Brigham and Women's Hospital
Founding Member, Mass General Brigham

Introduction to Diagnostic Error in Medicine

Gordon (Gordy) Schiff MD

Associate Director Center for Patient Safety Research and Practice
Brigham and Women's Hospital Div. General Medicine

Safety Director – Harvard Center for Primary Care
Academic Improvement Collaborative

Associate Professor of Medicine Harvard Medical School

CONTINUING MEDICAL EDUCATION
DEPARTMENT OF MEDICINE

HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Gordon (Gordy) Schiff MD

- Internist PCP at Brigham and Women's Hospital
- Associate Director Brigham Center for Patient Safety Research and Practice
- Quality and Safety Director Harvard Medical School Center for Primary Care
- Assoc. Professor of Medicine Harvard Med School
- Reviewer, contributor to National Academy of Medicine Report Improve Diagnosis in Healthcare
- 250+ articles, chapters on medication safety, health IT, diagnostic error and improvement
- Course Director HMS Masters in Safety, Quality, Informatics & Leadership Special Topics
- 30+ Years Cook County (Stroger) Public Hospital in Chicago
- Plaintiff in recent successful legal challenge to restore AHRQ PSNet removed/censored content

Disclosures Acknowledgements

No Commercial Conflicts

Grant Funding

-AHRQ (US Agency for Healthcare Res. Quality)

*Diagnostic Safety Center of Excellence

Learning from Cancer Dx delays

*Time for Better Diagnosis

Measuring Outcomes Stress Time (MOST)

-**IHI / Hartford Foundation**

*Earlier Diagnosis Adverse Drug Reactions in Older Adults

Learning Objectives

1. Describe the frequency and importance of diagnostic errors
2. Define diagnostic errors, and using a Venn diagram model differentiate diagnostic process errors, mis/wrong diagnosis, and adverse outcomes.
3. List at least 3 approaches to minimizing and preventing diagnostic errors.
4. Explain concept of “diagnostic pitfalls” and give a clinical example illustrating use in alerting to errors

Big picture concepts

Give a person a fish – eat for a day; teach to fish, eat for a lifetime

Practical Approaches and Tips

Ways you can improve diagnosis in your own practice

Prepare for Board Questions

Frankly don’t know what now asking; but…asked AI!!

Taste of state-of-the-art stuff

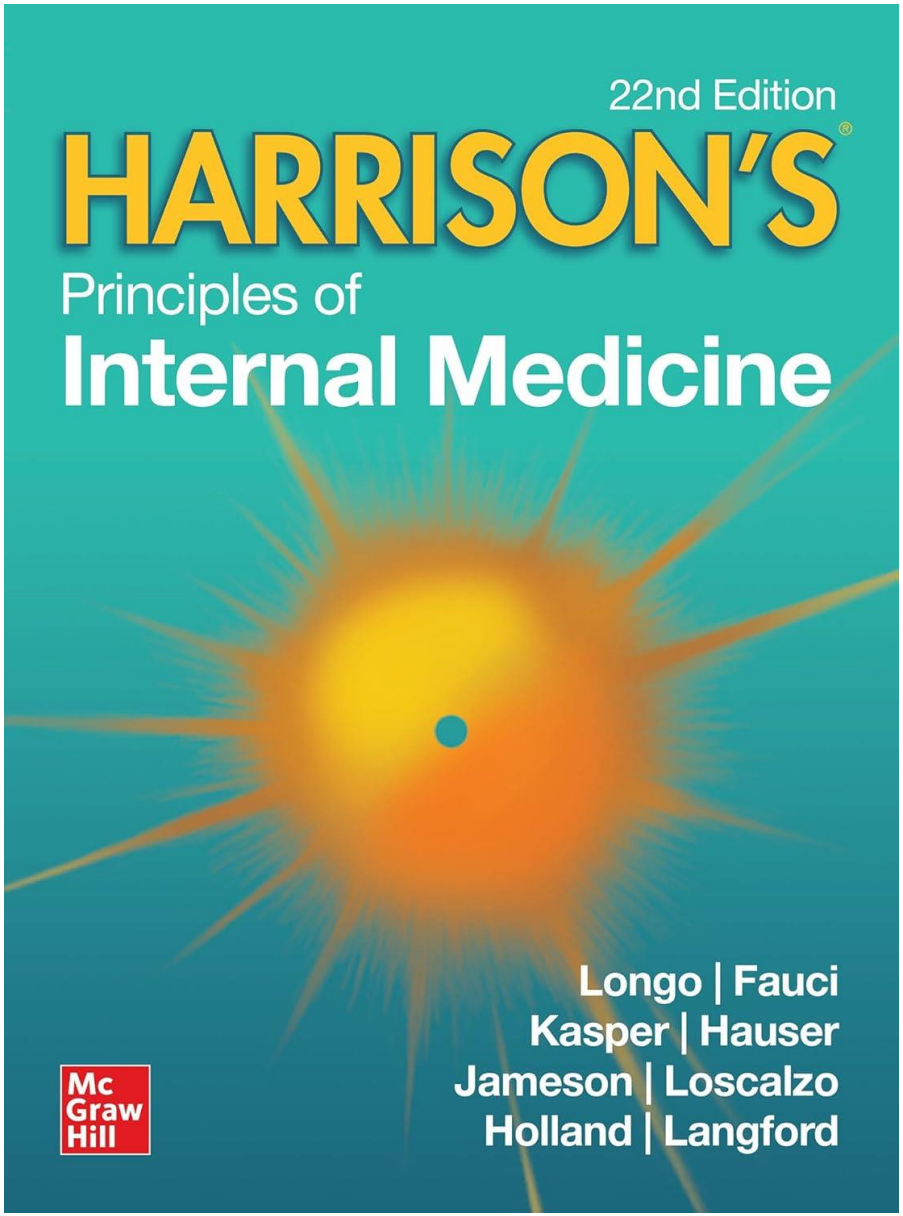
Help make diagnosis fun, welcome again

Enjoyable not threatening; Co-produce w/ patients

Become more comfortable with uncertainty

Outline

- Background on Diagnostic Errors
  - Data from local, national studies
  - Controversies
- Key Concepts and Tools
- Approaching Diagnosis as a System
  - 8 Recommendations from NAM Report
  - 5 Practical Practice Suggestions
  - 3 Key Questions to Ask



Just Published

Chapter 10
Diagnosis: Reducing Errors and Improving Quality

Three Quotes:

Systems Perspective

The Boston Globe

Genius diagnosticians make great stories, but they don't make great health care.

The idea is to make accuracy reliable, not heroic

Don Berwick
Boston Globe 7/14/2002

Lucian Leape
Father of Patient Safety

Safer practice can only come about from acknowledging the potential for error and building in error reduction strategies at each stage of clinical practice

Error in medicine. JAMA. 1994;272:1851

Dr. Nancy Leveson

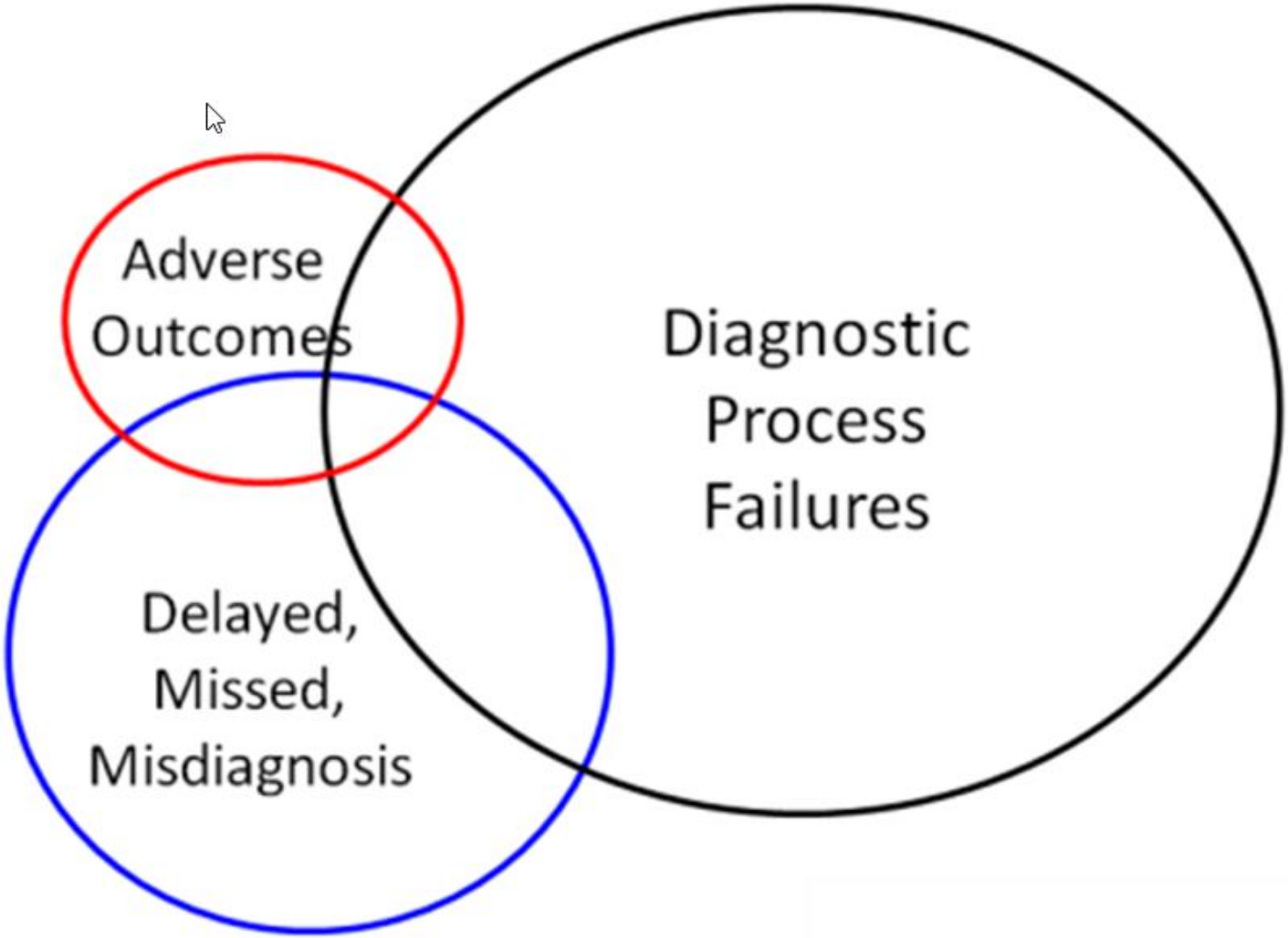
Operator error is a *symptom* not a *cause* of an error

Human error is a symptom of a system
that needs to be redesigned.

Safety is a system property

Dr. Nancy Leveson, Professor of Aeronautics and Astronautics Engineering Systems at MIT
https://www.youtube.com/watch?v=8bzWvII9OD4&list=PLmo9Xl8PKe5vz1CBNcJIzk1lvQK7Fjf7s

What is a Diagnosis Error?



HEALTH CARE REFORM

Diagnostic Error in Medicine

Analysis of 583 Physician-Reported Errors

Gordon D. Schiff, MD; Omar Hasan, MD; Seijeoung Kim, RN, PhD; Richard Abrams, MD; Karen Cosby, MD; Bruce L. Lambert, PhD; Arthur S. Elstein, PhD; Scott Hasler, MD; Martin L. Kabongo, MD; Nela Krosnjar; Richard Odwazny, MBA; Mary F. Wisniewski, RN; Robert A. McNutt, MD

Background: Missed or delayed diagnoses are a common but understudied area in patient safety research. To better understand the types, causes, and prevention of such errors, we surveyed clinicians to solicit perceived cases of missed and delayed diagnoses.

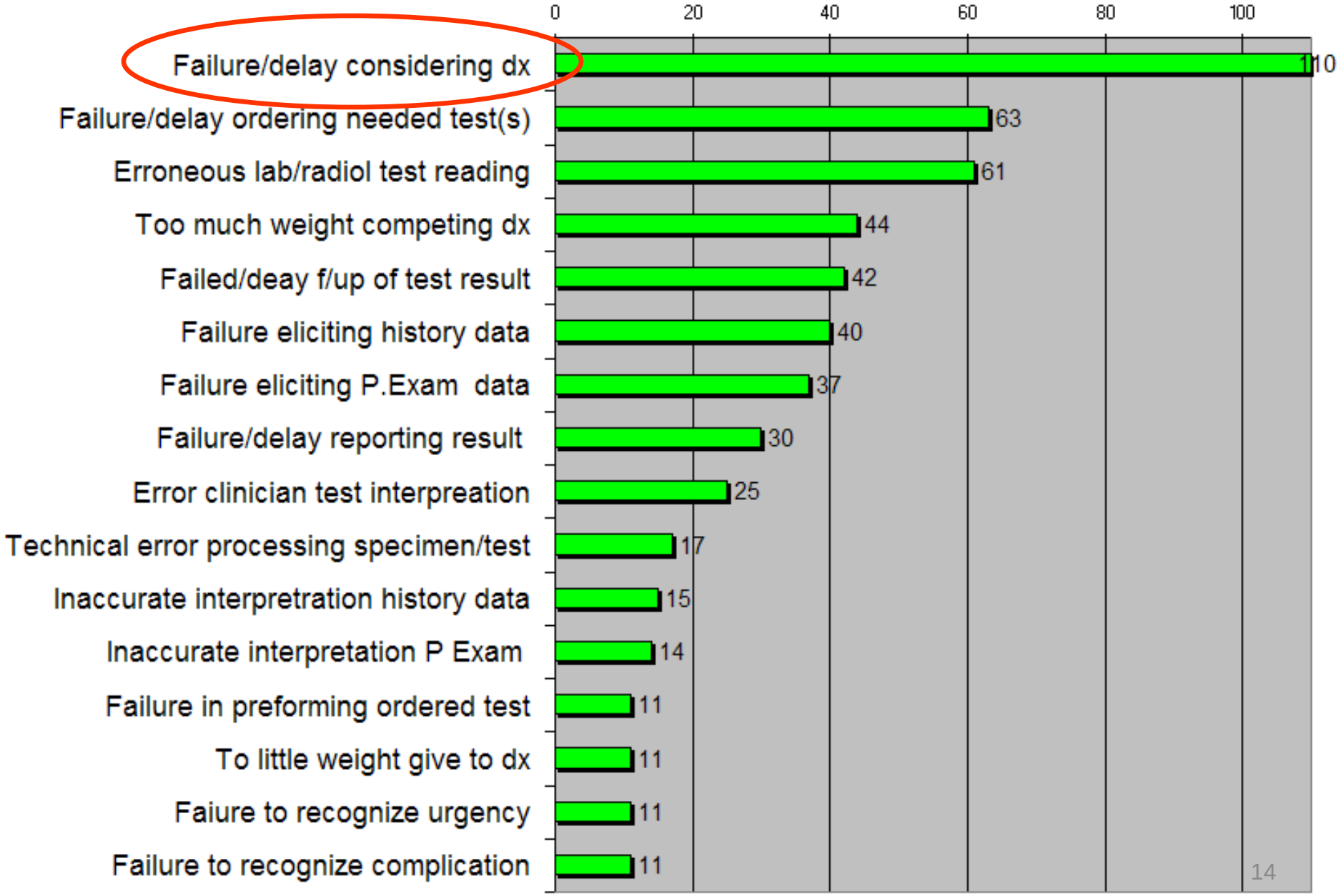
Methods: A 6-item written survey was administered at 20 grand rounds presentations across the United States and by mail at 2 collaborating institutions. Respondents were asked to report 3 cases of diagnostic errors and to describe their perceived causes, seriousness, and frequency.

Results: A total of 669 cases were reported by 310 clinicians from 22 institutions. After cases without diagnostic errors or lacking sufficient details were excluded, 583 remained. Of these, 162 errors (28%) were rated as major, 241 (41%) as moderate, and 180 (31%) as minor or insignificant. The most common missed or delayed diagnoses were pulmonary embolism (26 cases [4.5% of total]), drug reactions or overdose (26 cases [4.5%]), lung cancer (23 cases [3.9%]), colorectal cancer (19 cases [3.3%]), acute coronary syndrome (18 cases [3.1%]), breast cancer (18 cases [3.1%]), and stroke (15 cases [2.6%]). Errors occurred most frequently in the testing phase (failure to order, report, and follow-up laboratory results) (44%), followed by clinician assessment errors (failure to consider and overweighing competing diagnosis) (32%), history taking (10%), physical examination (10%), and referral or consultation errors and delays (3%).

Conclusions: Physicians readily recalled multiple cases of diagnostic errors and were willing to share their experiences. Using a new taxonomy tool and aggregating cases by diagnosis and error type revealed patterns of diagnostic failures that suggested areas for improvement. Systematic solicitation and analysis of such errors can identify potential preventive strategies.

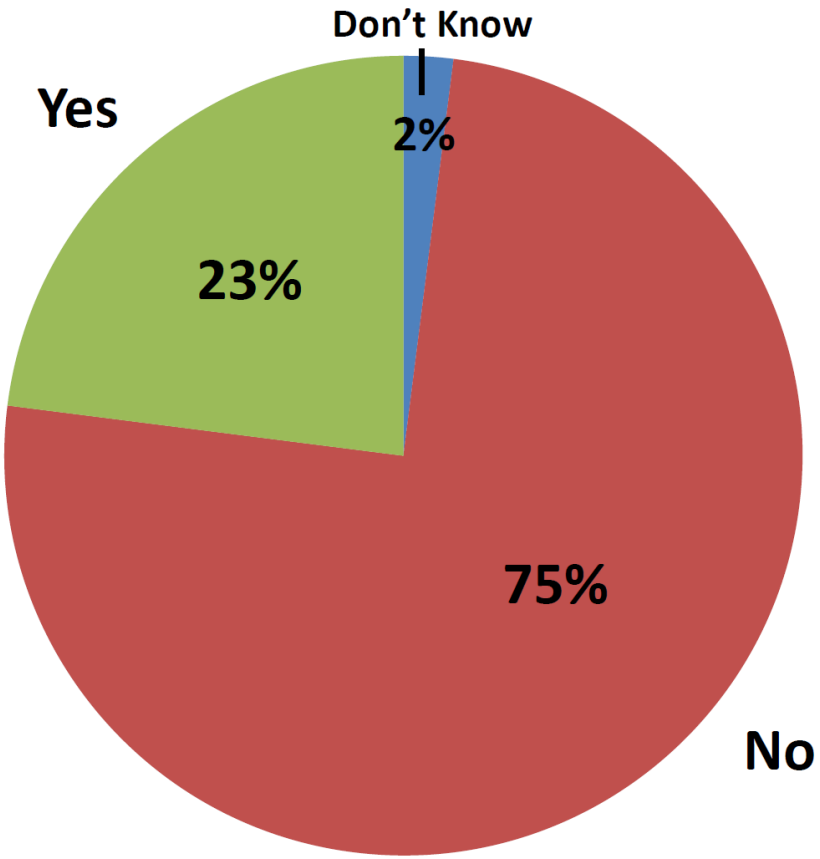
Arch Intern Med. 2009;169(20):1881-1887

What went wrong: DEER Taxonomy Localization



MA Residents Involved in a Medical Error Situation

% saying personally involved in a situation where a preventable medical error was made in their own care or in the care of someone close to them

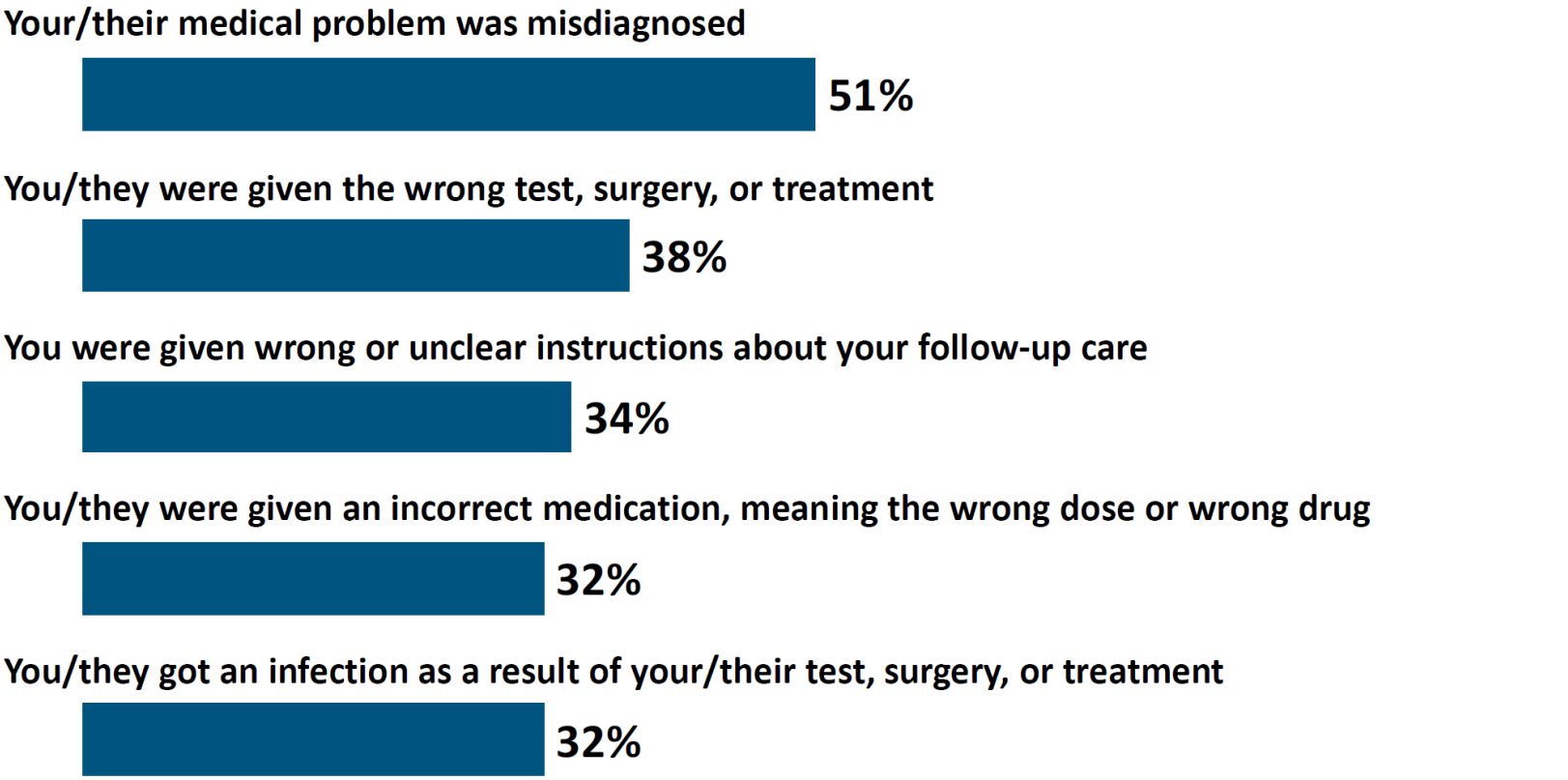


Harvard School of Public Health / Betsy Lehman Center for Patient Safety and Medical Error Reduction / Health Policy Commission
The Public's Views on Medical Error in Massachusetts, September 2 – 28, 2014.

Most Common Types of Medical Error Experienced by MA Residents

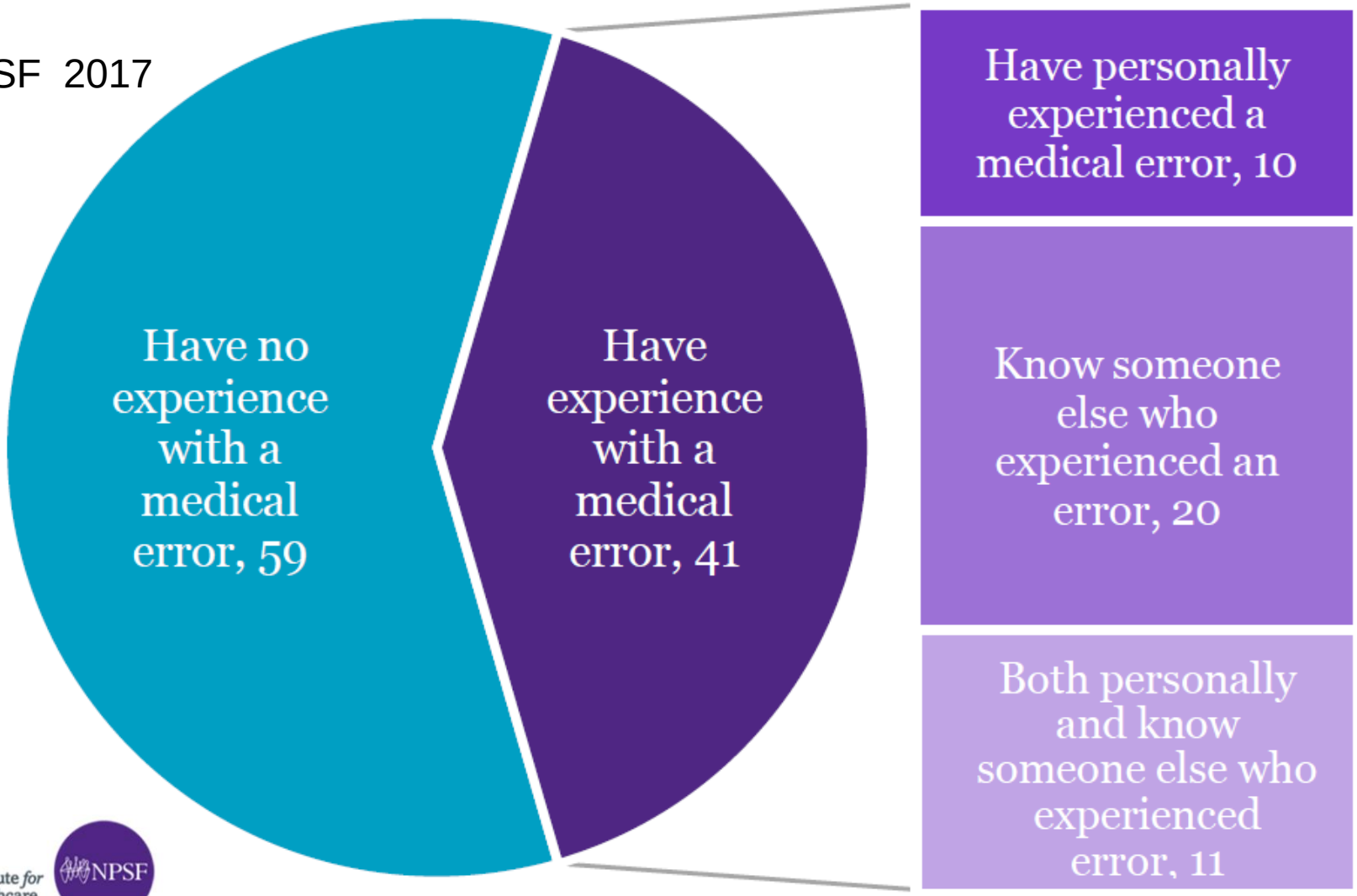
BETSY LEHMA CENTER
for Patient Safety and Medical Error R

% saying…
(Among the 23% who said they or a person close to them experienced a medical error)



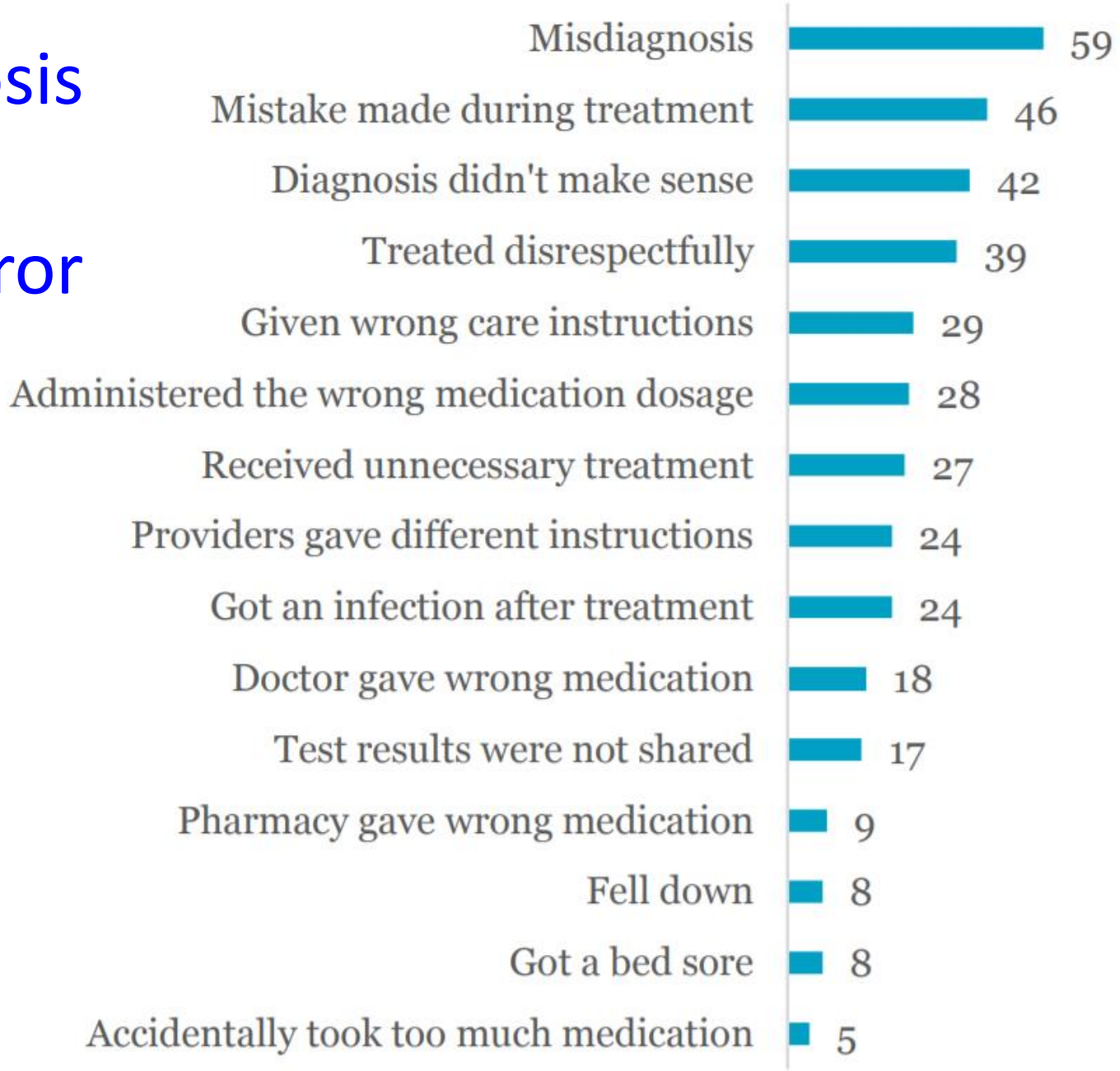
41% Personally Experienced or Knew Someone with Medial Error

IHI/NPSF 2017 Survey



Institute for Healthcare Improvement
NPSF
TOGETHER FOR SAFER CARE

Misdiagnosis Leading Type of Error

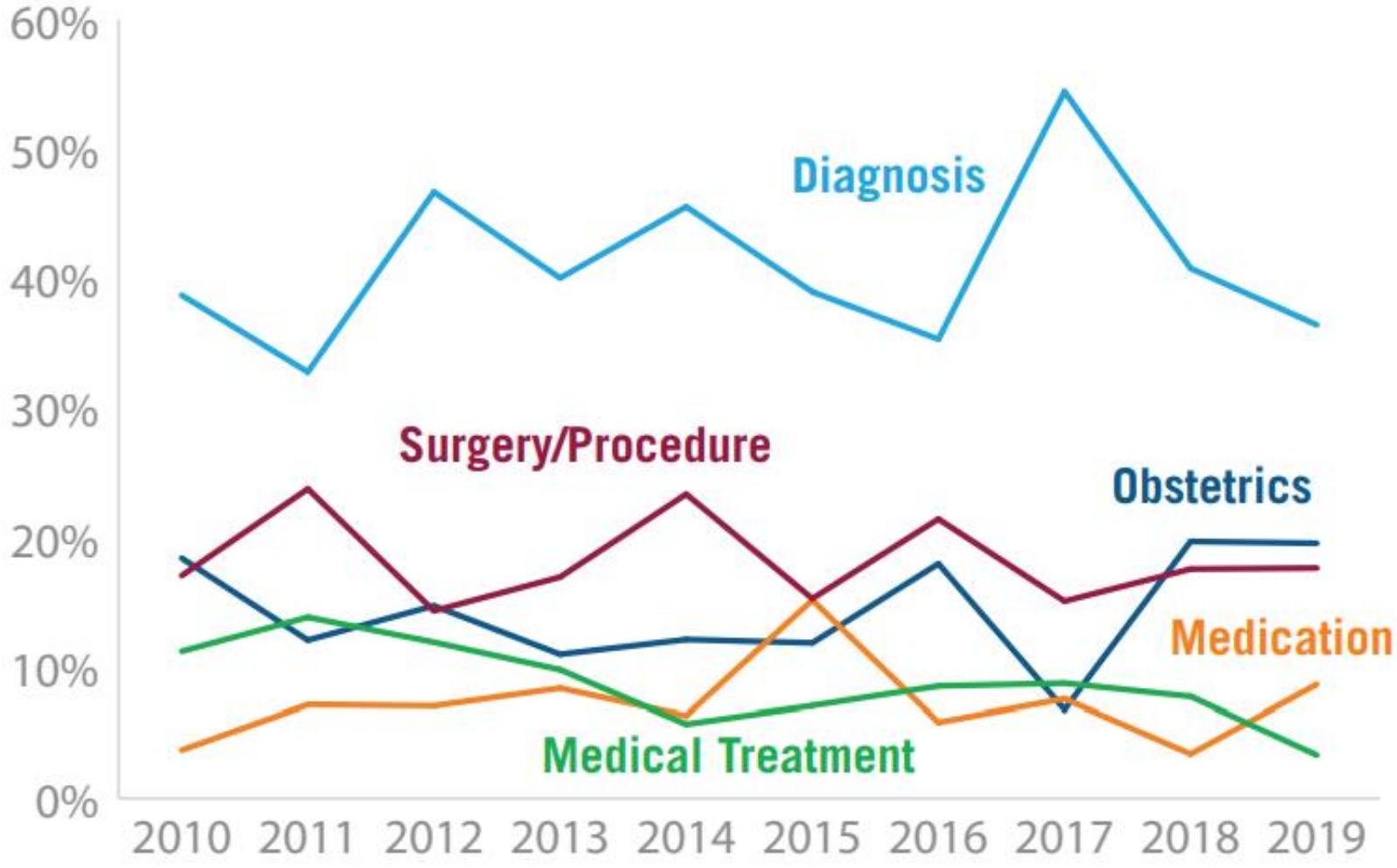


Institute for Healthcare Improvement NPSF

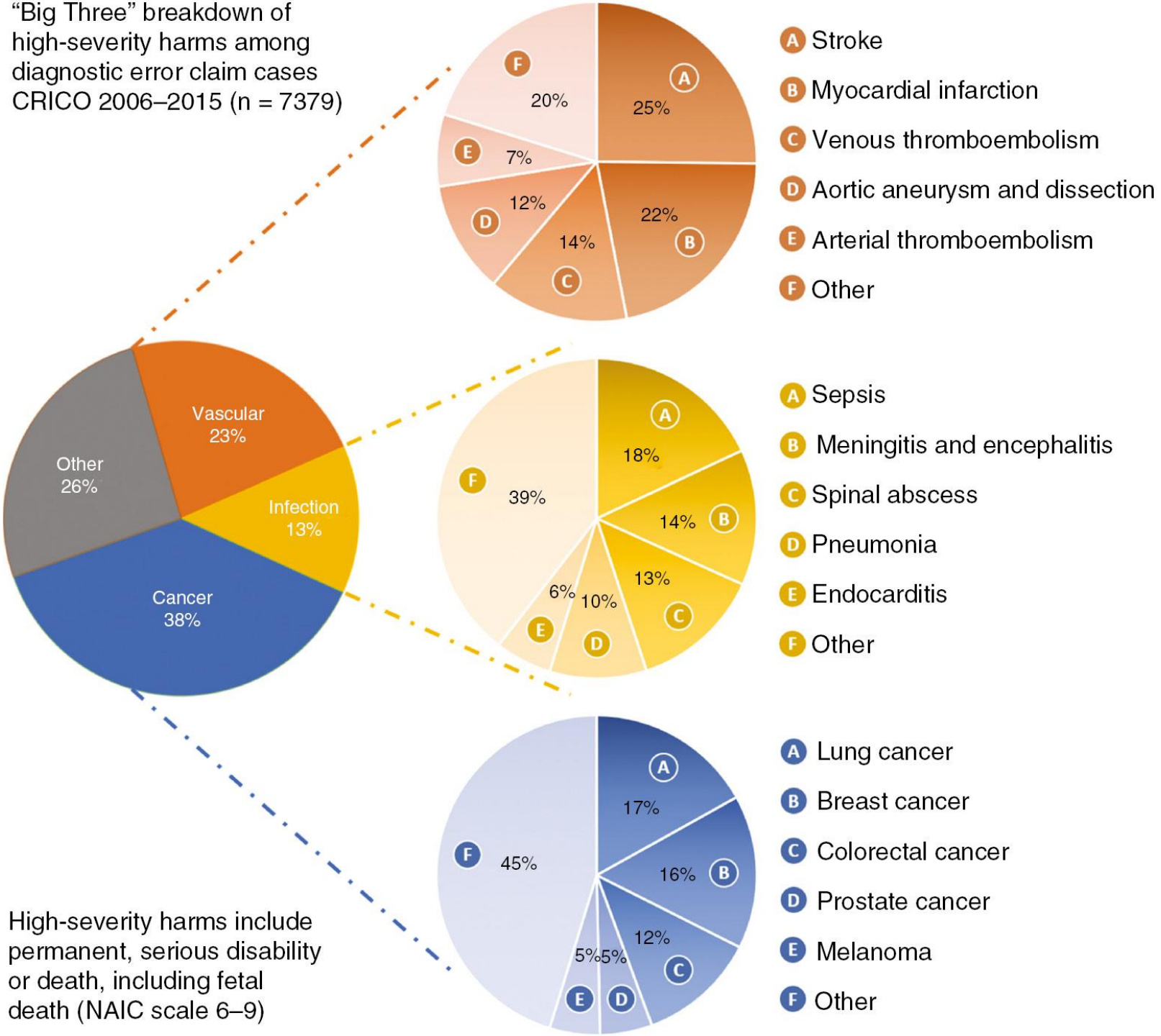
TOGETHER FOR SAFER CARE

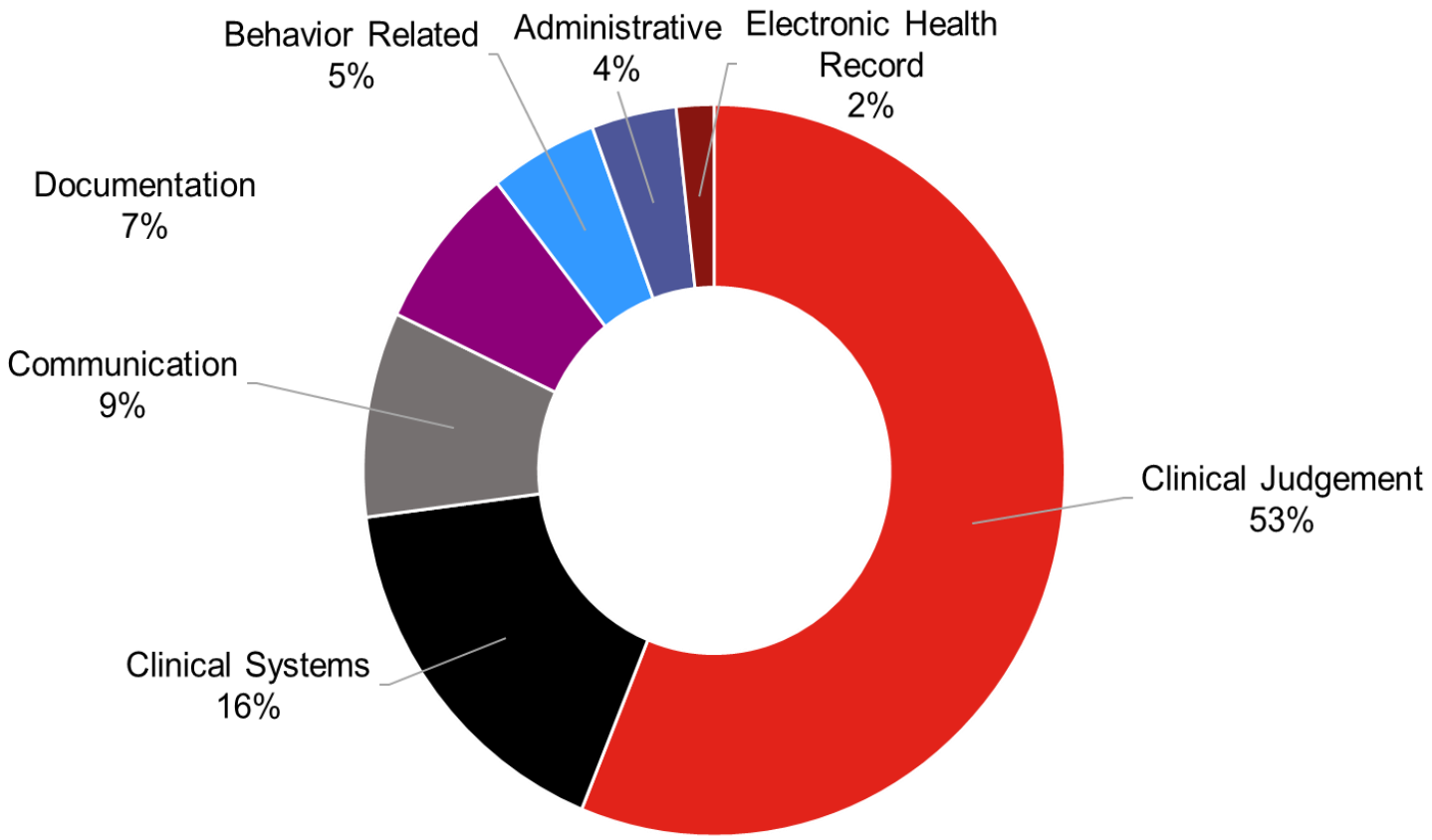
Closed With Indemnity Paid

Top 5 Allegation Types



COVERYS


"Big Three" breakdown of high-severity harms among diagnostic error claim cases CRICO 2006–2015 (n = 7379)
Vascular 23%
Infection 13%
Cancer 38%
Other 26%
A 25%
B 22%
C 14%
D 12%
E 7%
F 20%
A Stroke
B Myocardial infarction
C Venous thromboembolism
D Aortic aneurysm and dissection
E Arterial thromboembolism
F Other
A 18%
B 14%
C 13%
D 10%
E 6%
F 39%
A Sepsis
B Meningitis and encephalitis
C Spinal abscess
D Pneumonia
E Endocarditis
F Other
A 17%
B 16%
C 12%
D 5%
E 5%
F 45%
A Lung cancer
B Breast cancer
C Colorectal cancer
D Prostate cancer
E Melanoma
F Other
High-severity harms include permanent, serious disability or death, including fetal death (NAIC scale 6–9)



Selection: Closed PL claims from 2013-2017, N=3466 with a Diagnosis-Related allegation an identified Risk Management issue
Footnote: A claim can have more than 1 Risk Management issue.

Clinical Judgment – *Percentage of Claims*

21%	19%	17%	10%	8%
Narrow Diagnostic Focus	Inadequate / Inappropriate Testing	Misinterpretation of Diagnostic Studies	Failure to Adequately Assess Patient's Condition	Failure to Obtain Specialty Consult or Referral

Selection: Closed PL claims from 2013-2017, N=1840 with a Diagnosis-Related allegation and a Clinical Judgment Risk Management issue

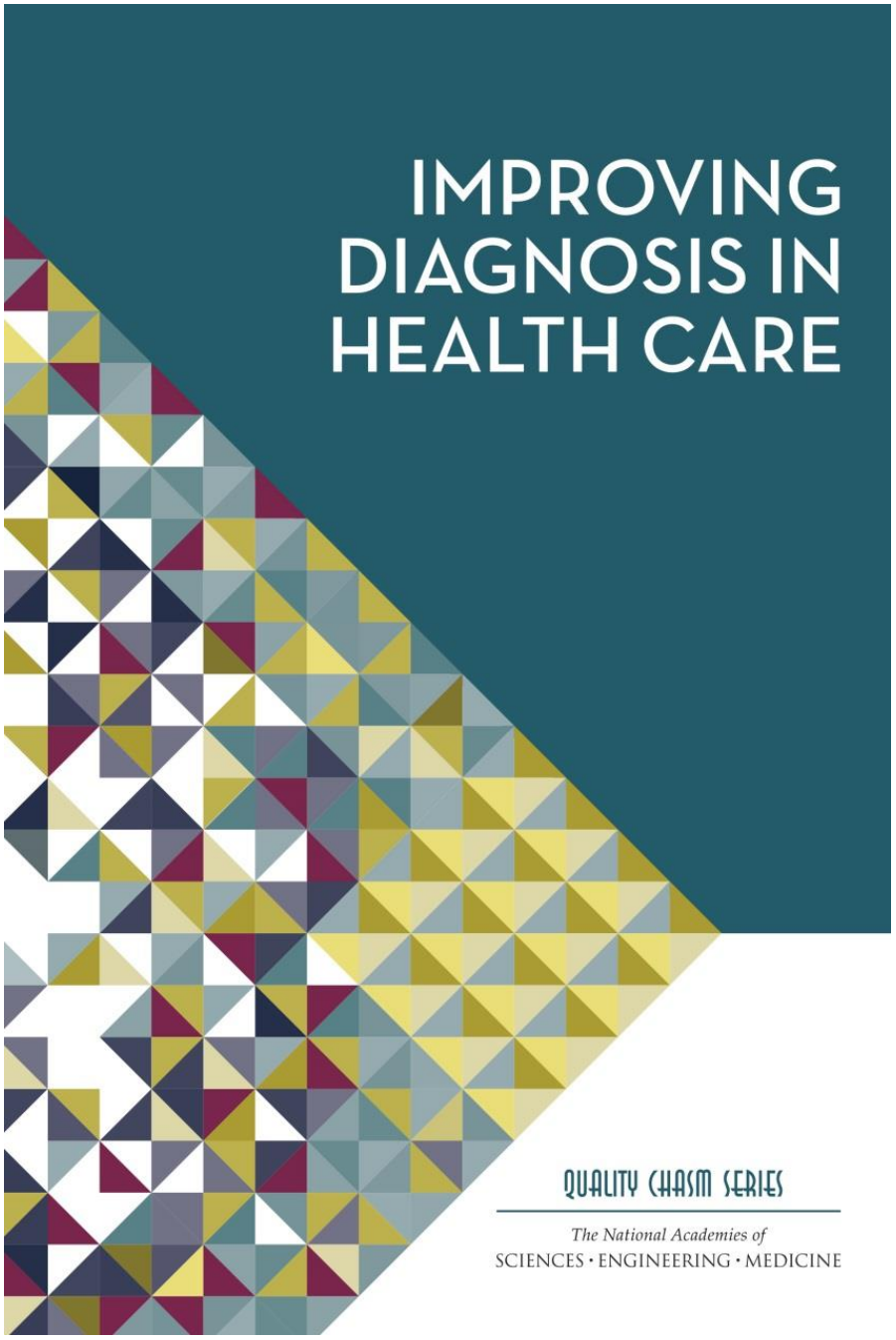
Top 10 Cognitive Biases

Premature Closure	Accepting a diagnosis before it has been fully verified
Anchoring	Tendency to fixate on specific symptom or piece of information early in the diagnostic process with subsequent failure to appropriately adjust
Confirmation Bias	Looking for confirming evidence to support one's diagnostic hypothesis, rather than disconfirming evidence to refute it
Search satisficing	Calling off search once a piece of data is found, and not considering/searching for additional findings or diagnoses
Availability Bias	Giving too much weight to diagnoses that come more readily to mind (e.g. recent dramatic case).

Top 10 Cognitive Biases

Base-Rate Neglect	Failing to adequately take into account prevalence of the disease (e.g erroneously interpreting positive test as indicating disease in a low prevalence population using test w/ 5% false + rate)
Knowledge Deficit	On part of provider, with accompanying lack of awareness
Framing bias:	Judgement overly influenced by the way problem was presented (how it was framed in words, settings, situations).
Social/Demographic Stereotype bias:	Biases from personal or cultural beliefs about women, minorities or other patient groups for whom prejudices may distort diagnostic assessment
Hindsight Bias	Inclination to retrospectively view a missed diagnosis as obvious; blame MD for dx others "would never have missed."

Schiff, Chapter 9 Harrisons Textbook of Medicine (2022) Crosskerry ,The Cognitive Auto



IOM Report
September
2015

SCIENTIFIC AMERICAN

SEPTEMBER 22, 2015 | 2 MIN READ

Most Americans Will Be Misdiagnosed at Least Once

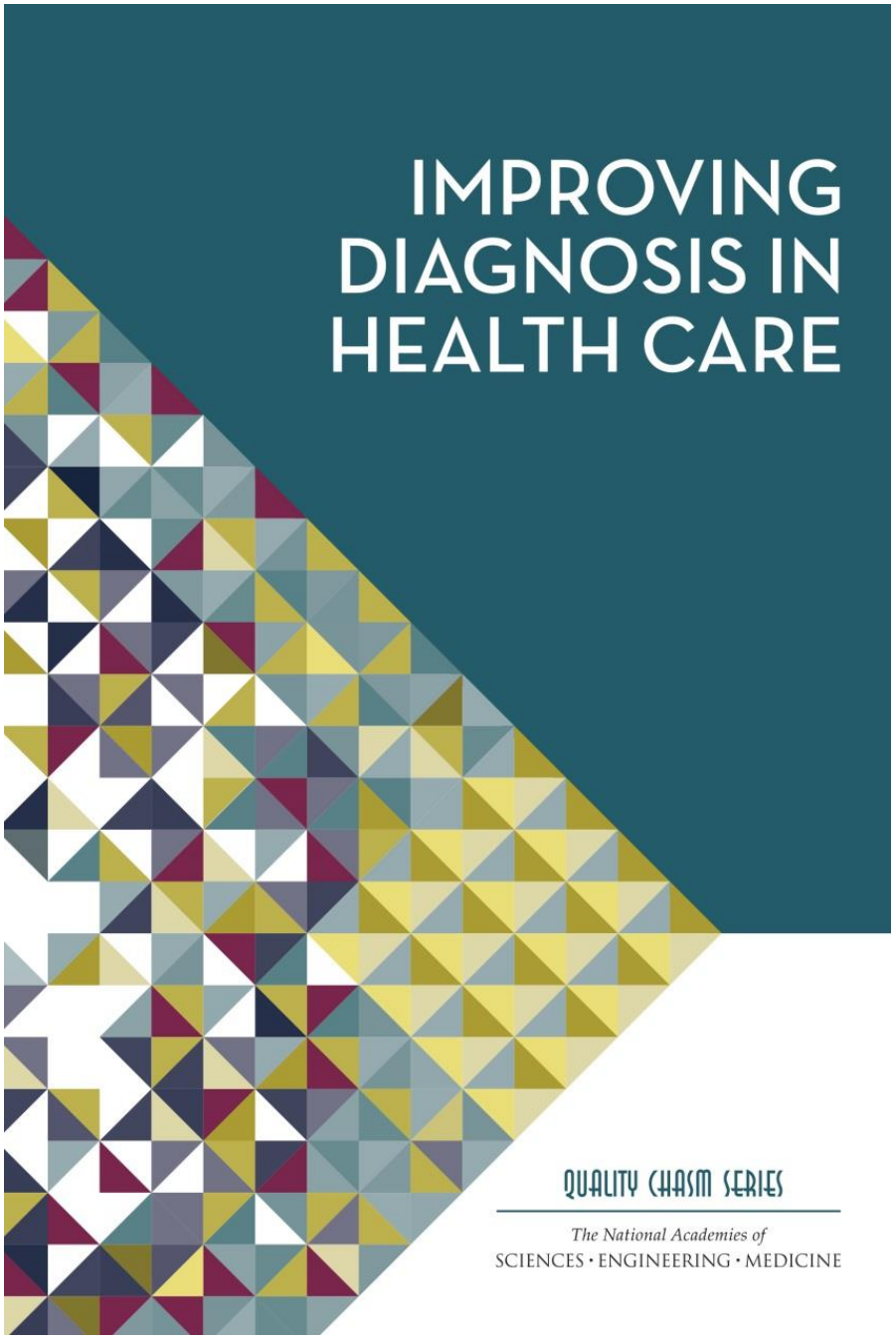
Alarming gaps in knowledge about diagnostic errors and medical delays require intense scrutiny, says an expert medical advisory group

BY DINA FINE MARON

Health

Most people in the U.S. will experience at least one misdiagnosis or delayed diagnosis in their lifetimes, according to a new report from the Institute of Medicine (IOM). Such mistakes—called diagnostic errors by physicians—could be as simple as failing to forward the results of a medical test showing that a patient recovered from a recent illness. Other errors can have

Improvement Ideas



IOM Report
September
2015

8 IOM Goals to Improve Diagnosis and Reduce Diagnostic Error

GOAL 1	Facilitate **more effective teamwork** in the diagnostic process among health care professionals, patients, and their families
GOAL 2	Enhance health care professional **education** and **training** in the diagnostic process
GOAL 3	Ensure that **health information technologies** support patients and health care professionals in the diagnostic process
GOAL 4	Develop and deploy approaches to **identify**, **learn from**, and **reduce** diagnostic errors and near misses in clinical practice

8 IOM Goals to Improve Diagnosis and Reduce Diagnostic Error

GOAL 5	Establish a **work system** and **culture** that supports the diagnostic process and improvements in diagnostic performance
GOAL 6	Develop a **reporting environment** and **medical liability system** that facilitates improved diagnosis through **learning from diagnostic errors and near misses**
GOAL 7	Design a **payment** and **care delivery environment** that supports the diagnostic process
GOAL 8	Provide **dedicated funding for research** on the diagnostic process and diagnostic errors

5 Practical Suggestions

- Create, cultivate, a **culture of diagnosis safety**
- Collect, **learn from**, **share**, **anticipate** dx **errors**
  - PRIDE Network ~ M&M Case Sharing
  - Become an expert on *diagnostic pitfalls*
- Ensure **closed loop** follow-up/feedback **systems**
  - Close the loop on tests, symptoms, and…misses
- Leverage **health IT,** clinical documentation
  - To overcome negatives, build on positive potential
- **Engage patients** to help **co-produce** better dx

1. Culture of Diagnostic Safety & Improvement

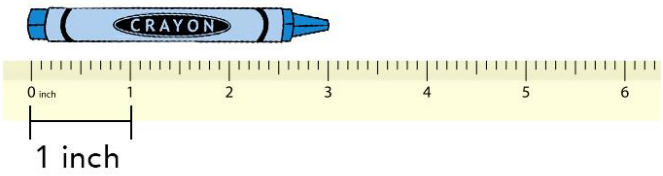
1. Driving out fear so no one afraid to ask questions, question a diagnosis, share when things go wrong
   - Dealing w/ adverse events replacing blame & fear, w/ learning & improvement
   - Freely share cases with colleagues building interest, avoiding defensiveness
2. Organization-wide commitment to improving diagnosis, learning from diagnosis delays, diagnostic process errors
   - Leadership/organizational recognition that misdiagnosis is the #1 top cause of patient-reported errors
   - Aggressive reporting, appreciative investigation, of adverse events
   - Relentless curiosity/worry/conferencing: what is wrong with patient; what might be missing, what can go wrong in system?
   - Obsession w/ details of dx process: what can go wrong, limitations of tests

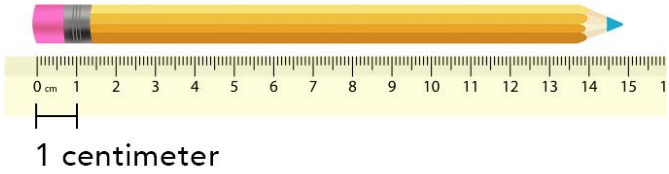
Schiff JGIM 2018

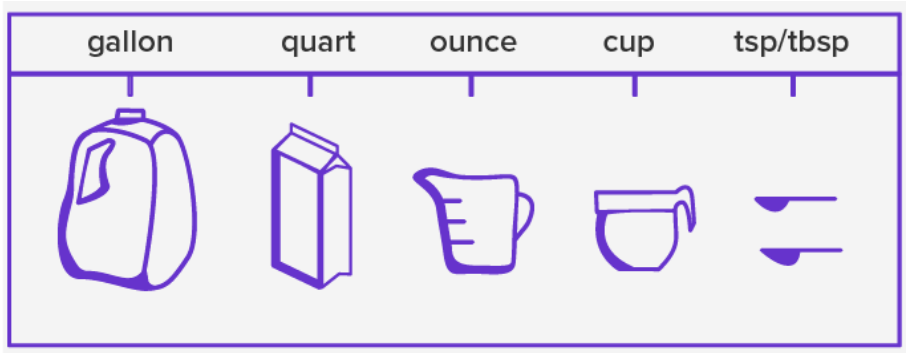
Culture of Diagnostic Safety & Improvement

3. Recognition uncertainty inherent in diagnoses, tests, illness presentation and evolution; anticipation of common pitfalls
   - Situational awareness local, disease specific, literature reported vulnerabilities/pitfalls.
   - Communication of uncertainties to patient, , families, in notes
   - Reliable, proactive, follow-up safety nets & feedback systems to detect and protect
   - Conservative approaches to testing, imaging
     - Enabled by shared decision-making and reliable follow-up
4. Respect human limitations, need for cognitive, process support
   - Decreased reliance on human memory, minimizing negative effects of stress, fatigue, fear, recognizing limited ability to truly multitask.
   - Redesign EMRs & communication systems to support cognition, collaborative diagnosis, and follow-up
5. Enhanced role for patient in co-producing diagnosis
   - Working collaboratively to formulate history, diagnosis, monitor course, raise and research questions

INSTRUMENTS TO MEASURE







New AHRQ Tool

Diagnostic Safety Supplemental Items for Medical Office SOPS

The SOPS® Diagnostic Safety Supplemental Items for the Medical Office Survey are designed to be used in conjunction with the core Medical Office SOPS to help medical offices assess the extent to which their organizations support the diagnostic process, accurate diagnoses, and communication around diagnoses. The supplemental items may be added to the end of the Medical Office Survey, just before the Background Questions, to assess content in areas not included in the core questionnaire.

The Diagnostic Safety Supplemental Items were developed and pilot tested for providers and staff and ask for their opinions about their medical office's processes around diagnosis.

- Diagnostic Safety Supplemental Items for the Medical Office Survey – English (Word, 120 KB; PDF, 204.5 KB).
- Diagnostic Safety Supplemental Items for the Medical Office Survey – Spanish (Word, 77 KB; PDF, 270 KB).

Topics Covered by the Diagnostic Safety Item Set

The Diagnostic Safety Supplemental Items address the following topic areas:

- Time Availability.
- Testing and Referrals.
- Provider and Staff Communication Around Diagnosis.

Pilot Study Results

Pilot study results are available for the Medical Office Diagnostic Safety Supplemental Items, which were administered to more than 800 providers and staff in 66

The following items ask about **your medical office's processes around diagnosis**. The processes start when a patient seeks care for a health problem, and include:

- Gathering, integrating, and interpreting information about the patient (e.g., clinical history, physical exam, test and imaging results, referrals),
- Making an initial diagnosis,
- Discussing the diagnosis with the patient, and
- Following up with the patient and revising the diagnosis over time, as needed.

New AHRQ Tool

Your Medical Office's Processes Around Diagnosis

SECTION F: Time Availability

How much do you agree or disagree with the following statements?	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1. The amount of time for appointments is long enough to fully evaluate the patient's presenting problem(s).....	☐1	☐2	☐3	☐4	☐5	☐9
2. Providers in this office have enough time to review the relevant information related to the patient's presenting problem(s)	☐1	☐2	☐3	☐4	☐5	☐9
3. Providers in this office finish their patient notes by the end of their regular workday	☐1	☐2	☐3	☐4	☐5	☐9

Surveys on Patient Safety Culture™

New AHRQ Tool

SECTION G: Testing

How much do you agree or disagree with the following statements?	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1. This office is effective at tracking a patient's test results from labs, imaging, and other diagnostic procedures	☐1	☐2	☐3	☐4	☐5	☐9
2. When this office doesn't receive a patient's test results, staff follow up	☐1	☐2	☐3	☐4	☐5	☐9
3. All test results are communicated to patients, even if the test results are normal	☐1	☐2	☐3	☐4	☐5	☐9

Surveys on Patient Safety Culture™

New AHRQ Tool

Pilot Test Diagnostic Safety Items – 08-11-2020

SECTION H: High Priority Referrals

How much do you agree or disagree with the following statements?	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1. This office is effective at tracking high priority referrals to outside providers	☐1	☐2	☐3	☐4	☐5	☐9
2. When this office makes a high priority referral to an outside provider, we provide relevant patient information with the referral (e.g., medical history, provider notes, test results).....	☐1	☐2	☐3	☐4	☐5	☐9
3. When this office makes a high priority referral, we try to confirm whether the patient went to the appointment	☐1	☐2	☐3	☐4	☐5	☐9

Surveys on Patient Safety Culture™

New AHRQ Tool

SECTION I: Provider and Staff Communication Around Diagnosis

How much do you agree or disagree with the following statements?	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1. Providers in this office encourage staff to share their concerns about a patient's health condition.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 9
2. Providers document differential diagnoses when they have **not** ruled out other diagnoses	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 9
3. When a provider thinks another provider in this office/system may have missed a diagnosis, they inform that provider	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 9
4. When a missed, wrong, or delayed diagnosis happens in this office, we are informed about it.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 9
5. Providers in this office talk directly with specialists/radiologists/pathologists when something needs clarification	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 9

2. Learn from Anticipate and Share Errors

Diagnostic Pitfalls

Diagnostic Risk
Situational Awareness

- Specialized type of situational awareness
- High reliability organizations/theory
  - High worry anticipation of what can go wrong
  - Preoccupied w/ risks recognizing/preventing
- Appreciation diagnosis uncertainty, limitations
  - Limitations of tests, systems' vulnerabilities
  - Knowing when "over head" need for help
- Making failures visible
- Don't miss diagnoses, red flag symptoms
- Diagnostic pitfalls – potentially useful construct

What is a **Diagnostic Pitfall**?

Clinical situations where patterns of, or vulnerabilities to errors leading to missed, delayed or wrong diagnosis

DECEMBER 28, 1912

The Journal of the American Medical Association

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VOL. LIX, No. 26 CHICAGO, ILLINOIS DECEMBER 28, 1912

DIAGNOSTIC PITFALLS IDENTIFIED DURING A STUDY OF THREE THOUSAND AUTOPSIES *

RICHARD C. CABOT, M.D.
BOSTON

I wish in this paper to make three points: 1. A goodly number of "classic" time-honored mistakes in diagnosis are familiar to all experienced physicians because we make them again and again. Some of these we can avoid; others are almost inevitable, but all should be borne in mind and marked on medical maps by a danger-signal of some kind: "In this vicinity look out for hidden rocks," or "Dangerous turn here, run slow." I shall enumerate some of these danger points presently.

2. Some common diseases are relatively inaccessible to diagnosis, no matter how carefully we are on the watch for them. From the study of 3,000 autopsies, I have begun to work out a percentage or ratio of accessibility for the commoner diseases (shown in the accompanying chart).

3. Besides the classic and well-known pitfalls there are some less familiar to the profession and needing all the more, therefore, to be marked "dangerous."

FREQUENT AND WELL-RECOGNIZED PITFALLS

poisoning, morphin habit, alcoholic neuritis, trichiniasis and gonorrheal infection. "Rheumatism" is one of the most dangerous of all diagnoses to the conscientious physician.

"Cystitis" is usually a symptom, not a disease. It points to disease below the bladder (stricture, obstructing prostate, etc.), or above it (renal tuberculosis and other renal infections) as its cause.

"Hemorrhoids" often mask cancer of the rectum.

"Neurasthenia." The real disease almost always shows itself in youth on the basis of congenital tendencies, though like tuberculosis it may be roused into active progress by any prolonged strain, mental or physical. When it appears after middle age it is almost always a symptom of organic disease such as dementia paralytica, chronic nephritis, arteriosclerosis, myxedema, hyperthyroidism or phthisis.

The incipient stages of the disease mentioned in the last sentence are rarely recognized. The same is true of gastric ulcer, pernicious anemia, leukemia, cirrhosis of the liver, congenital renal cysts, renal tuberculosis and many other diseases.

All this is trite and obvious, but I mention it to avoid the reproach of ignoring it.

As one looks at the accompanying chart of diagnoses one naturally asks: Whose success or failure does this represent? Where Smith and Jones have failed, could you and I have done better? I doubt it. The study of

he Journal of the
an Medical Association

Under the Auspices of the Board of Trustees

CHICAGO, ILLINOIS DECEMBER 28, 1912

NTIFIED DURING
THOUSAND
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T, M.D.

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JAMA Network Open

JAMA Open 2022

Original Investigation | Health Policy

Characteristics of Disease-Specific and Generic Diagnostic Pitfalls
A Qualitative Study

Gordon D. Schiff, MD; Mayya Volodarskaya, MD; Elise Ruan, MD, MPH; Andrea Lim, MD; Adam Wright, PhD; Hardeep Singh, MD, MPH; Harry Reyes Nieva, MAS, MA

Abstract

IMPORTANCE Progress in understanding and preventing diagnostic errors has been modest. New approaches are needed to help clinicians anticipate and prevent such errors. Delineating recurring diagnostic pitfalls holds potential for conceptual and practical ways for improvement.

OBJECTIVES To develop the construct and collect examples of "diagnostic pitfalls," defined as clinical situations and scenarios vulnerable to errors that may lead to missed, delayed, or wrong diagnoses.

DESIGN, SETTING, AND PARTICIPANTS This qualitative study used data from January 1, 2004, to December 31, 2016, from retrospective analysis of diagnosis-related patient safety incident reports, closed malpractice claims, and ambulatory morbidity and mortality conferences, as well as specialty focus groups. Data analyses were conducted between January 1, 2017, and December 31, 2019.

MAIN OUTCOMES AND MEASURES From each data source, potential diagnostic error cases were identified, and the following information was extracted: erroneous and correct diagnoses, presenting signs and symptoms, and areas of breakdowns in the diagnostic process (using Diagnosis Error Evaluation and Research and Reliable Diagnosis Challenges taxonomies). From this compilation, examples were collected of disease-specific pitfalls; this list was used to conduct a qualitative analysis of emerging themes to derive a generic taxonomy of diagnostic pitfalls.

RESULTS A total of 836 relevant cases were identified among 4325 patient safety incident reports, 403 closed malpractice claims, 24 ambulatory morbidity and mortality conferences, and 355 focus

Key Points

Question Are there similarities among clinical situations associated with diagnostic errors?

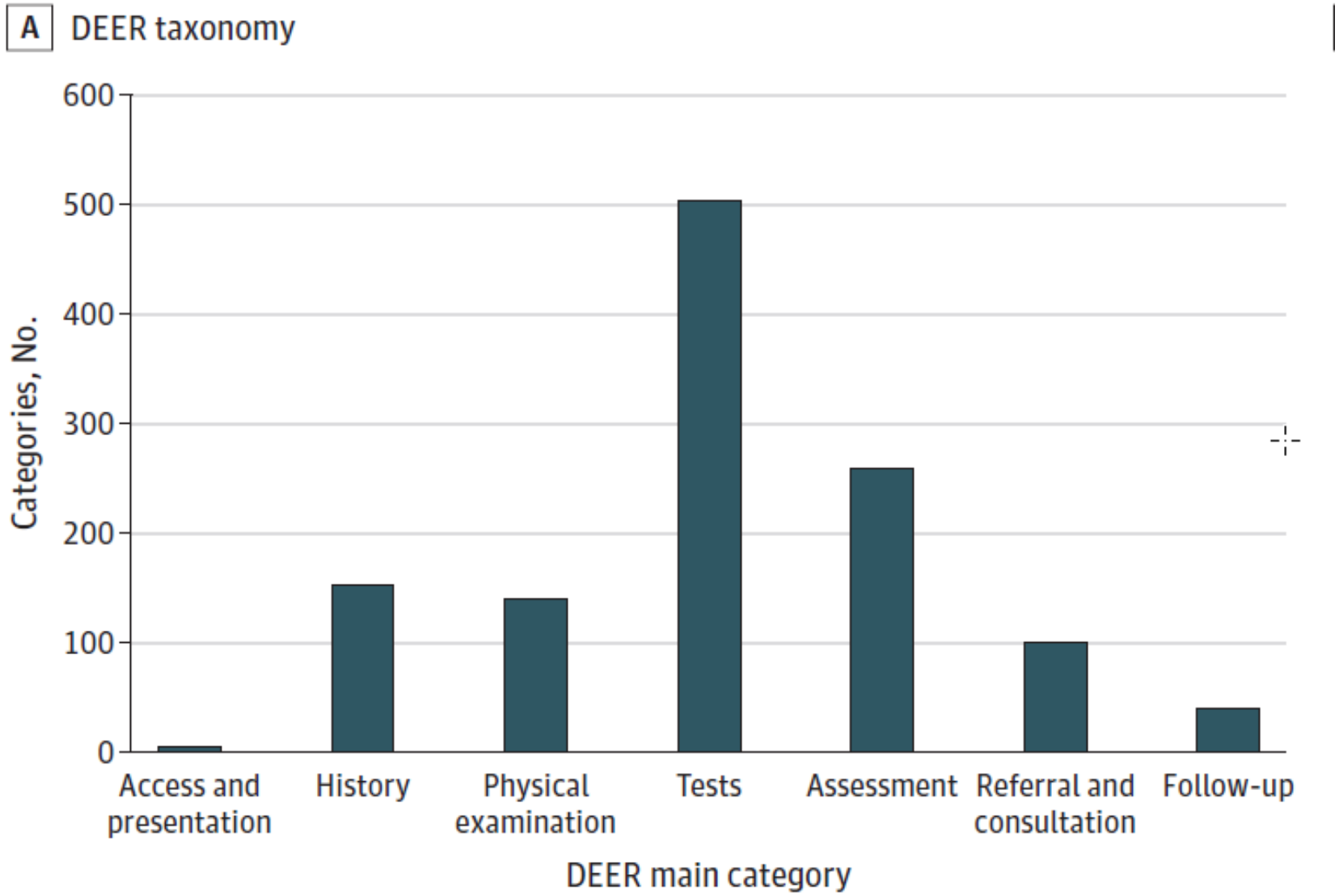
Findings This qualitative study identified 836 relevant cases among 4325 patient safety incident reports, 403 closed malpractice claims, 24 morbidity and mortality reports, and 355 focus group responses. From these 661 disease-specific and 21 generic diagnostic "pitfalls" were identified.

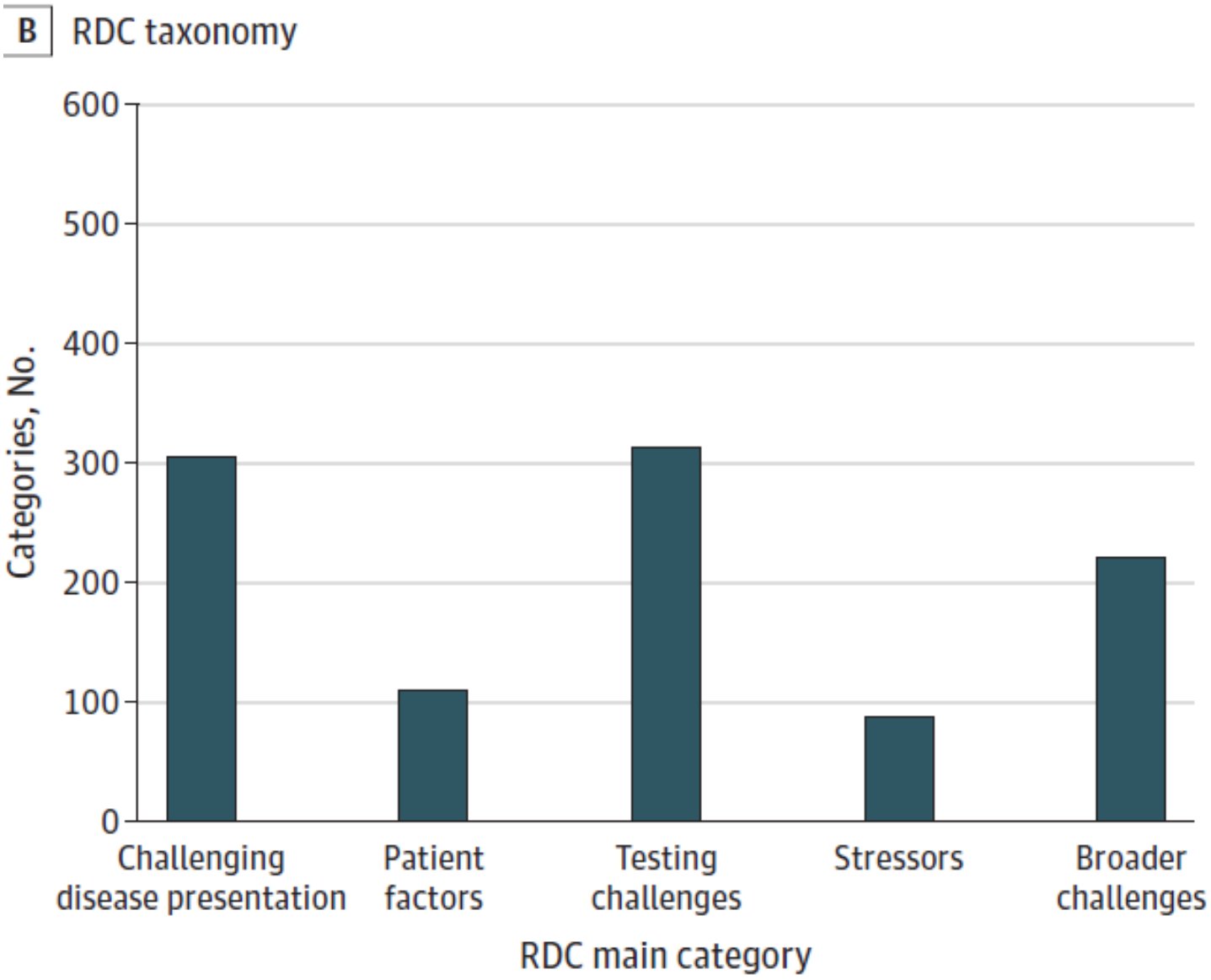
Meaning Diagnostic pitfalls represent potentially useful construct that bridge cognitive and systems diagnosis error approaches because they can delineate and demonstrate recurrent patterns of diagnostic error.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Figure 2. Classification by Diagnosis Error Evaluation and Research (DEER) and Reliable D




B
RDC taxonomy
600
500
400
300
200
100
0
Categories, No.
Challenging disease presentation
Patient factors
Testing challenges
Stressors
Broader challenges
RDC main category

PITFALL	EXAMPLES
Disease A mistaken for disease B Diseases often mistaken/misdiagnosed with each other	• Aortic dissection misdiagnosed as acute myocardial infarction 34% • Bipolar disorder misdiagnosed as depression 65%
Misinterpretation of test result(s) False-positive or false-negative results with failure to recognize test limitations	• Breast lump dismissed after negative mammogram 15% • Negative COVID-19 test early or late in course 28% day 1 of sx
Failure to recognize atypical presentation, signs, and symptoms	• Apathetic hyperthyroidism • Sepsis in elderly patient who is afebrile or hypothermic
Failure to assess appropriately the urgency of diagnosis Urgency of the clinical situation was not appreciated and/or delays critical diagnoses	• Compartment syndrome • Pericardial tamponade • Tension pneumothorax
Perils of intermittent symptoms or misleading evolution	• "Lucid interval" in traumatic epidural hematoma

	especially if urgent or treatable
Drug or environmental factor not considered/overlooked Underlying etiology causing/ contributing to symptoms, or disease progression not sought, uncovered	• Ventricular arrhythmia related to QT-prolonging drug • Achilles tendon rupture related to quinolone drugs
Failure to appreciate risk factors for particular disease	• Family history of breast, colorectal cancer not solicited and/or weighed in diagnostic evaluation or screening
Failure to appreciate limitations of physical exam Now with ↑ telemedicine, missing physical exam entirely	• Overweighing absence of tenderness, swelling in deep vein thrombosis • Missing pill-rolling tremor during telemedicine visit
Confusion arising from response/ masking by empiric treatment	• Empiric treatment with steroids, proton pump inhibitors, antibiotics, pain medication erroneously masking serious diagnosis
Chronic disease or comorbidity presumed to account for new symptoms Especially in medically complex patients	• Septic joint signs misattributed to chronic rheumatoid arthritis • Mental status change due to infection or medication misattributed to underlying dementia

Diagnostic Pitfalls	Overall (N=241)	Colon cancer (N=46)	Lung cancer (N=43)	Prostate cancer (N=34)	Breast cancer (N=33)	Myocardial infarction (N=29)	Sepsis (N=16)	Stroke (N=16)	Pulmonary Embolism (N=11)	Thyroid cancer (N=7)	Melanoma (N=6)
Failure to follow-up	28%	10	14	16	14	6	-	-	-	4	4
Limitations of a test or exam finding not appreciated	26%	5	12	8	14	12	-	4	2	3	2
Disease A repeatedly mistaken for Disease B	24%	9	11	5	-	12	6	8	3	-	4
Risk factors not adequately appreciated	16%	10	-	15	4	7	-	-	3	-	-
Atypical presentation	15%	-	-	4	15	8	3	7	-	-	-
Counter-diagnosis cues overlooked (e.g., red flags)	10%	21	-	-	-	-	4	-	-	-	-
Communication failures between primary care physician and specialist	7%	7	4	-	4	3	-	-	-	-	-
Issues surrounding referral	3%	-	-	3	-	4	-	-	-	-	-
Urgency not fully appreciated	2%	-	-	-	-	-	4	2	-	-	-
Chronic disease presumed to account for new symptoms	2%	-	-	-	-	-	3	1	-	-	-
Miscommunication related to lab ordering	1%	-	-	-	-	-	3	-	-	-	-
Evolving symptoms not monitored	1%	-	2	-	-	-	-	-	-	-	-

Examples of 50 Disease-Specific Pitfalls

A1. COVID Diagnosis Pitfalls

1. False negative COVID test results (PCR, home antigen) - depending on timing, technique.

2. COVID with no symptoms- pooled data shows 40% of patients are asymptomatic

3. Atypical presentations: patients presenting with ocular, cutaneous, delirium, thrombosis, hepatic

4. Deceptive Initial stability; later onset severe illness, unstable with cytokine storm

5. Confusion, complexity with AMI, PE - both as a competing diagnosis as well as a complication

A2. Non-COVID Diagnoses COVID Related Pitfalls

6. Delays in presentation, due to patient reluctance to come in for fear of exposure to COVID.

7. Missing physical exam (for fear of coming in; tele-visits) findings.

8. False positive antibody, PCR tests-which can be consequential (i.e. lead to assume safe to be exposed)

9. Influenza, RSV misdiagnosed as COVID

10. False + mammogram after vaccination
(false positive lymphadenopathy in 1st week after mRNA vaccine 1st dose 10.2% vs. 4.8 placebo patients; 2nd dose 14.2% vs. 3.9 placebo recipients).

B1. Cancer - Breast

11. False negative mammogram breast lump on exam mammogram ordered negative, falsely reassure patient

12. Ordering or doing *screening,* rather than *diagnostic* mammogram in a patient with a palpable breast lump (related to #11 above

13. Failure to suspect and diagnose in younger patients (9% of breast cancer in US in patients <45, despite this being cut-off age for initiating screening)

14. Failure to obtain, or update, family history. Neg 1st visit to MD, but next year 1st degree relative diagnosed

15. Erroneous alternate diagnoses in patients with presenting with as yet undiagnosed breast cancer. Incorrectly attributing symptoms to mastitis, fibrocystic disease.

16. Failure to appreciate false negative MMG screen mammography risk dense breasts, as well as recognize the ~2x risk dense breasts confer on patients.

B2. Cancer --Colorectal

17. Attributing rectal bleeding to hemorrhoids

18. Failure to repeat colonoscopy done i< 2 years prior, but continuing symptoms further time elapsing (i.e. now is 3 years)

19. Failure to obtain or update family history – initially negative but in next year 1st degree relative diagnosed but failure to capture/update family history risk.

20. Anemia (from LGI bleeding due to colon cancer) attributed to heavy menses

21. Distracting UGI lesion (e.g., gastritis) leading to search satisficing for source of + stool guaiac test/anemia.

B2. Cancer --Colorectal

22. Universal delayed return of Pathology report – overlooked because disconnected from colonoscopy report with failure to incorporate recommendations/timeframe .

23. False negative colonoscopy due to poor/inadequate prep (often with failure to carry out recommendations for more timely repeating of the test)

24. Pts declining colonoscopy- but with failure to revisit shared decision-making in subsequent visits or offer alternative screening

25. Deferring colonoscopy (at times indefinitely) in patients with competing medical issues. Can be at times appropriate (terminal lung cancer)

C. Cardiology

26. Failure to appreciate that echocardiogram findings are dynamic and reader dependent

26. Leg swelling, then ultrasound finding *chronic* DVT, misinterpreted as *acute* DVT (with erroneous starting of urgent anticoagulation)

27. Underlying dysautonomia failure to consider and test being dismissed as chronic fatigue, anxiety, lightheadedness, and/or palpitations, esp in younger pts

28. Cellulitis misdiagnosed in patients with stasis dermatitis who have red and swollen legs (often bilaterally, and chronically).

29. Labeling patients w/ PE as having heart failure, acute, coronary syndrome, syncope.

30. Misdiagnosing acute aortic dissection as acute MI (with grave potential consequences from erroneously anticoagulating in type A aortic dissection

31. PSVT- misdiagnosing patients, especially female patients, as having anxiety, or panic attacks

D. Infectious Diseases

32. Contaminated urine misinterpreted as UTI (multiple organisms), or related problem of overlooking true UTI organism because “contaminated” specimen dismissed

33. Too much consideration to Lyme disease, without considering other tick-borne illness like babesia.

34. New back pain, with anemia, failure to consider and dx spinal epidural abscess

35. Misinterpreting test characteristics based on disease stage (Covid, Lyme, syphilis, HIV) w/ (e.g., HIV) negative window for up to 90 days after exposure

36. False +HIV test, esp in lower resourced countries, (rates 5% or higher) due to over-interpretation of weakly + or cross reactivity due to HLA class II antigens

D. Infectious Diseases

37. Interferon-Gamma Release Assays (IGRAs), TB test TB: false negatives deu to errors collecting and transporting (must be processed 8-30 hours after collection while WBCs still viable); limited data on ability to predict clinical TB.

38. Absence or masking (by antipyretics) of fever erroneously interpreted as ruling-out infection . Failure to appreciate tachycardia as red flag for infection.

39. False negative blood cultures, (e.g., in endocarditis or sepsis) especially in pts partially treated with antibiotics.

40. Failure to note elevated eosinophil count (absolute or % on differential) in pts from country endemic for Strongyloides (particularly dangerous for pts given steroids, other immune suppressive Rx)

41. Missing necrotizing fasciitis in pts w/ rapidly progressive skin infections, esp w/ risks (diabetes, steroids) Often initially indistinguishable from benign soft tissue infections; failure to recognize key clues e.g. bullae and crepitus.

E. Urology

42. Falsely reassuring normal PSA level in pts on finasteride or prostatectomy--level is reduced by 50% w/ finasteride (thus should double result).
Likewise, *any* detectable PSA after a prostatectomy is abnormal.

43. Falsely elevated PSA levels in pts with very enlarged prostate (BPH)
PSA density issues).

44. Hydroureter/obstructive uropathy presenting silently. Progressive renal damage before obstruction is clinically evident, suspected, or ↑Cr noted.

45. Failure to note significant change-delta in PSA levels when the rising PSA is still withing the normal (i.e., < 4) range.

F. Miscellaneous

46. Endometriosis dismissed as “normal“ menstrual pain (despite severe disabling periods) or dyspareunia or IBD. Failure to refer for definitive diagnostic test (laparoscopy) even when suspected.

47. Bipolar misdiagnosed as depression (major depression disorder); or at rarer times other psychiatric diagnoses.

48. Failure to consider carbon monoxide toxicity due to non-specific vague sx (e.g. headache, dizziness, nausea, weakness, malaise, fatigue). Confused w/ flu since both seen winter months.

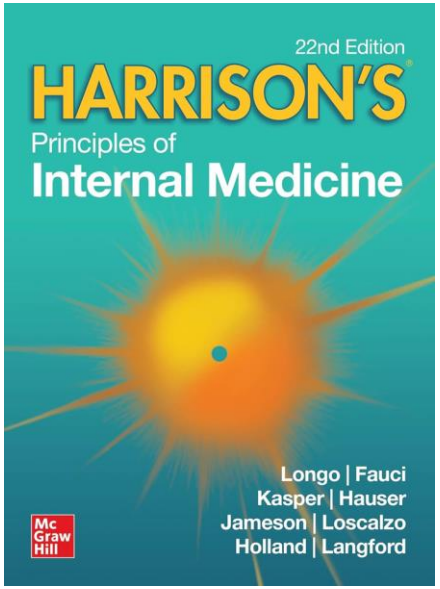
49. Foot pain due to a spinal lesion or spinal stenosis (not recognizing that pain originating way above the location of the pain).

50. Failure to consider drug etiology (many many drugs and clinical symptoms).

51. False negative ESR in temporal arteritis (sensitivity only 82-87%). Or even false negative temporal artery biopsy (reported rate false negative ~7%)

What if We Had a New Section for Each Disease in Harrison's or Up-to-Date?

- Definition
- Epidemiology
- Pathophysiology
- Diagnosis
  - Clinical Features
  - Differential Diagnosis
  - Testing
  - Diagnostic Pitfalls
- Management/Treatment
- Prognosis
- Prevention



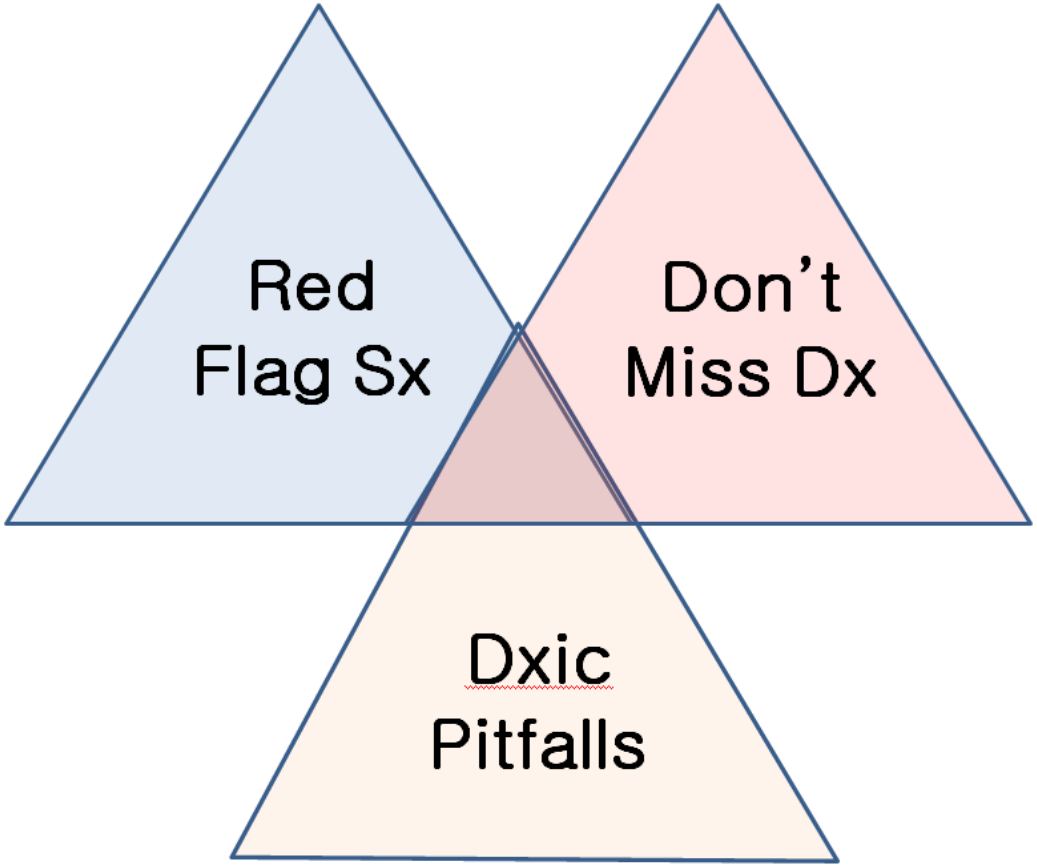
UpToDate®

OpenEvidence®

How about Alt-P

Info-button to display Context-aware Pitfalls?

Diagnostic Situational Awareness Model



Olson, Linzer, Schiff Measuring and Improving Diagnostic Safety in Primary Care JGIM 2021

Don’t Miss Diagnoses 4 R’s

4 R’s mandating acute dx/rx

- Rare
- Rapidly Progressive
- Remediable
- Really bad

> *Spinal cord compression*

> *Upper airway obstruction*

> *Pericardial tamponade*

Don’t Miss Diagnoses 4 C’s

4 C’s serious consequence misses

- Continuing exposures
- Contagious
- Chronically progressive
- Confusing

> *COVID*

> *Carbon monoxide poisoning*

> *TB*

> *Occupational Asthma*

Examples of “Don’t Miss Diagnoses

Infections/Inflammation	Cardiac/Ischemic/Bleeding	Metabolic/Hematologic/Environmental
Spinal epidural abscess	Aortic dissection Leaking/ruptured AAA	Diabetes ketoacidosis Hyperosmolar hyperglycemia
Necrotizing fasciitis	Pericardial tamponade	Myxedema/thyrotoxicosis
Meningitis	Wolff-Parkinson-White	Addison's disease
Endocarditis	Pulmonary embolism	B12 deficiency anemia
Peritonsillar abscess	Tension pneumothorax	von Willebrand disease
TB-active pulmonary, other	Acute mesenteric ischemia Sigmoid volvulus	Hemochromatosis
COVID-19 infection	Esophageal perforation	Celiac sprue
Guillain-Barre Syndrome	Cerebellar hemorrhage	Carbon monoxide poisoning
Temporal arteritis	Spinal cord compression	Food poisoning
Rhabdomyolysis	Testicular, ovarian torsion	Malignant hyperthermia
Angioedema	Ectopic pregnancy	Alcohol, benzo, barbiturate withdrawal

Schiff, Ch 10 Harrison’s Textbook of Medicine 2025

3. Closed Loop Systems

Diagnosis is Currently an Open Loop System

Water goes on the same time each day, regardless of whether it is raining or lawn is flooded

Schiff A J Med 2008

The American Journal of Medicine (2008) Vol 121 (5A), S38–S42

ELSEVIER

THE AMERICAN JOURNAL *of* MEDICINE®

Minimizing Diagnostic Error: The Importance of Follow-up and Feedback

An open-loop system (also called a "nonfeedback controlled" system) is one that makes decisions based solely on preprogrammed criteria and the preexisting model of the system. This approach does not use feedback to calibrate its output or determine if the desired goal is achieved. Because open-loop systems do not observe the output of the processes they are controlling, they cannot engage in learning. They are unable to correct any errors they make or compensate for any disturbances to the process. A commonly cited example of the open-loop system is a lawn sprinkler that goes on automatically at a certain hour each day, regardless of whether it is raining or the grass is already flooded.[1]

To an unacceptably large extent, clinical diagnosis is an open-loop system. Typically, clinicians learn about their diagnostic successes or failures in various ad hoc ways (eg, a knock on the door from a server with a malpractice subpoena; a medical resident learning, upon bumping into a surgical resident in the hospital hallway that a patient he/she improve diagnosis. Whereas their emphasis centers around the question of physician overconfidence regarding their own cognitive abilities and diagnostic decisions, I suspect many physicians feel more beleaguered and distracted than overconfident and complacent. There simply is not enough time in their rushed outpatient encounters, and too much "noise" in the nonspecified undifferentiated complaints that patients bring to them, for physicians, particularly primary care physicians, to feel overly secure. Both physicians and patients know this. Thus, we hear frequent complaints from both parties about brief appointments lacking sufficient time for full and proper evaluation. We also hear physicians' confessions about excessive numbers of tests being done, "overordered" as a way to compensate for these constraints that often are conflated with and complicated by "defensive medicine"—usually tests and consults ordered solely to block malpractice attorneys.

The issue is not so much that physicians lack an awareness of the thin ice on which they often are skating, but that

Exploration of an Automated Approach for Receiving Patient Feedback After Outpatient Acute Care Visits

Eta S. Berner, EdD[1], Midge N. Ray, RN, MSN[1], Anantachai Panjamapirom, PhD[2], Richard S. Maisiak, PhD[3], James H. Willig, MD[1], Thomas M. English, PhD[4], Marc Krawitz, MBA[5], Christa R. Nevin, MSPH[1], Shannon Houser, PhD[1], Mark P. Cohen, MD[6], and Gordon D. Schiff, MD[7]

[1]University of Alabama at Birmingham (UAB), Birmingham, AL, USA; [2]The Advisory Board Company, Washington, DC, USA; [3]Maisiak Consulting, Scottsdale, AZ, USA; [4]University of Massachusetts Medical School, Worcester, MA, USA; [5]Physician Innovations, LLC, Birmingham, AL, USA; [6]United Cerebral Palsy of Greater Birmingham, Birmingham, AL, USA; [7]Brigham and Women's Hospital, Boston, MA, USA.

55/338 (16%) → not improved
of whom only 21 (38%)
had contacted any clinician

BAC such
outc
Acco
Medi
low-t comes;
OBJ
cians

DESIGN: A three-phase cross-sectional study [live follow-up call three weeks after acute care visits (baseline), one week post-visit live call, and one week post-visit interactive voice response system (IVRS) call]

DOI: 10.1007/s11606-014-2783-3

Feedback –Key Role in Safety

- Structural commitment patient role to play
- Embodies/conveys message: uncertainty, caring, reassurance, access if needed
- Allows deployment of test of time, more conservative diagnosis
- Enables differential diagnosis
- Emphasizes that disease is dynamic
- Reinforces culture of learning & improvement
- Illustrates how much disease is self limited
- Makes invisible missed diagnoses visible

Examples of Feedback Learning

Feeding back to upstream hospital

- Spinal epidural abscess

IVR follow-up post urgent care visit

- UAB project

Dedicated Dx Error M&M

Autopsy Feedback

- 7/32 MDs aware disseminated CMV

ED residents post admission tracking

Feedback to previous service

Tracking persistent mysteries

Chart correction by patients

Radiology/pathology

- systematic second reviews

2nd opinion cases

- Best Doctors dx changed

Linking lab and pharmacy data

- to find signal of errors (missed ↑ TSH)

Urgent care

- call back f/up systems

Malpractice

- knock on the door

4. Health IT Clinical Documentation

4. Health IT & Clinical Documentation

The NEW ENGLAND JOURNAL of MEDICINE

Can Electronic Clinical Documentation Help Prevent Diagnostic Errors?

Gordon D. Schiff, M.D., and David W. Bates, M.D.

The United States is about to invest nearly $50 billion in health information technology (HIT) in an attempt to push the country to a tipping point with respect to the adoption of computerized records, which are expected to improve the quality and reduce the costs of care.[1] A fundamental question is how best to design electronic health records (EHRs) to enhance clinicians' workflow and the quality of care. Although clinical documentation plays a central role in EHRs and many questions about it persist. For example, can it be leveraged to improve quality without adversely affecting clinicians' efficiency? Will the quality of electronic notes be better than that of paper notes, or will it be degraded by the widespread use of templates and copied-and-pasted information?

A fundamental part of delivering good medical care is getting the diagnosis right. Unfortunately, diagnostic errors are common, outnumbering medication and surgical errors as causes ing physicians from the patient, discouraging independent data gathering and assessment, and perpetuating errors.[4] But we envision a redesigned documentation function that anticipates new approaches to improving diagnosis, not one that relies on the putative "master diagnosticians" of past eras. The diagnostic process must be made reliable, not heroic, and electronic documentation will be key to this effort. Systems developers and clinicians will need to reconceptualize documentation

BMJ Quality & Safety Online First, published on 7 August 2013 as 10.1136/bmjqs-2013-001

OPEN ACCESS

Use of health information technology to reduce diagnostic errors

Robert El-Kareh,[1,2] Omar Hasan,[3] Gordon D Schiff[4,5]

▸ Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/bmjqs-2013-001884).

[1]Division of Biomedical Informatics, UCSD, San Diego, California, USA
[2]Division of Hospital Medicine, UCSD, San Diego, California, USA
[3]American Medical Association, Chicago, Illinois, USA
[4]Division of General Medicine, Brigham and Women's Hospital, Boston, Massachusetts, USA
[5]Harvard Medical School, Boston, Massachusetts, USA

ABSTRACT

Background Health information technology (HIT) systems have the potential to reduce delayed, missed or incorrect diagnoses. We describe and classify the current state of diagnostic HIT and identify future research directions.

Methods A multi-pronged literature search was conducted using PubMed, Web of Science, backwards and forwards reference searches and contributions from domain experts. We included HIT systems evaluated in clinical and experimental settings as well as previous reviews, and excluded radiology computer-aided diagnosis, monitor alerts and alarms, and studies

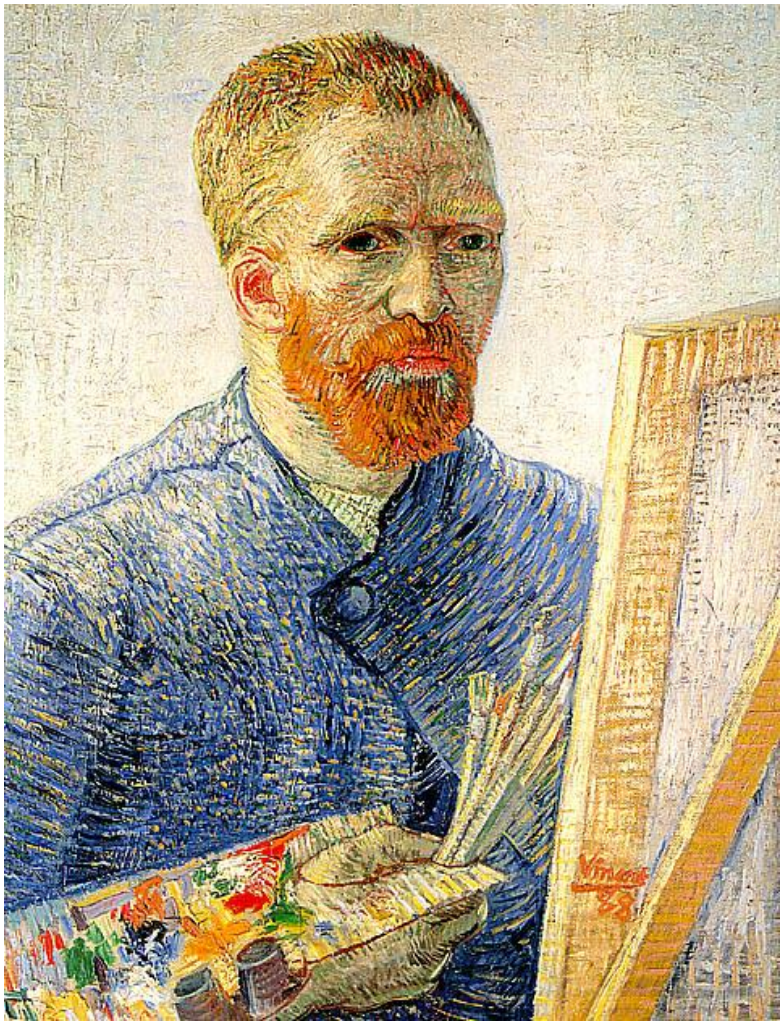
INTRODUCTION

Unaided clinicians often make diagno errors. Vulnerable to fallible hu memory, variable disease presentation, ical processes plagued by communica lapses, and a series of well-documer 'heuristics', biases and disease-specific falls, ensuring reliable and timely diagn represents a major challenge.[1–3] He information technology (HIT) tools systems have the potential to enable ph cians to overcome—or at least minimis these human limitations.

Despite substantial progress during 1970s and 1980s in modelling and si

Clinical Documentation

CYA



Van Gogh: Self-Portrait in Front of the Easel

Canvass for Your Assessment

Canvass for Your Assessment

10 WAYS HEALTH INFORMATION TECHNOLOGY CAN HELP PREVENT AND MINIMIZE DIAGNOSTIC ERRORS

FUNCTION	EXAMPLES
Facilitate collection/gathering of information	-Quickly access past history from prior care at same and outside institutions. -Electronic collection of history of present illness, review of systems, social determinant risks, in advance of visits
Enhanced information entry, organization, and display	-Visually enhanced flowsheets showing trends, relationships to treatment -Reorganized notes to facilitate summarization, simplification, and prevent items from getting lost
Generating Differential Diagnosis	-Automated creation of lists of diagnoses to consider based on patient's symptoms, demographics, risks
Weighing diagnoses likelihoods	-Tools to assist in calculation of post-test (Bayesian) probabilities
Aids for formulating diagnostic plan, intelligent test ordering	-Entering a diagnostic consideration (e.g., celiac disease, pheochromocytoma) and computer suggests most appropriate diagnostic test(s) and how to order

Modified from NEJM Schiff & Bates 2010

10 WAYS HEALTH INFORMATION TECHNOLOGY CAN HELP PREVENT AND MINIMIZE DIAGNOSTIC ERRORS

Access to diagnostic reference information	-Info-buttons instantly linking symptom or diagnosis relevant to Harrisons, Up-to-Date chapters, references
Ensuring more reliable follow-up	-Hardwiring "closed loops" to ensure abnormal labs, missed referrals, worrisome symptoms are tracked and followed-up
Support screening for early detection	-Collaborative tools that patients, clinicians, offices, can use to know when due, order and track screening based on individualized demographics, risk factors, prior tests
Collaborative diagnosis; access to specialist	-Real time posing/answering of questions -Electronic consults; virtual co-management
Facilitating feedback on diagnoses	-Feeding back new diagnoses (from downstream providers, patients) that emerge suggesting potential misdiagnosis/errors to clinicians, ERs who saw previously

Modified from NEJM Schiff & Bates 2010

JAMA 2023

VIEWPOINT

AI IN MEDICINE

Artificial Intelligence in Clinical Diagnosis
Opportunities, Challenges, and Hype

Prathit A. Kulkarni, MD
Medical Care Line, Michael E. DeBakey Veterans Affairs Medical Center, Houston, Texas; and Infectious Diseases Section, Department of Medicine, Baylor College of Medicine, Houston, Texas.

Hardeep Singh, MD, MPH
Center for Innovations in Quality, Effectiveness, and Safety (IQuESt), Michael E. DeBakey Veterans Affairs Medical Center and Baylor College of Medicine, Houston, Texas; and Health Services Research Section, Department of Medicine, Baylor College of Medicine, Houston, Texas.

ChatGPT, a generative artificial intelligence (AI) chatbot, has recently been hailed as a promising tool to improve health care quality. One study compared output from the AI chatbot for medical questions with answers from physicians[1]; other studies have evaluated the AI chatbot's responses to sample clinical vignettes.[2,3] A foundational aspect of high-quality health care—making a correct and timely diagnosis—remains a challenge in modern medicine despite decades of technological advances.[4,5] Therefore, any emerging technology with potential to reduce diagnostic errors warrants serious examination.

Recent literature provides some suggestions as to what role AI and the AI chatbot may have in assisting with diagnosis.[6-8] However, clinical diagnosis is both an art and a science, and is more challenging for AI to optimize than visual diagnostic interpretation, such as radiographic and pathologic diagnosis. Here, we provide a realistic overview of generative AI's role in clinical diagnosis to clarify hype, strengths, challenges, and future opportunities.

Diagnostic dilemmas are common in clinical medicine. Arriving at a patient's final diagnosis is a process that evolves over time and can include periods of uncertainty. One potential use of AI is to identify rare diagnoses or unusual presentations in particularly

tient's presentation. For example, dyspnea on exertion, anemia, and hyponatremia are classic general medicine problems, but clinicians often rely on their memory when performing their diagnostic evaluation, a fallible approach. Additionally, laboratory or radiographic findings might not be interpreted correctly by clinicians. AI chat platforms can be consulted, potentially in real time, to ensure that obvious diagnostic possibilities have not been overlooked. Ideally, the platform would be embedded into the electronic health record (EHR) to make this consultation highly efficient.

AI also has the advantage of being able to scan a patient's medical record faster than a person can. Clinicians often spend long periods trying to decipher a patient's story and longitudinal journey by clicking through scores of notes, laboratory trends, radiology and pathology reports, and additional diagnostic data. With associated visualization platforms, AI could display these data in a more intuitive way and potentially assist with nuanced interpretation of such cumulative historical data.

Despite these potential benefits of AI, fundamental limitations and challenges require careful consideration as AI is further integrated into medical care. Of paramount significance is that the accuracy of data

The NEW ENGLAND JOURNAL of MEDICINE

AI-Driven Clinical Documentation — Driving Out the Chitchat?

Gordon D. Schiff, M.D.[1,2]

For the past year, I have been using artificial intelligence (AI)–based documentation software to write the patient notes for my primary care practice. At its best, the software, which combines voice recognition with advanced AI technology to turn the transcript of a patient encounter into a completed note in less than 60 seconds, is awesome. Its ability to systematize a conversation into a "history of present illness," "physical exam," "results," and "assessment and plan," often with minimal or no errors, is both time-saving and transformative for my note-writing workflow. As a fast typist, I used to record my patients' comments in real time during each encounter, and I would be left with a jumble of quotes and notes that I'd have to spend the evening editing. Cleaning up these notes and crafting a succinct and (ideally) thorough, thoughtful, respectful, nuanced assessment of the patients and their problems took many nighttime hours, often spilling over to the weekend.

Although this new software sometimes makes mistakes, occasionally even serious ones (getting drug names wrong or omitting mention of important diagnoses), one of the things I noticed immediately was that it stripped out much of the "social" conversation. A patient's daughter is struggling with substance use; a patient and his wife are about to leave for a trip to Puerto Rico; another has a stressful new job; a patient loved or hated the annual music mix I give patients each holiday season.

5. Working w/ Patients to CO-PRODUCE Diagnosis

Role for Patient

In Minimizing and Preventing Diagnosis Error and Delay

- Seek timely access/care
- Reliable follow-up, continuity
- Keen observer, reporter sx
- Proactive on test results
- Sharing hunches
- Curiously reading on own
- Adhering w/ treatment empiric trial regimens
- Active as co-investigator
- Co-grappling with Uncertainty
- Being patient: time & tests
- Recruiting family for support
- Respecting limits on staff time, society resources
- Agreeing to disagree
- Help in building, maintaining trust and communication
- Getting involved with patient organizations

Key question is:
What will it take at the provider and institutional end to support these roles and help them flourish?

[1] Center for Innovations in Quality, Effectiveness and Safety, Michael E DeBakey Veterans Affairs Medical Center and Baylor College of Medicine Houston, TX, USA

[2] Department of Medicine, University of California San Francisco, San Francisco, CA, USA

[3] Medical Service, San Francisco Veterans Affairs Medical Center, San Francisco, CA, USA

Correspondence to: H Singh
hardeeps@bcm.edu. Twitter @HardeepSinghMD, @Denise_M_Connor, @Gurpreet2015

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PRACTICE POINTER

Five strategies for clinicians to advance diagnostic excellence

Hardeep Singh,[1] Denise M Connor,[2,3] Gurpreet Dhaliwal[2,3]

What you need to know

- The World Health Organization and the National Academy of Medicine (US) have identified measuring and reducing diagnostic error as a patient safety priority
- Diagnosis is a process that is influenced by systems, cognitive, teamwork, and social factors that may either enhance or reduce diagnostic accuracy
- Clinicians can integrate diagnostic performance feedback into their day-to-day work
- Clinicians can take steps to mitigate biases (regarding race, ethnicity, gender, and other identities) that run counter to their values and impair diagnostic performance
- Clinicians can integrate the expertise of other health professionals, patients, and families to reimagine the routines and culture around diagnosis

Diagnostic accuracy is an important component of clinical excellence. However, diagnostic errors—failures to establish an accurate and timely explanation of a patient's health problem or to communicate that explanation to the patient—harm patients worldwide.[1,2] In a recent UK study, diagnostic errors occurred in 4.3% of primary care consultations.[3] A meta-analysis estimated that nearly 250 000 harmful diagnostic errors occur annually among hospitalised adults in the United States.[4] The National Academies of Science, Engineering, and literature, expert opinion, and theoretical frameworks pertaining to diagnostic decision making and learning, we propose five strategies for clinicians to consider to achieve diagnostic excellence and reduce diagnostic error in their practice.

Why diagnostic errors occur

Diagnosis is a complex categorisation task driven by mental models (illness scripts and diagnostic schemas) that reside in long term memory. Through education and experience, clinicians form illness scripts that encapsulate their knowledge of specific conditions (such as osteoarthritis) and develop diagnostic schemas that structure their approach to a specific health problem (such as knee pain). This cognitive process intersects with systems, teamwork, and social factors that can enhance or reduce diagnostic accuracy.[14] Diagnosis is often a dynamic longitudinal process in which patients' clinical features evolve, multiple interactions with the healthcare system occur, and additional information surfaces.[15]

Multiple factors can contribute to a delayed or inaccurate diagnosis. Clinicians may be unaware of a disease, or a disease may manifest in an atypical way. However, most diagnostic errors involve common conditions that clinicians are aware of.[4,16-18] In these situations, diagnostic errors may result from inadequate data gathering, inadequate information

thebmj Visual summary

Advancing Diagnostic Excellence

Five strategies for clinicians

Diagnostic excellence involves making a correct and timely diagnosis using the fewest resources while maximising patient experience and managing uncertainty. Based on current scientific literature, expert opinion, and theoretical frameworks pertaining to diagnostic decision making and learning, we propose five strategies for clinicians to consider to achieve diagnostic excellence and reduce diagnostic error in their practice.

Strategy	Why	How
 **Seek feedback on diagnostic decisions**	Fosters better understanding of your own diagnostic accuracy Ensures better calibration of future decisions	Create an electronic list of patients where diagnosis-related questions remain Solicit feedback from colleagues and patients on your performance
 **"Byte" sized practice**	Test-enhanced learning promotes knowledge acquisition and skill development	Integrate brief diagnostic challenges from apps, social media, and medical journals into your daily routine
 **Consider biases**	Encourages awareness of fallibility in clinical decision making Promotes humility Increases recognition of the impact of harmful societal forces (such as racism) on diagnosis	Find common ground, foster individuation, and build empathy Use practice level data to identify harmful patterns in diagnostic evaluation Consider if alternative diagnostic possibilities would be entertained if a patient had a different background or identity
 **Make diagnosis a team sport**	Diagnosis is not just the purview of doctors alone	Flatten hierarchy and elevate voices of all health professionals on the diagnostic team Seek opportunities for group decision making with colleagues and invite patient concerns and opinions about diagnoses Use technology to augment decision making
 **Foster critical thinking**	Optimises data acquisition and interpretation throughout the diagnostic process	Take a sceptical stance towards your initial provisional diagnosis by looking for data to both support and contradict it Commit to monitoring and collecting more data and setting prompts for further investigation if the patient doesn't improve

Key Takeaway Messages

1. Diagnosis errors are frequent, important, and receiving increasingly attention
2. Venn Diagram conceptual model: Need to tease apart: *process errors* from *misdiagnosis*
3. Diagnostic Process can be broken down into discrete but interacting steps, each vulnerable to errors and potentially amenable/ripe for improvement.

Key Takeaway Messages

5. Five most promising areas for high leverage improvement
   - Diagnostic culture transformation
   - Learning from, anticipating, sharing errors, and pitfalls
   - Closed loop systems: role/need and how to design integrating feedback loops for tests, referrals
   - Leveraging the EMR: taming the beast
   - Working with patients to co-produce diagnosis

3 Questions – Patient Care

- 1. What else might this be?
  - Forcing a differential diagnosis to be made
- 2. What doesn't fit?
  - Making sure unexplained abnormal findings are not dismissed
- 3. What critical diagnosis are important not to miss ?
  - Injecting consideration of don't miss, red flags, known pitfalls

3 Questions – System of Care

- 1. Do we have reliable “closed loop” systems for tracking and following up sx, abnl labs or imaging, and important referrals ?
- 2. What is the culture of safety climate in our organization and office/clinic?
- 3. How does EMR help vs. get in the way of efficient, timely, accurate, and fail safe diagnosis; and how can it be improved?

Background Readings/References

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- Schiff, AI-Driven Clinical Documentation: Driving out the Chit-Chat? *NEJM* 2025
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Quiz Question 1
Which of the following is ***not true*** regarding diagnostic errors

A. Diagnostic errors are the #1 type of error reported by patients and allegation in malpractice claims

B. There are many types of failures in the diagnostic process that mostly do not result in patient harm or even misdiagnosis.

C. More important than "making" the exact right diagnosis initially is creating safety nets to ensure reliable follow-up, particularly in the patient is not responding or improving as expected.

D. Making sure patients do not interfere with clinicians thinking and making the correct diagnosis is a good strategy for preventing misdiagnosis.

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Quiz Question 2

Which of the following are ***not*** ways that EMRs can be leveraged to improve diagnosis and decrease errors

A. Provide a space to craft and share a narrative assessment, including differential diagnosis, degree of certainty, and contingency plan

B. Hard-wire delivery, acknowledgement and tracking of key lab results and referrals

C. Produce comprehensive, lengthy notes, to document extensive review of system questions that are copy and pasted from preceding visits and others' notes for billing and defensive medicine purpose

D. Facilitate easy access to reference material so that clinicians can more easily look up information

E. Aid in calculating post-test likelihood of various diseases using sensitivity, specificity and pre-test likelihood of that disease

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ChatGPT

Here are **10 board-style sample questions** covering core **conceptual themes in diagnostic safety**, aligned with what an **internal medicine resident** or practitioner might encounter in board prep, QI projects, or case conferences.

✅ 1. Diagnostic Reasoning and Bias

A 62-year-old man presents with 3 days of progressive shortness of breath and a productive cough. A trainee diagnoses him with COPD exacerbation based on his history and orders bronchodilators and steroids. His oxygenation worsens, and a chest CT later reveals a pulmonary embolism.

Which cognitive bias most likely contributed to the initial diagnostic error?

A. Blind obedience
B. Availability bias
C. Anchoring bias
D. Triage cueing bias

Contact information

Gschiff@bwh.Harvard.edu

Encourage you to send questions, feedback or request more information