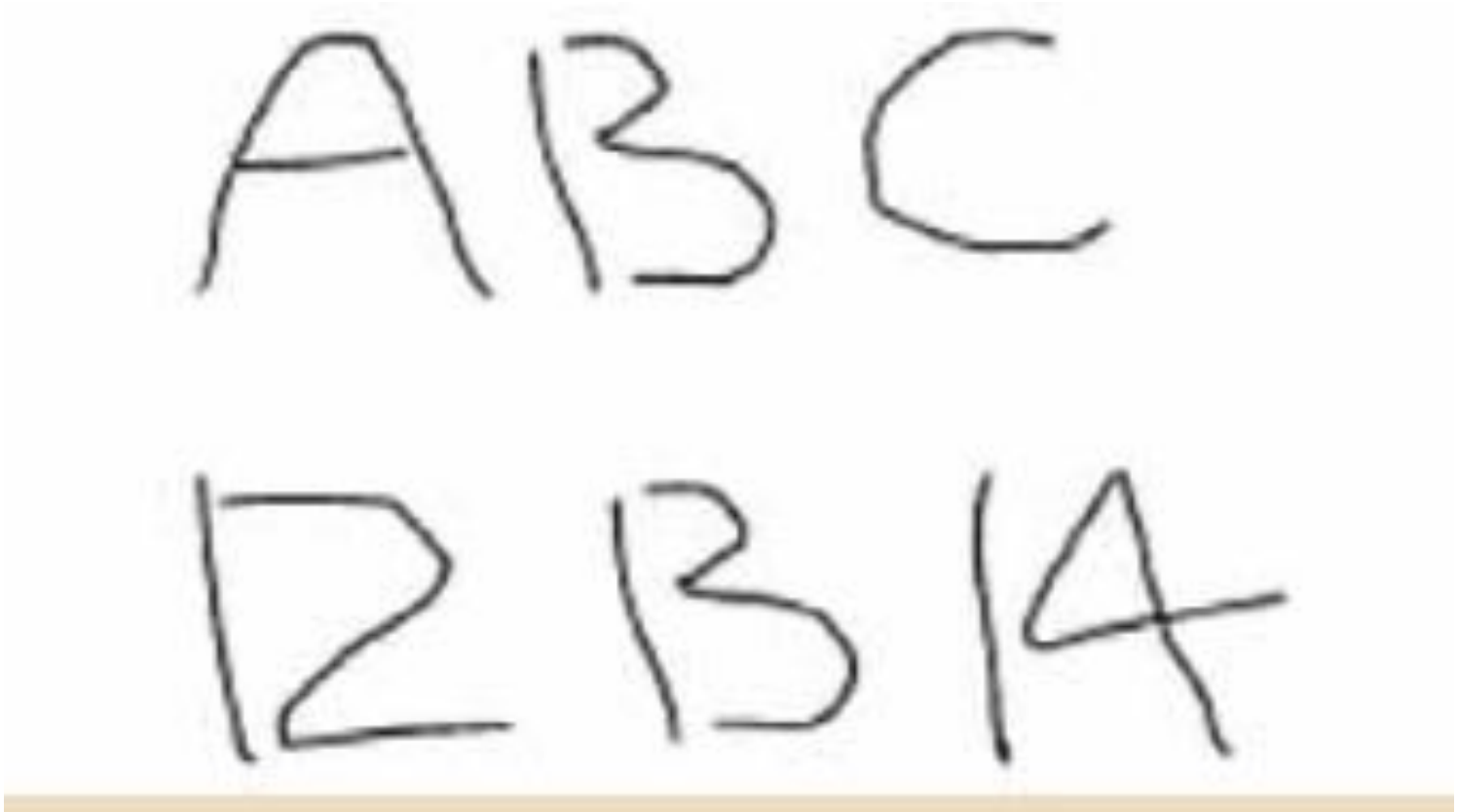
"Just didn't think of it"

System Errors

- **Lab results not available fast enough**
- **Inadequate plan for follow-up**
- **No system to learn from errors**



“ Say … What’s a mountain goat doing way up here in a cloud bank ?”


ABC
12B14

Premature closure = Satisficing

= Falling in love with the first puppy …

(Herbert Simon)

Cognitive Error is EVERYWHERE

Diagnosis

Military decisions **Business decisions**

Legal decisions **Political decisions**

EVERY DAY LIFE

The consequences may differ;

the errors are the same

So where are we?

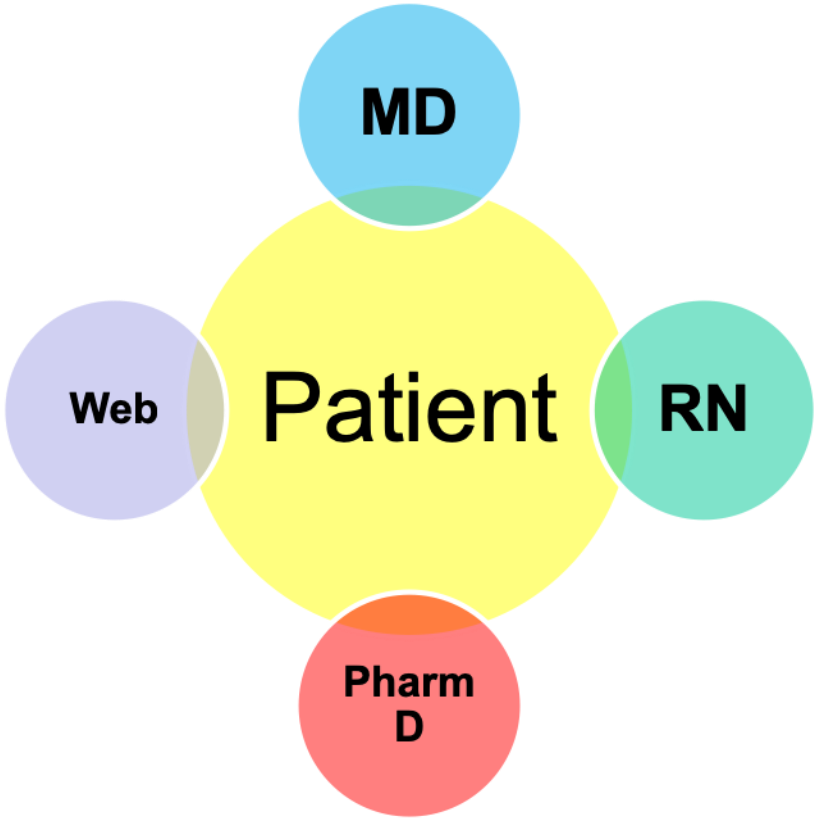
The Problem is….Diagnostic Error

The Solution is …. The Team

Our assumptions:

- **You can't change people & You can't fix the system**
- **Safety is produced by the people involved**
- **Resiliency is the key**


MEET THE TEAM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PHYSICIANS - What can I do?

Be thoughtful and reflective

Learn why dx errors occur and how to avoid

Always construct a differential diagnosis

Take advantage of second opinions

Use decision support resources

Make the patient your partner (and nurses)

Get feedback

Nurses - What can I do?

Make sure communication was effective

Does what you hear and see match up with the diagnosis?

Is information in the EMR correct ?

Help empower the patient & be their advocate

Washington State Nurse Practice Act language

WAC 246-840-700
Standards of nursing conduct or practice

Nursing Diagnosis/Problem Identification: The registered nurse uses client data and nursing scientific principles to develop ***nursing diagnosis*** and to identify client problems in order to deliver effective nursing care;

Pharmacists - What can I do?

You're the first point-of-contact: Be careful with triage !

Could the symptoms be drug related? (Side effects, duplicate Rx's, interactions)

Does what you hear and see and dispense match with the diagnosis?

PATIENTS - What can I do?

Be a good historian

Keep accurate records of your tests

SPEAK UP ! What else could this be ?

Ask what to expect & how to follow-up

Get a second opinion

"This is a second opinion. At first, I thought you had something else."

SECOND OPINIONS CHANGE THE DIAGNOSIS

Radiology, Pathology: 2-5%

Internal medicine: 10-20%

The Web - What can I do?

It is….

A portal to KNOWLEDGE:

- **Up-to-Date; MedScape; WebMD; PubMed**

The connection to your records & HCO

The access point to decision support

Aids for Differential Diagnosis

Dxplain

http://www.lcs.mgh.harvard.edu/projects/dxplain.html

Isabel

www.isabelhealthcare.com

Derm

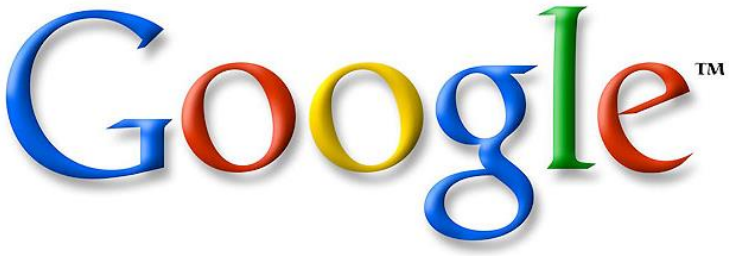
www.visualdx.com

IMPACT OF ISABEL

Studied pediatric ICU admissions who did NOT have a diagnosis on admission (n = 206). Correct diagnosis rates:

- **Residents on their own:** **89.4%**
- **Residents + Isabel:** **92.5%**
- **Residents + Isabel + Attending** **95%**

Thomas et al. International assessment of a web-based diagnostic tool in critically ill children. Technol Health Care 2008; 16:103-110

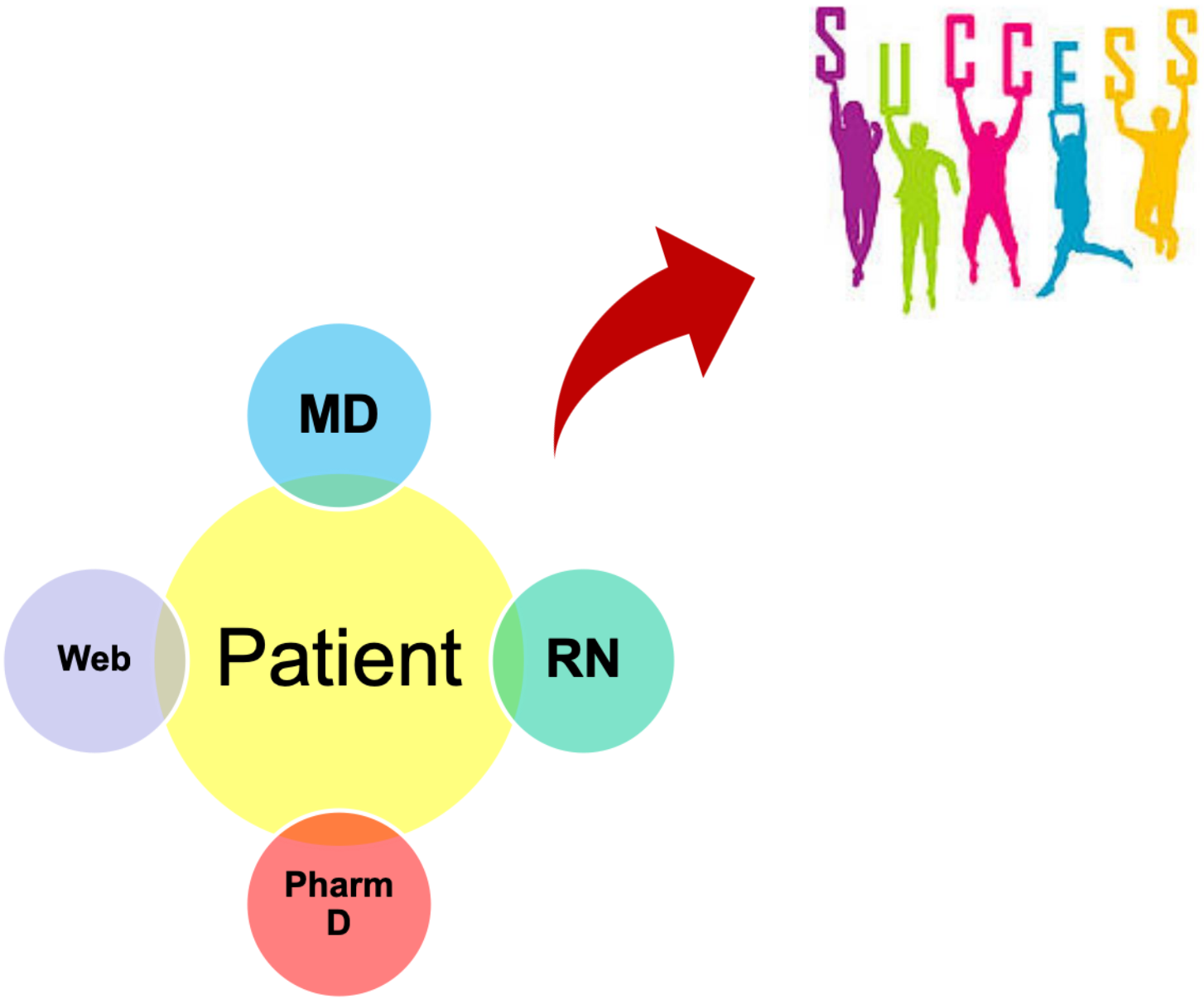


Googling a Diagnosis:

Sensitivity – 58%

Specificity - 0 %

Tang and Ng; BMJ 2006 Dec 2;333(7579):1143-5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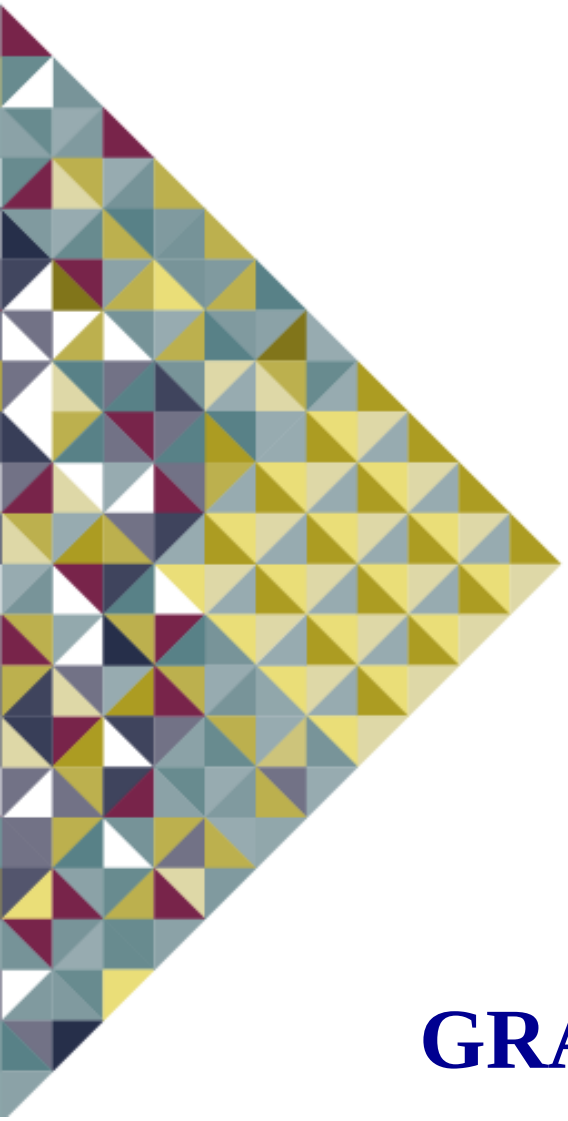

“Improving the diagnostic process is not only possible, but it also represents a moral, professional, and public health imperative.”

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