STRATEGIES AND COLLECTIVE ACTION TO REDUCE DIAGNOSTIC ERRORS

Hardeep Singh & Laura Zwaan

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BMJ IHI Forum for Quality and Safety

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The burden of diagnostic errors

- 10-15% of the diagnoses are not entirely correct [1]
- Most people will experience a diagnostic error in their lifetime [2]
- Highly preventable and high mortality rates[3,4]
- Prevalent in malpractice claims [4]

1. Berner & Graber, Am J Med, 2008
2. National Academies of Medicine, 2015
3. Zwaan et al. Arch Intern Med, 2010
4. Bishop et al. JAMA, 2011

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Patient Safety Priority

National Academy of Medicine Report

Diagnostic Safety
WHO world patient safety day

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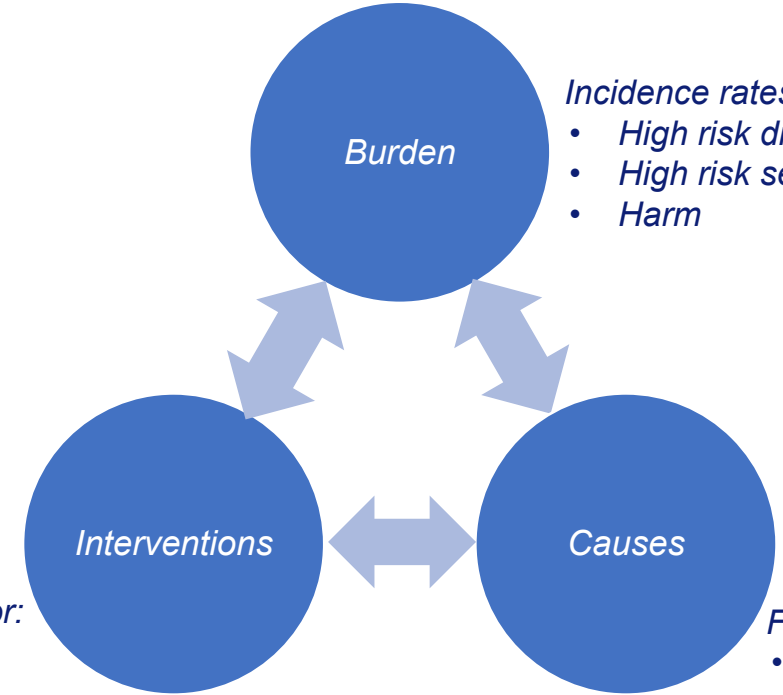
Diagnostic error research



Incidence rates of diagnostic error
- *High risk diseases*
- *High risk settings*
- *Harm*

Efforts to reduce diagnostic error:
- *Education*
- *System improvement*
- *Teamwork*
- *Patient involvement*
- *Health IT*

Factors contributing to diagnostic error:
- *Human error*
- *System*
- *Context*

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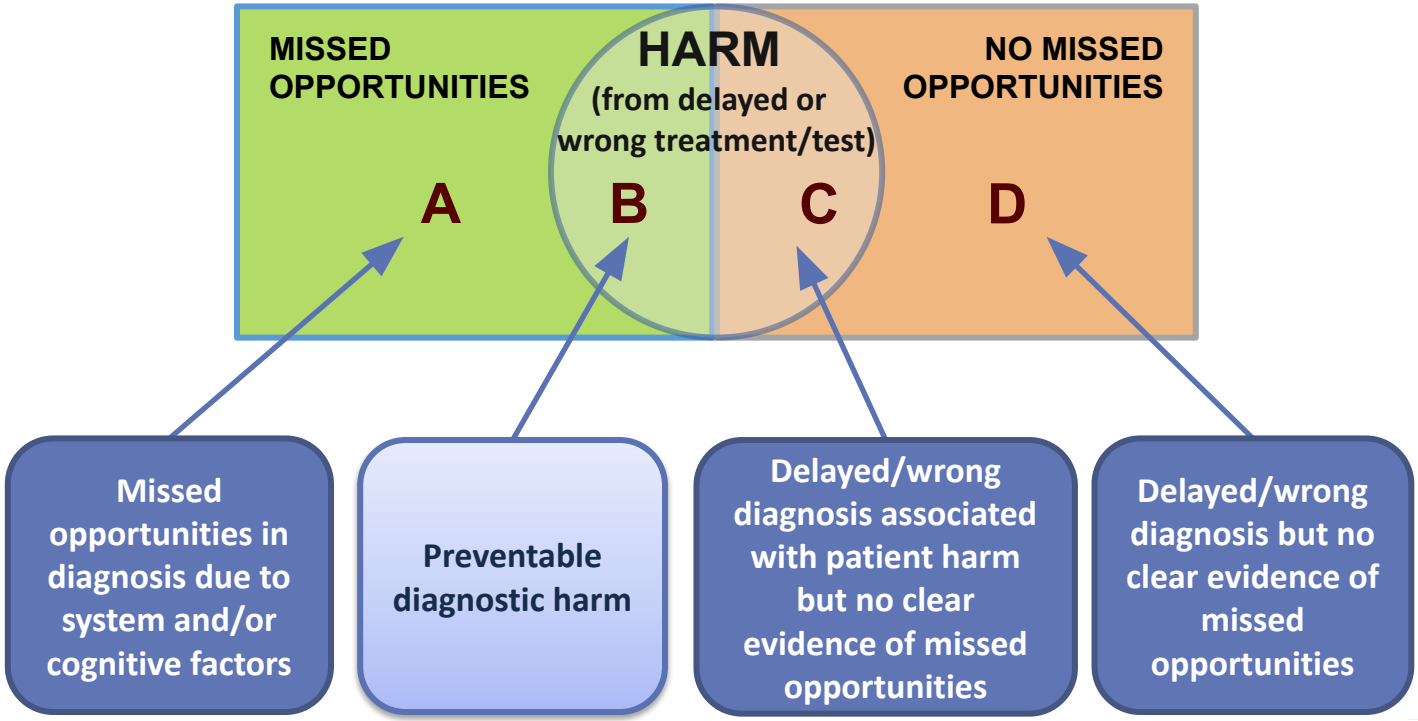
What is a diagnostic error?

	Definition	by
Diagnostic error	A diagnosis that was unintentionally delayed, wrong, or missed, as judged from the eventual appreciation of more definitive information.	Graber, 2005
Missed opportunities	Missed opportunities to make a correct or timely diagnosis based on the available evidence, regardless of patient harm.	Singh, 2014
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.	NAM, 2015
Diagnostic discrepancy	A difference between the diagnosis made at the time of patient admission (or initial evaluation) and the diagnosis established at the end of the hospital stay (discharge or follow-up)	Hautz, 2019
Diagnostic Adverse event	A diagnosis related unintended (physical or mental) injury that (2) resulted in prolongation of the hospital stay, temporary or permanent disability, or death and (3) was caused by health care management rather than the patient's disease.	AE studies

Defining Preventable Diagnostic Harm



Adapted from Singh, Jt Comm J Qual Pat Saf 2014

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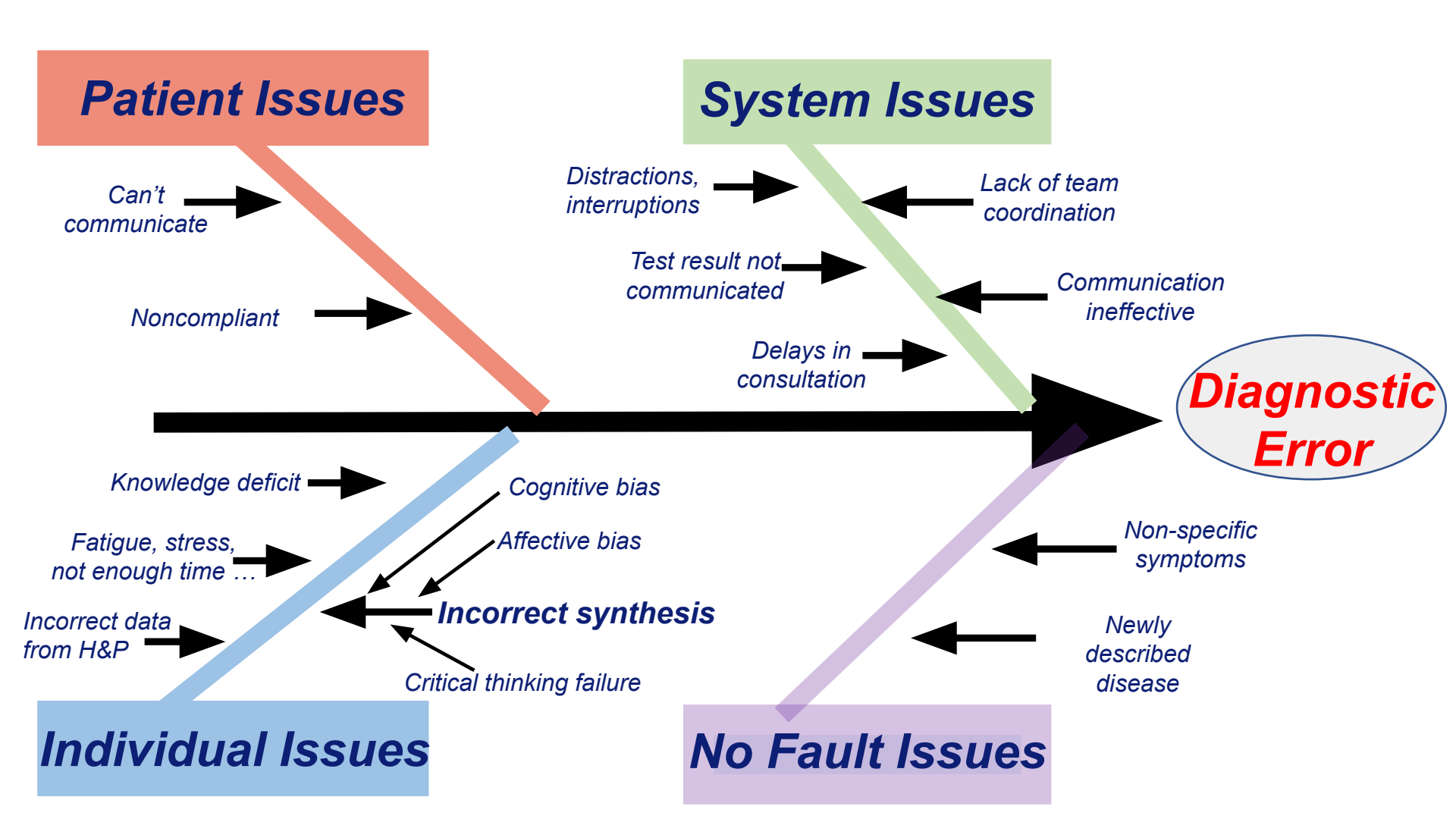
Patient Issues
System Issues
Can't communicate
Noncompliant
Distractions, interruptions
Test result not communicated
Delays in consultation
Lack of team coordination
Communication ineffective
Diagnostic Error
Knowledge deficit
Fatigue, stress, not enough time …
Incorrect data from H&P
Cognitive bias
Affective bias
Incorrect synthesis
Critical thinking failure
Non-specific symptoms
Newly described disease
Individual Issues
No Fault Issues

Complexity of the diagnostic process

1. A disease evolves over time

2. Balance of overdiagnosis and underdiagnosis

3. Dealing with uncertainty

Evolving disease

Healthy Pre-symptomatic Symptomatic Changes in disease

Time

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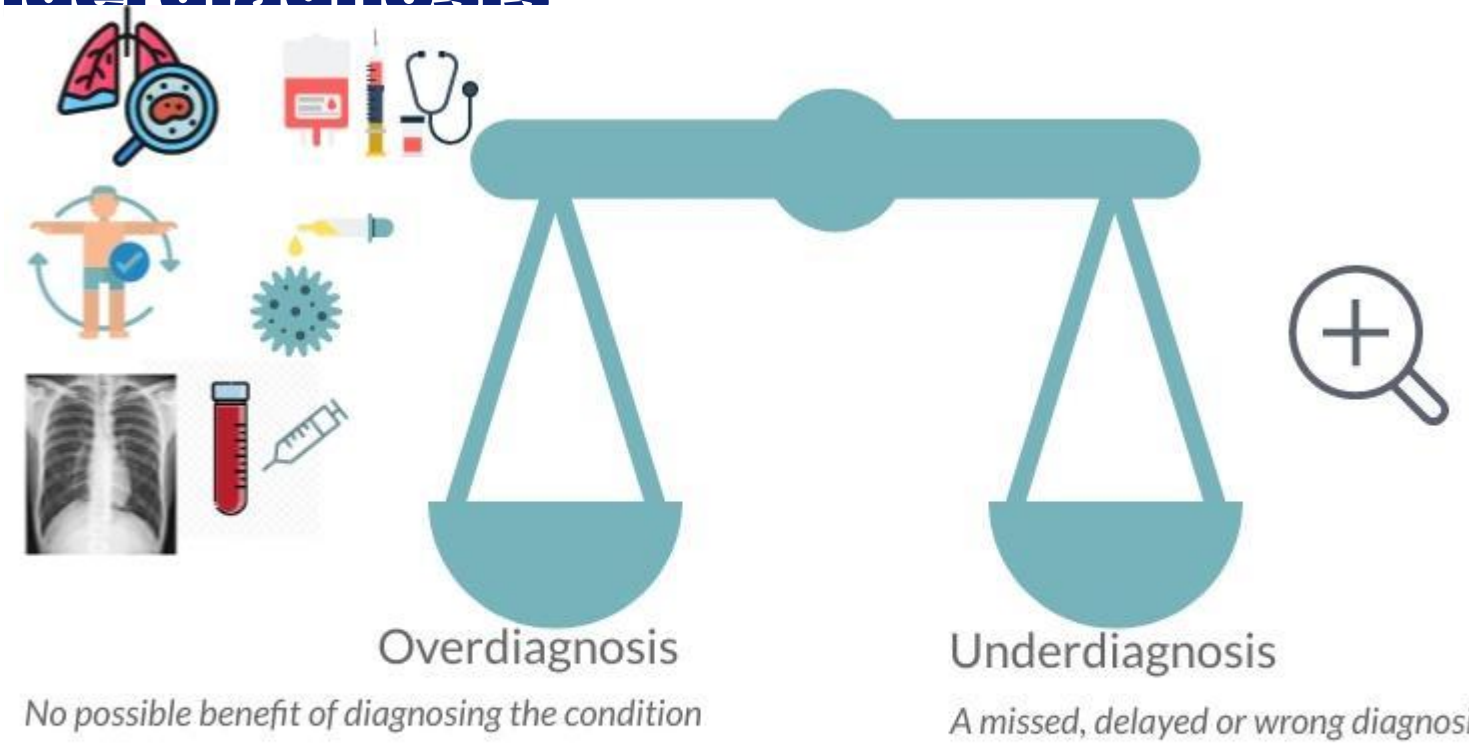
Balance of overdiagnosis vs underdiagnosis



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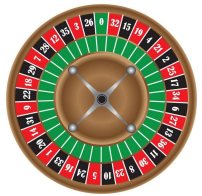
Singh, Dickinson et al. Can Fam Physician, 2018
Graber et al. Arch Intern Med, 2005

Types of decision making

- Decision making under certainty
  - The decision maker *knows with certainty* the consequences of every alternative

- Decision making under risk
  - The decision maker *knows the probabilities* of the various outcomes (risk)



- Decision making under uncertainty
  - The decision maker *does not know* the probabilities of the various outcomes

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Dealing with under uncertainty

Decision making under uncertainty

Patient history?

Heart attack?

Pulmonary embolsim?

Family history?

Smoker?

High blood pressure?

Diabetes?

Overweight

Aorta dissection?

Age?

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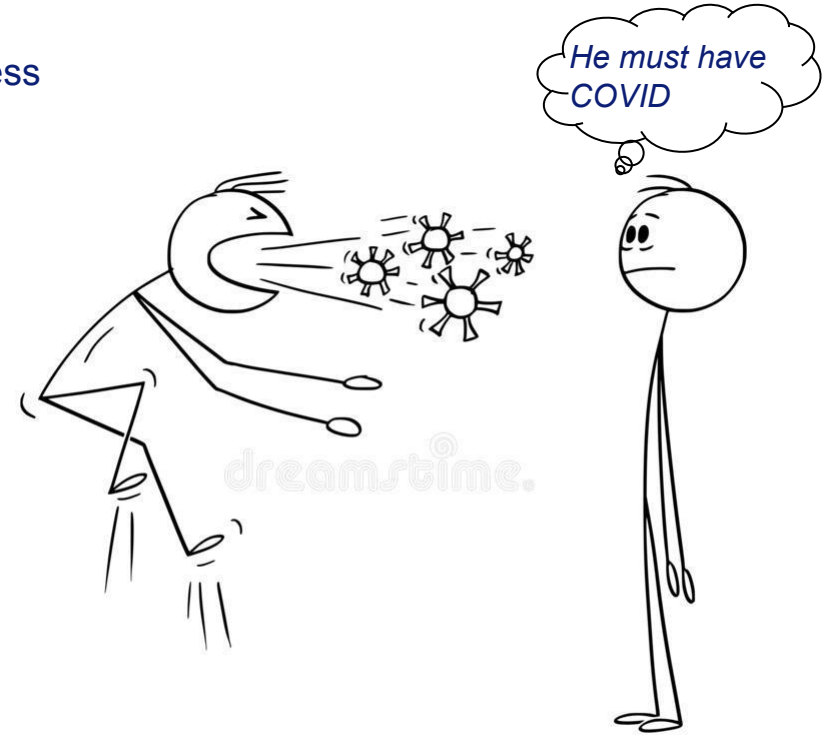
Zwaan & Hautz, BMJ Qual Saf, 2019

Coping with the challenges

Heuristics: Shortcuts in the reasoning process

- Representativeness heuristic
- Availability heuristic



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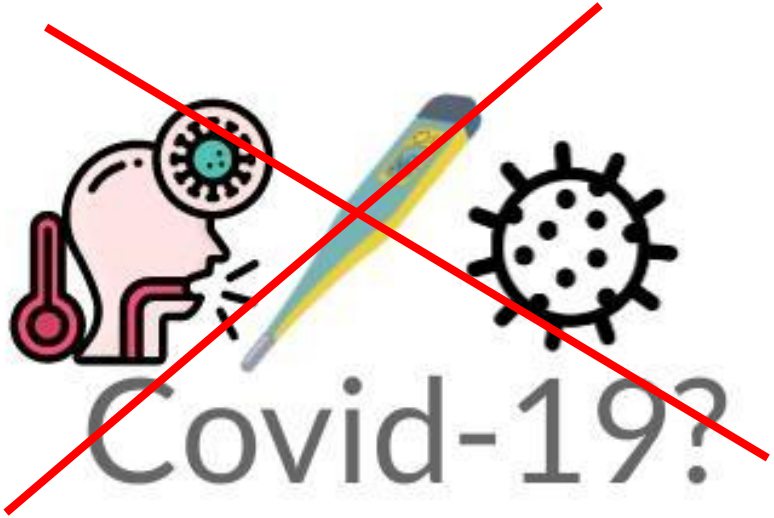
Cognitive biases

Failed heuristic can result in a cognitive bias

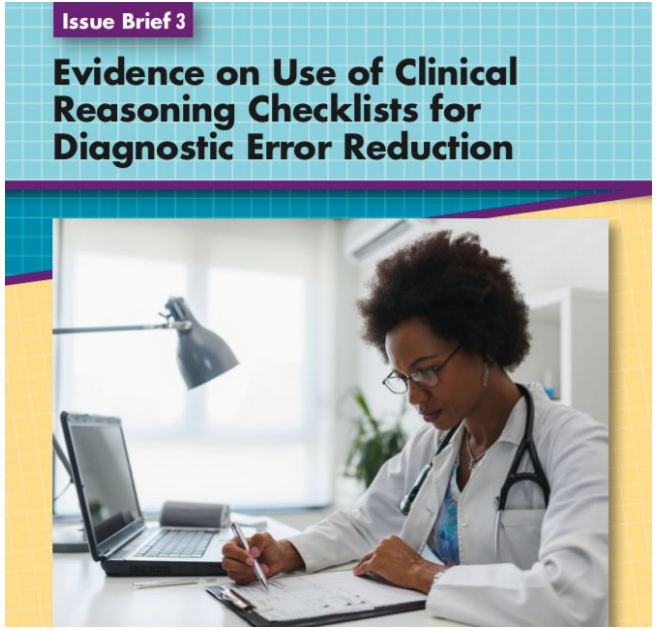
- Representativeness bias
- Availability bias



Knowledge is key

- Correct and extensive knowledge representations are key

- Little/no effect:
  - General debiasing (awareness of biases)
  - General checklists (slow down, reconsider)



Zwaan & Staal, AHRQ brief, 2020

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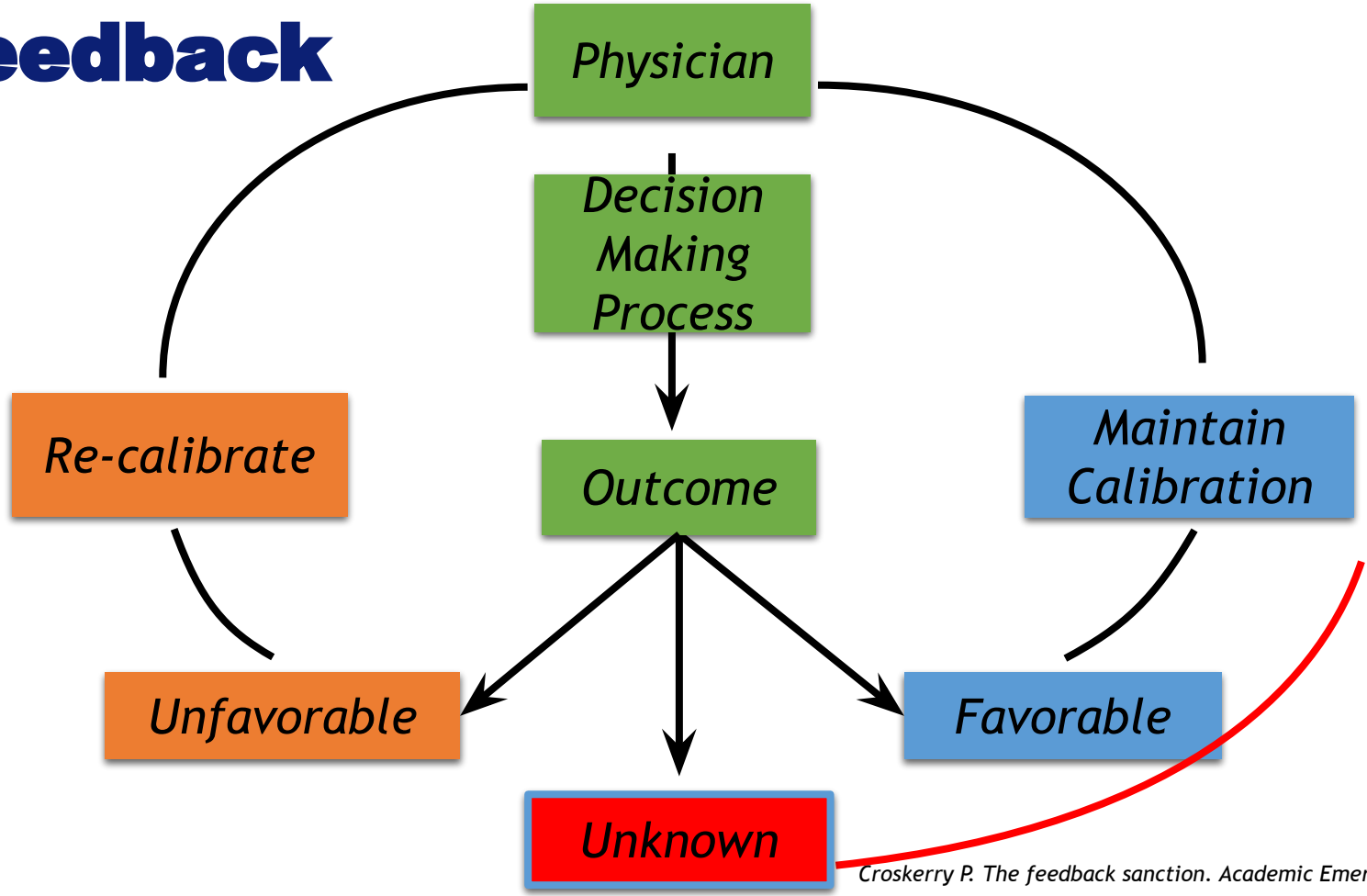
Feedback



Croskerry P. The feedback sanction. Academic Emergency Med 2000.

Reducing Diagnostic Errors in Healthcare Through Science, Policy and Practice

Hardeep Singh, MD, MPH

Center for Innovations in Quality, Effectiveness & Safety (IQuESt)

Michael E. DeBakey VA Medical Center

Baylor College of Medicine, Houston

Social media: LinkedIn and Bluesky

Themes from Research Studies

Common diseases missed

Missed opportunities to elicit or act upon key clinical findings (history/exam)

Overlooking information in medical record

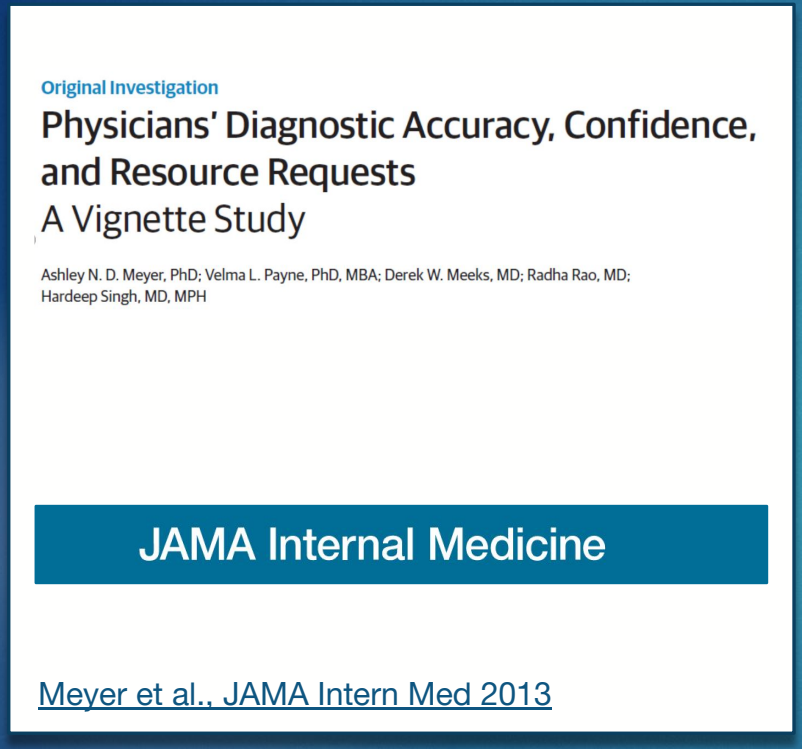
Singh et al JAMA IM 2012; Singh et al Arch IM 2009

Diagnostic Excellence

Make correct & timely diagnosis

- Use **fewest** resources
- Maximize **patient experiences**
- Manage and communicate **uncertainty** to patients
- Tolerates **watchful waiting** when unfocused treatment may be harmful

Meyer AND, Singh H. The Path to Diagnostic Excellence Includes Feedback to Calibrate How Clinicians Think.



Original Investigation

Physicians' Diagnostic Accuracy, Confidence, and Resource Requests

A Vignette Study

Ashley N. D. Meyer, PhD; Velma L. Payne, PhD, MBA; Derek W. Meeks, MD; Radha Rao, MD; Hardeep Singh, MD, MPH

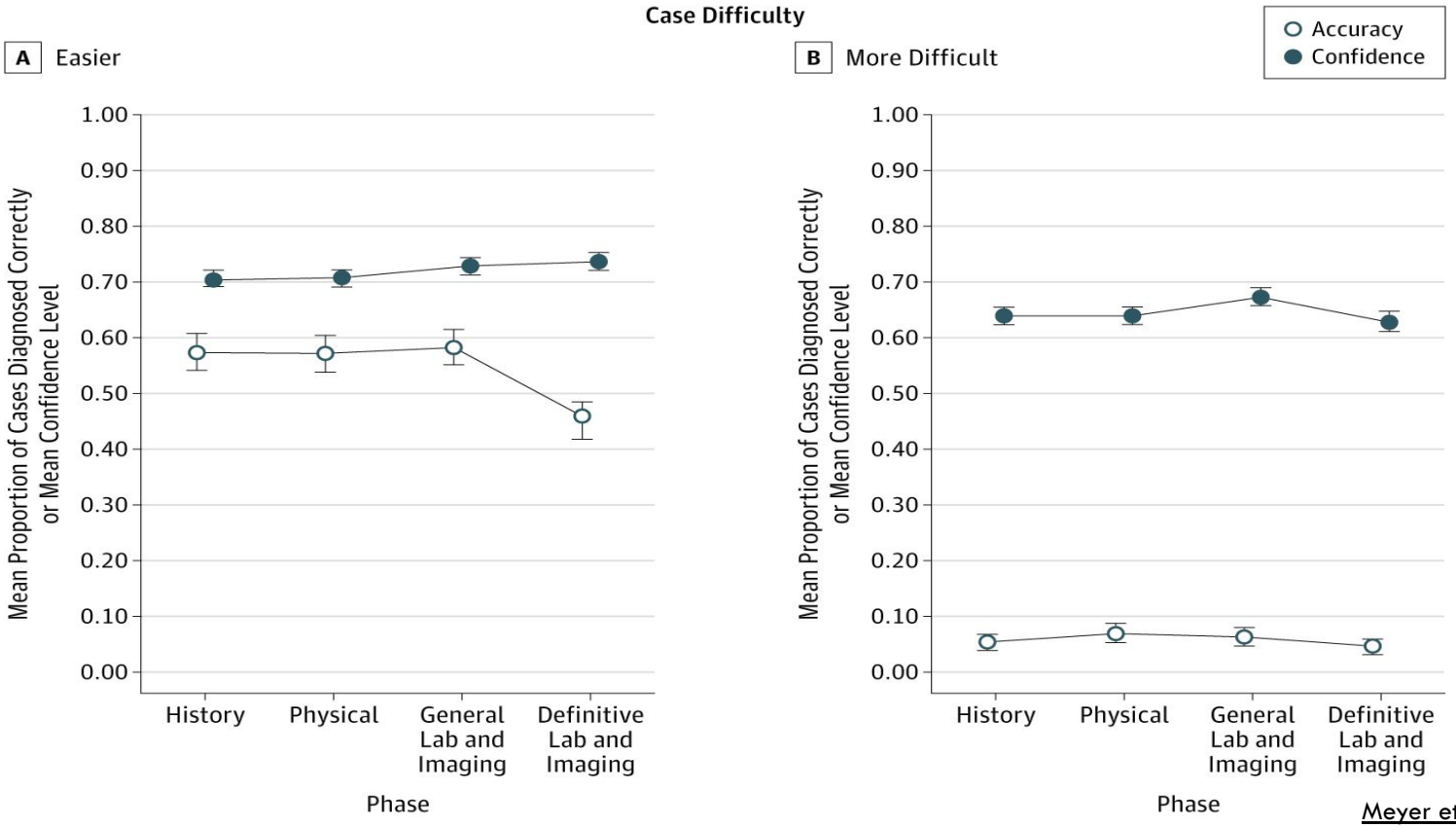
JAMA Internal Medicine

Meyer et al., JAMA Intern Med 2013

Quest for Calibration

Diagnostic Accuracy and Confidence

Diagnostic Accuracy versus Confidence



Meyer et al., JAMA Intern Med 2013

Physicians' diagnostic accuracy and confidence not aligned

= Miscalibration

Physicians may not seek help (either from humans or decision support systems) when they most need it

Engaging Clinicians

Studies have engaged frontline physicians in reporting

Frontline provider engagement, leadership support and physician champion/s


Quality Reports

PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Increasing Physician Reporting of Diagnostic Learning Opportunities

Trisha L. Marshall, Anna J. Ipsaro, Matthew Le, Courtney Sump, Heather Darrell, Kathleen G. Mapes, Julianne Bick, Sarah A. Ferris, Benjamin S. Bolser, Jeffrey M. Simmons, Philip A. Hagedorn and Patrick W. Brady

Pediatrics January 2021, 147 (1) e20192400


BMJ Journals

Volume 33, Issue 4

Emergency Medicine Journal

Using voluntary reports from physicians to learn from diagnostic errors in emergency medicine

Nnaemeka Okafor, Velma L Payne, Yashwant Chathampally, Sara Miller, Pratik Doshi, Hardeep Singh

Seek feedback on diagnostic decisions

Make diagnosis a team sport

"Byte" sized practice

Foster critical thinking

Consider biases

PRACTICE POINTER

thebmj

Five strategies for clinicians to advance diagnostic excellence

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

https://www.ahrq.gov/patient-safety/settings/multiple/calibrate-dx.html

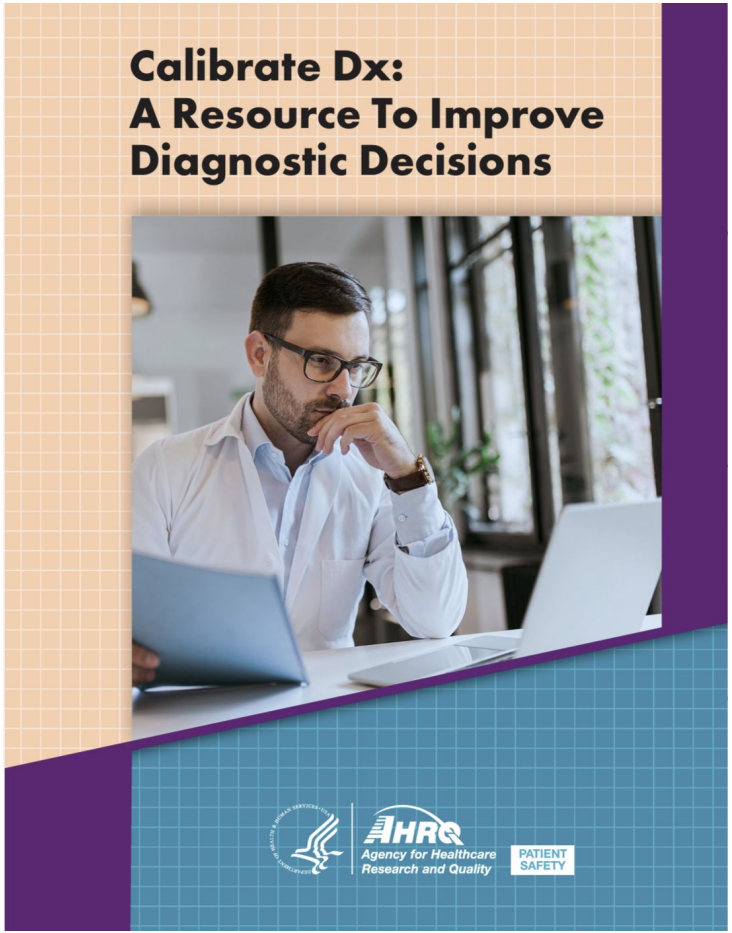


TABLE 1. Diagnostic Calibration Learning and Improvement Cycle

STEP	ACTIVITY
SPECIFY the calibration task	Choose an area of practice for which you would like to be better calibrated. You will likely learn more by focusing on a specific area of practice than reviewing your cases at random.
EVALUATE diagnostic performance using self-assessment and peer feedback tools in this resource	Select a small sample of your cases, review them for learning opportunities, and seek further feedback from a colleague.
PLAN AND APPLY improvement strategies and continuously monitor performance	Identify improvement strategies for yourself (and, when appropriate, your team and your system), and begin to take appropriate action. Repeat the previous steps at regular intervals.
REFLECT on this exercise and adjust if needed	Reflect on this calibration exercise over time, evaluate additional areas of interest, and make adjustments as needed.

Mechanisms to Engage Patients

HealthAffairs VOL. 37, NO. 11: PATIENT SAFETY

Learning From Patients' Experiences Related To Diagnostic Errors Is Essential For Progress In Patient Safety

Traber Davis Giardina[1], Helen Haskell[2], Shailaja Menon[3], Julia Hallisy[4], Frederick S. Southwick[5], Urmimala Sarkar[6], Kathryn E. Royse[7], and Hardeep Singh[8]See fewer authors

ORIGINAL RESEARCH

Use of patient complaints to identify diagnosis-related safety concerns: a mixed-method evaluation

Traber D Giardina ,[1,2] Saritha Korukonda,[3] Umber Shahid,[1,2] Viralkumar Vaghani,[1,2] Divvy K Upadhyay,[4] Greg F Burke,[4,5] Hardeep Singh [1,2]

Journal of the American Medical Informatics Association, 29(6), 2022, 1091–1100
https://doi.org/10.1093/jamia/ocac036
Advance Access Publication Date: 29 March 2022
Research and Applications

AMIA INFORMATICS PROFESSIONALS: LEADING THE WAY.

Research and Applications

Inviting patients to identify diagnostic concerns through structured evaluation of their online visit notes

Traber D. Giardina[1], Debra T. Choi[1], Divvy K. Upadhyay[2], Saritha Korukonda[2], Taylor M. Scott[1], Christiane Spitzmueller[3], Conrad Schuerch[2], Dennis Torretti[2], and Hardeep Singh [1]

OpenNotes®

Patients Priorities for Research

Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.journals.elsevier.com/patient-education-and-counseling

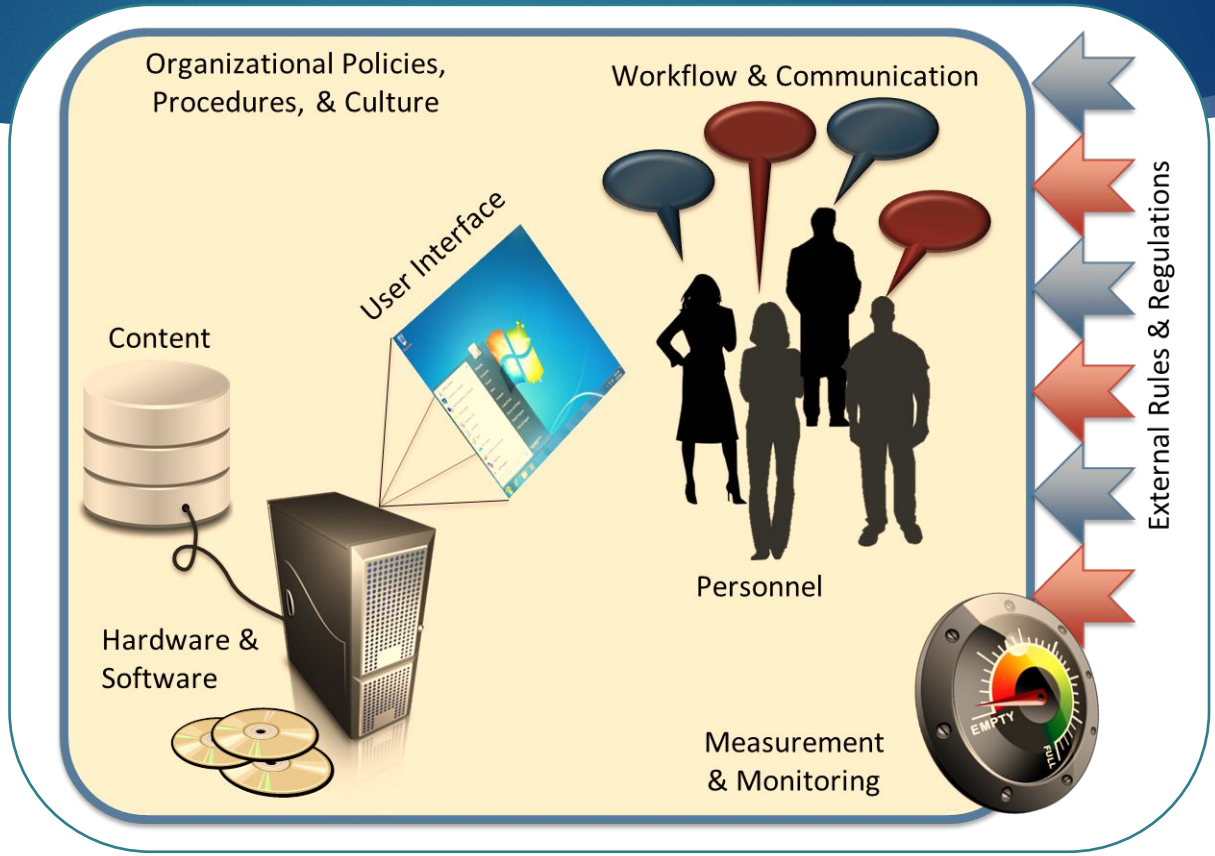
Short communication

Patient generated research priorities to improve diagnostic safety: A systematic prioritization exercise

Laura Zwaan [a,*], Kelly M. Smith [b,c], Traber D. Giardina [d,e], Jacky Hooftman [a,f], Hardeep Singh [d,e]

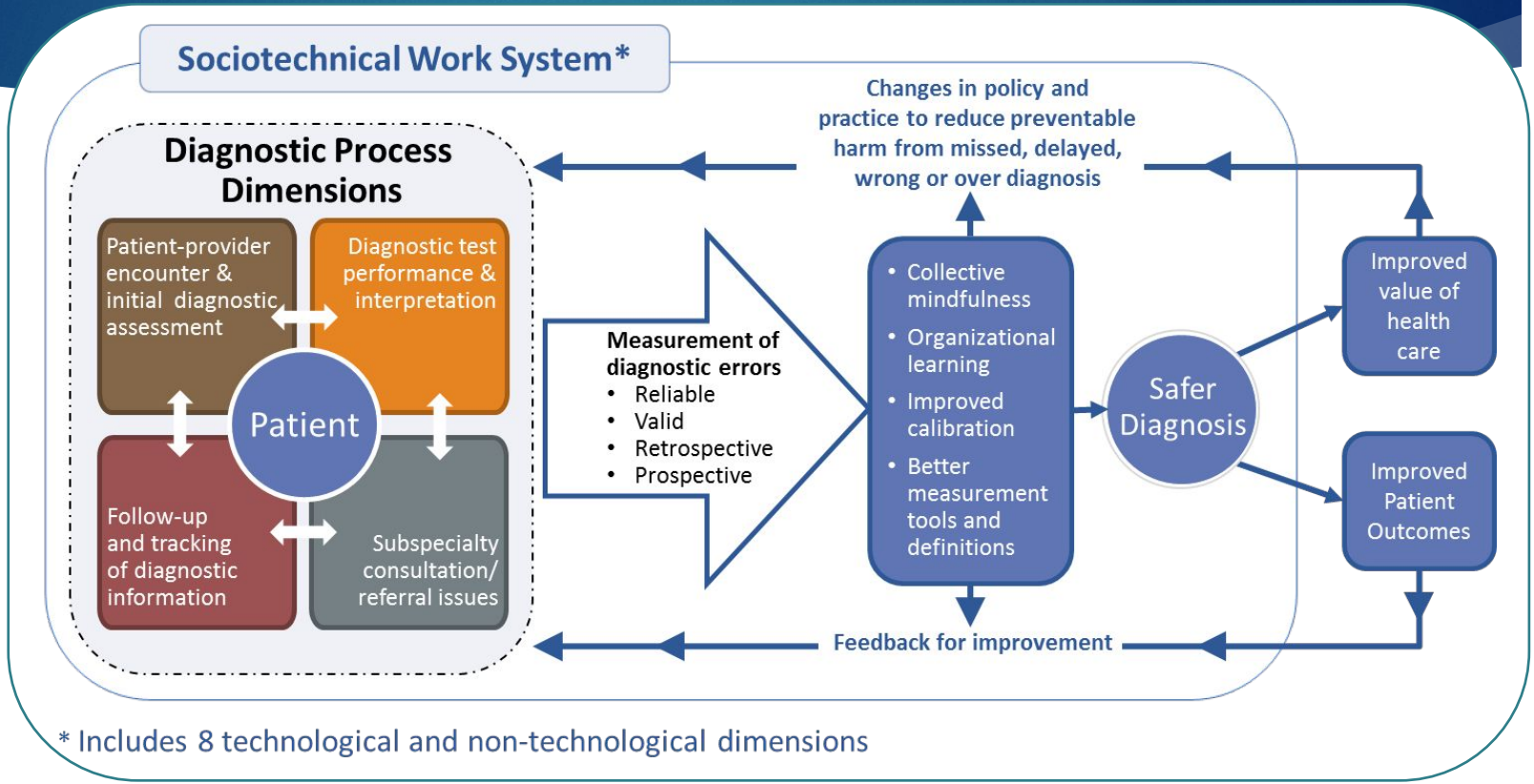
Rank	Research priorities
1	How do we implement better integration, coordination, and communication between clinical teams and patients/caregivers to improve the accuracy and efficiency of the diagnostic continuum?
2	How to accurately track and report diagnostic errors at a health system level?
3	How do clinician documentation requirements affect the diagnostic process and outcomes?
4	What specific solutions would address the common contributing factors that affect the diagnostic process for at risk patients such as rural and low health literacy.
5	How do we identify and decrease gaps in diagnostic care across care transitions?

8-Dimensional Sociotechnical Framework

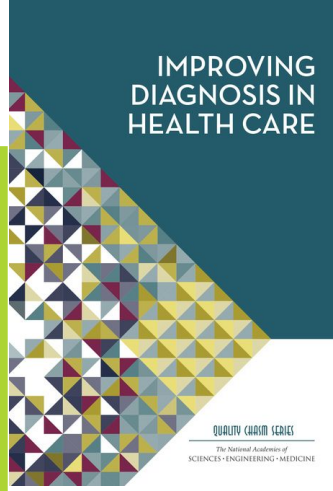


Sittig Singh *Qual Saf Health Care. 2010 Oct; 19(Suppl 3): i68–i74.*

Safer Dx Framework for Diagnosis



Singh and Sittig, BMJ Qual Saf 2015

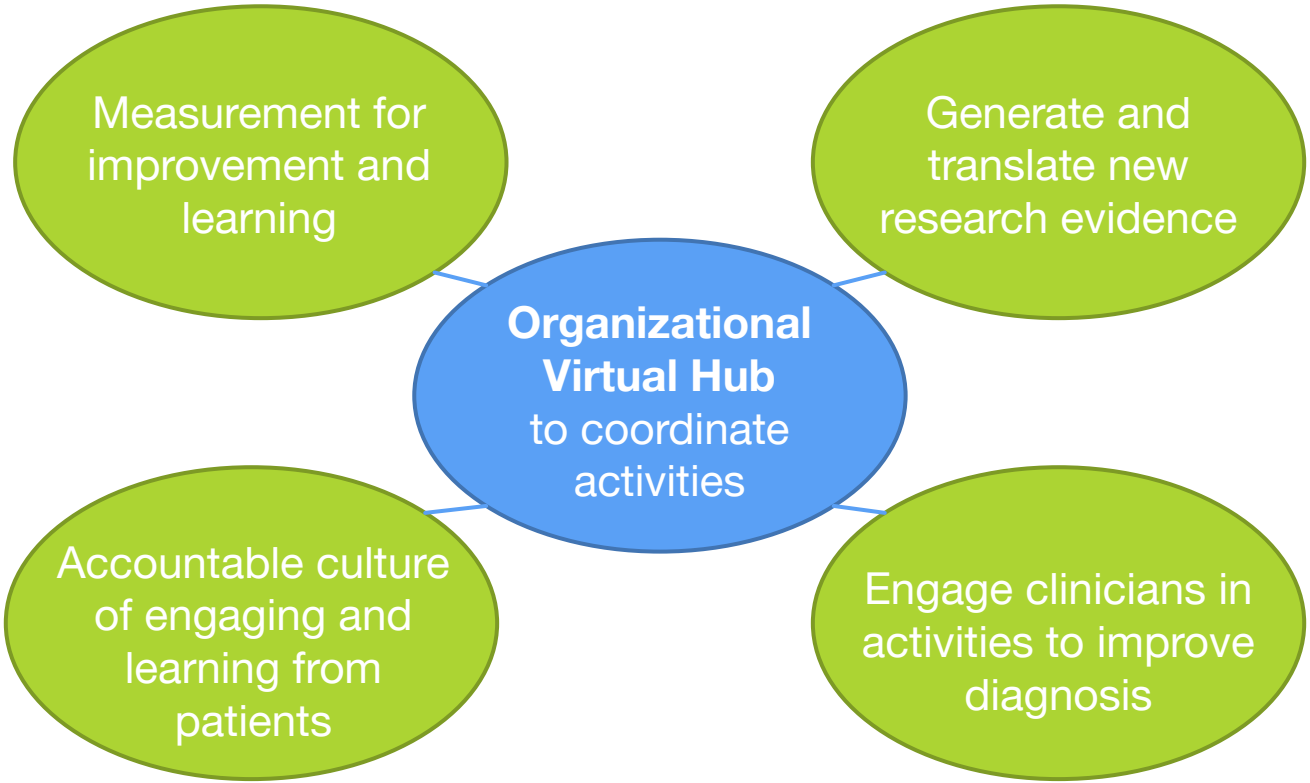


Recommendations

- More effective **teamwork** in the diagnostic process
- Enhance health care professional **education and training**
- Ensure **health information technologies** support patients and health care professionals
- Implement **approaches to identify, learn from, and reduce** diagnostic errors/near misses in clinical practice
- Establish a **work system and culture** that supports the diagnostic process and improvements
- Provide **dedicated funding for research** on the diagnostic process and diagnostic errors

New Care Models: "LEDE" Organizations

LEDE = Learning & Exploration of Diagnostic Excellence



Singh H, Upadhyay DK, & Torretti D. Developing health care organizations that pursue learning and exploration of diagnostic excellence: An action plan. *Acad Med*.

Taking Actions to LEDE

The Safer Dx Checklist

10 High-Priority Practices for Diagnostic Excellence

PREPARED BY:

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- Patricia McGaffigan, RN, MS, CPPS

http://www.ihi.org/resources/Pages/Tools/safer-diagnostic-checklist.aspx

Checklist Example Items

Health care organization actively seeks patient and family feedback to identify and understand diagnostic safety concerns and addresses concerns by codesigning solutions.

Health care organization has in place standardized systems and processes to close the loop on communication and follow up on abnormal test results and referrals.

Gathering Safety Data: Find Needles in the Haystack

- Not possible to find or review everything
- Trigger queries can alert safety personnel of possible adverse event
  - E-trigger algorithm queries for a selective "high-risk" sample in an EHR data warehouse

BMJ Quality & Safety

The international journal of healthcare improvement

Application of electronic trigger tools to identify targets for improving diagnostic safety

Daniel R Murphy, Ashley ND Meyer, Dean F Sittig, Derek W Meeks, Eric J Thomas, Hardeep Singh

BMJ Qual Saf 2019;28:151–159. doi:10.1136/bmjqs-2018-008086

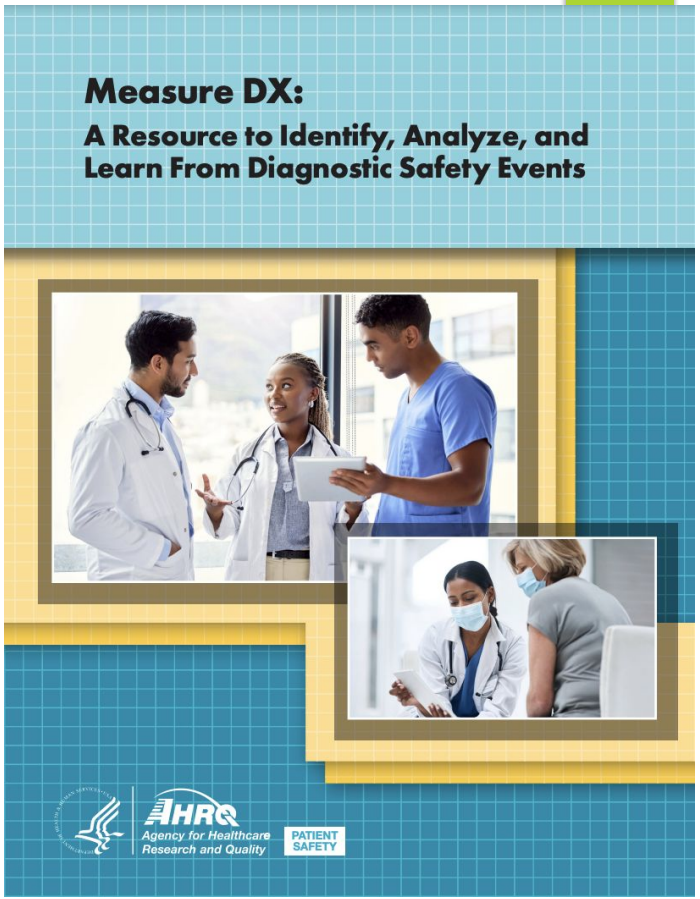
Example Triggers

Transfer to the ICU or initiation of rapid response team (RRT) within 15 days of admission in a low-risk patient

A primary care index visit followed by unplanned hospitalization within 14 days

Treat-and-release ED visit followed by unexpected hospitalization within 10 days

Implement Pathways to Measure and Learn from Diagnostic Errors



Bradford Singh IJQHC 2022 https://academic.oup.com/intqhc/article/34/3/mzac068/6679727?login=false

Overview of Measure Dx

1

Prepare for Measurement

- Engage stakeholders
- Build a team
- Foster psychological safety

2

Conduct a Self-assessment

Inventory available resources to support this work and select a measurement strategy

3

Implement Measurement Strategies

Use one or more data sources within the organization to capture potential diagnostic safety events for further review

4

Review & Analyze Cases

Use a systematic review process to identify learning opportunities and translate findings into useful feedback

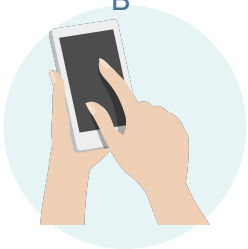
Four Strategies to Detect Diagnostic Safety Learning Opportunities

A

USE EXISTING QUALITY & SAFETY DATA

Examine previously identified safety events for diagnostic improvement opportunities

B



SOLICIT REPORTS FROM CLINICIANS

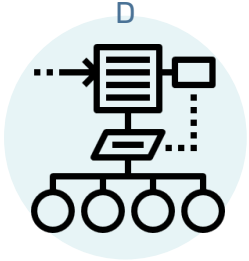
Ask clinicians to bring attention to diagnostic events within an environment of psychological safety

C

LEVERAGE PATIENT-REPORTED DATA

Examine patient surveys, incident reports, and complaints to identify missed opportunities

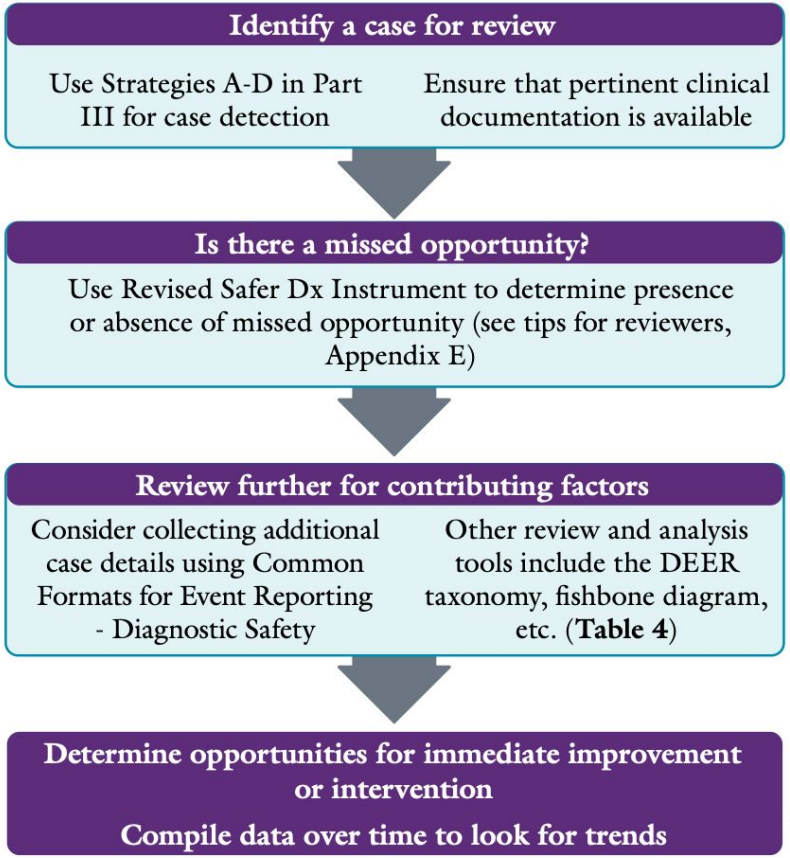
D



EHR-ENHANCED CHART REVIEW

Use EHR searches or trigger algorithms to identify high-risk diagnoses or care patterns

Case Review & Data Gathering



CDC - The Core Elements of Hospital Diagnostic Excellence Programs

1 Hospital Leadership Commitment and Accountability

Commitment to the staff and board that improving diagnosis is a priority for the hospital and ensuring the entire organization is accountable for progress.
Dedicating the necessary human, financial, technological, and information technology resources.

2 Multidisciplinary Expertise

Creating inclusive and multidisciplinary diagnostic teams that include laboratory and radiology testing experts.

3 Patient, Family, and Caregiver Engagement

Engaging patients, their families, and caregivers as partners in diagnostic excellence, including identifying effective ways to communicate diagnostic test results and other information.

4 Actions

Improving diagnosis through 1) diagnostic stewardship, 2) strengthening systems and processes, and 3) identifying, monitoring, and learning from diagnostic safety events.

5 Education

Educating healthcare personnel, patients, and family/caregivers about diagnosis and testing.

6 Tracking and Reporting

Monitoring and reporting the activities of the diagnostic excellence program.

What's Next

- AI
- Incentives
- Business Case: OECD report
- Global Action: WHO report

Thank You

- **Funding Agencies that make research possible:**
  - Department of Veterans Affairs
  - Agency for Healthcare Research and Quality
  - Gordon and Betty Moore Foundation

- **Our multidisciplinary team at the Center for Innovations in Quality, Effectiveness and Safety (IQuESt):**
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