Transforming Education on Diagnostic Reasoning:

Ready, Set, Go!

This document provides guidance on how to implement a Diagnostic Reasoning Quality Improvement Intervention. The described process is scalable and can be implemented in any healthcare system. This education quality improvement intervention focuses on collaboration, teamwork and measurement of clinical reasoning.

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Who can use this guide?

Any person working in a healthcare system or clinical setting who is looking to implement an innovative educational strategy to improve diagnostic reasoning, including but not limited to:

- Chief Executive Officers, Chief Medical Officers, Chief Operating Officers, Quality Improvement and Patient Safety Leaders, Clinical Department Directors, Medical Education Leaders, Medical Practice Group Executives, and other such senior leaders
- Some outlined activities are also relevant for use with Patient and Family Advisory Councils and members.

Why focus on Diagnostic Reasoning?

Diagnosis is one of the most complex challenges clinicians face. Diagnostic error, as defined by The National Academy of Medicine (formerly the Institute of Medicine), is 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.

These categories overlap, but examples help illustrate some differences:

- A **delayed diagnosis** refers to a case where the diagnosis should have been made earlier. Delayed diagnosis of cancer is by far the leading cause in this category. A major problem in this regard is that there are very few good guidelines on making a timely diagnosis, and many illnesses aren't suspected until symptoms persist, or worsen (*Aronson et al. 2019*).

- A **wrong diagnosis** occurs, for example, if a patient truly having a heart attack is told their pain is from acid indigestion. The original diagnosis is found to be incorrect because the true cause is discovered later (*Graber 2013*).
- A **missed diagnosis** refers to a patient whose medical complaints are never explained. Many patients with chronic fatigue, or chronic pain fall into this category, as well as patients with more specific complaints that are never accurately diagnosed (*Devasahayam et al. 2012*).

An estimated 40,000 to 80,000 people die each year from diagnostic failures in U.S. hospitals alone, and probably at least that many suffer permanent disability (*Tehrani et al. 2012*).

Diagnostic errors are often caused by multiple factors, involving both system-related and cognitive factors. Diagnostic errors that arise through cognitive errors are often associated with faulty perception, failed heuristics, and biases (*Croskerry 2003*). Clinicians rely on these shortcuts in reasoning to minimize delay, cost, cognitive load, and anxiety in their clinical decision making. Cognitive factors contribute to diagnostic error in 74% of internal medicine cases (*Graber et al. 2005*)*. In an analysis of a large medical malpractice claims database, failures in clinical judgment were the leading identified cause of serious misdiagnosis-related harms (*Newman-Toker et al. 2019*)*.

**Referenced analyses are not based on any review of Kaiser Permanente data.*

Background: Diagnostic Reasoning Challenge

In 2020, The Human Diagnosis Project (Human Dx), the Southern California Permanente Medical Group (SCPMG), and the Society to Improve Diagnosis in Medicine (SIDM) partnered to implement a Quality Improvement (QI) Education Intervention for practicing physicians:

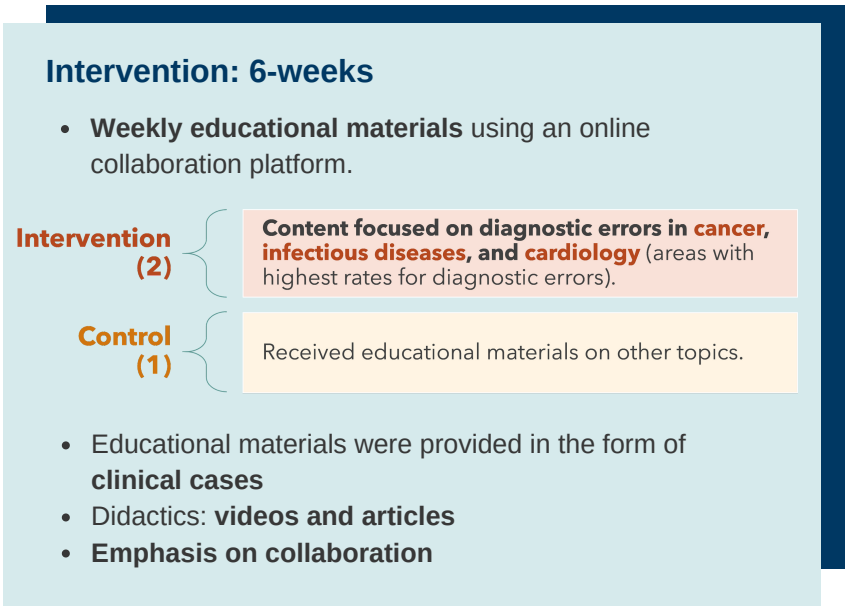
The Diagnostic Reasoning Challenge

Human Dx provided Global Morning Report (GMR) clinical cases focused on diagnostic reasoning in the following three areas: infectious diseases, cardiology, and cancer. Global Morning Report cases are carefully curated real-life scenarios that undergo extensive internal peer review for content accuracy. Users are provided a clinical case in pieces known as aliquots before the final diagnosis is revealed, and then are measured on their efficiency and accuracy when completing each case (*Chatterjee et al. 2019*). SCPMG recruited participants and administered the educational platform, materials, and administrative support throughout the quality intervention. SIDM provided consultative support for the project.

Global Morning Report (GMR) is part of the Human Dx Project, an open medical education platform for collaborating on clinical cases. GMR provides a virtual fun and engaging way for doctors to build their differential diagnosis and improve their clinical reasoning skills.

This project aimed to assess outcomes in clinical reasoning, diagnostic accuracy, and collaboration in an innovative virtual educational format.

- Physicians were recruited from three Kaiser Permanente regions. Participants were randomly assigned to one of 3 teams (2 intervention and 1 control).
- In the **pre-intervention phase**, participants solved a set of Human Dx GMR cases.
- In the **6-week intervention phase**, each team received weekly educational materials (See additional resources list below) using an online collaboration platform. The intervention groups received content focused on diagnostic errors in cancer, infectious diseases, and cardiology (areas with highest rates for diagnostic errors according to the literature). The control group received educational materials on general topics. Educational materials were provided in the forms of videos, articles, surveys, and clinical cases.



- In the **post-intervention phase**, all participants were asked to solve another set of GMR cases different than the ones previously completed.

Performance and collaboration were monitored throughout the project.

- Weekly prompts and questions were tailored to engage participants to collaborate in general clinical management in the control group and in clinical reasoning and diagnostic accuracy in the intervention groups.
- The benefit of having a flexible virtual learning platform allowed participants to engage and collaborate at their own time and space.
- Physicians who completed all phases of the program were eligible to obtain CME and MOC credits.
- Recruitment and retention of participants posed a challenge.
- This educational intervention proved to be successful, however, it needs ongoing initiatives in diagnostic reasoning to help reinforce the outcomes of the project.

This intervention demonstrated it is possible to successfully implement a virtual education program targeting busy practicing physicians.

- The structure of the project is flexible, allowing physicians to participate on their own time and engage in meaningful collaborative discussions.
- This type of intervention is applicable to multiple settings and specialties (i.e., inpatient/outpatient; surgical/medical/emergency medicine) and can be adapted to a diverse array of practicing clinicians (i.e., Nurse Practitioners or Physician Assistants).

The recommendations on the following sections are driven by the learnings from this partnership.

Learnings from Intervention:

- Created a culture of learning to help improve diagnostic reasoning skills
- Created a safe environment for clinicians to “speak up” on diagnostic errors (system-based and cognitive errors)
- Facilitated collaboration among practicing physicians from different geographical regions
- Documented the benefits of combining various virtual learning tools
- Demonstrated high participation interest and engagement for virtual educational content
- Developed a fun and friendly competitive environment as part of an educational program

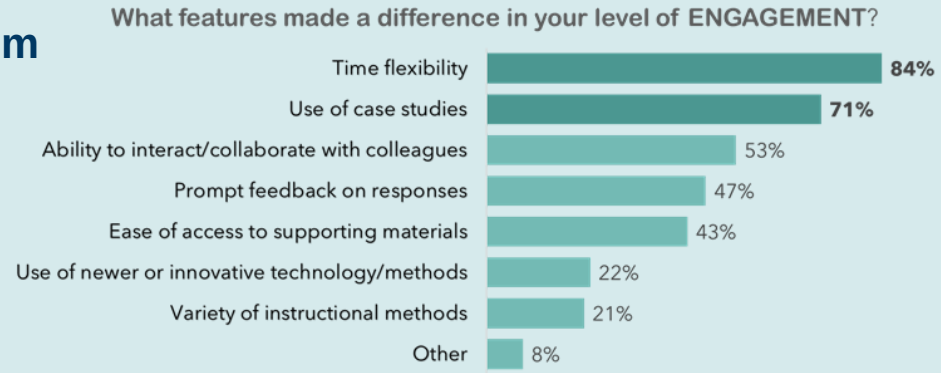
> *This was really fun and interesting. It would be a great way to deliver all of our teaching didactics [...]. I think the case-based format is much more engaging.*

Keys to Success:

- Engage leadership support
- Allow for flexibility
- Utilize a variety of learning tools and formats
- Incorporate a “psychological safe” environment in the learning process
- Provide education that is fun and includes a little friendly competition

Feedback from Participants

Time flexibility and the use of **case studies** were determinant in the **level of engagement**.



Steps for Implementing a Diagnostic Reasoning Improvement Intervention: Ready – Set – Go!

⇀ Ready

1.Define the Problem; Establish a Goal

- Determine readiness for change
- Analyze gap between current practice and desired performance
  - Research/review previously conducted approaches to improve diagnostic reasoning.
- Identify diagnostic area of focus
- Develop Aims statement(s); set a goal. For guidance on developing Aims statements, see resources on pg. 7

2. Engage Key Stakeholders

- Obtain leadership support (i.e., Chief Medical Officer, Medical Director, Director for CME, etc.)
- Identify and engage champions
- Form an implementation team
  - Identify clinical and non-clinical staff necessary to success of project. IT is often a limiting resource and should be considered in team representation
  - Agree on team tasks
  - Where possible, include patient or family representatives with relevant experience (from diagnostic error or within the disease category being studied) in design, production, and evaluation.

SIDM PFAC Guides: A set of manuals, each intended for an equal and opposite audience. The first is for hospital and health system leadership to better work with PFACs to address diagnostic quality and safety in a given institution or system, as well as with individual patients and families in their own care journeys. The second is for PFACs to better work with hospital and health system leadership to address diagnostic quality and safety within a given institution or system, at an enterprise and individual patient/family level.

⇀ Set

3. Prepare Action and Communication Plans

- Determine overall strategy and specific actions
- Identify necessary resources; develop a budget
  - Learning tools: format and design
    - Self-instructional (e.g., one-page articles, virtual sessions, faculty-led videos, podcasts, webinars)
    - In-person sessions
    - Hybrid of all learning tools and formats
  - Educational materials
    - Curate education on diagnostic errors (both system-based and cognitive)
    - Repurpose educational materials to stay in budget and timeline vs. creating new materials
  - Incorporate patient or family representatives with relevant experience (from diagnostic error or within the disease category being studied) to provide their perspectives/stories
- Develop a reasonable intervention timeline with targeted milestones
  - Build in time for stragglers
- Develop qualitative and quantitative methods and metrics
- Consider barriers and unexpected consequences and how to mitigate, i.e, competing priorities, staff turnover
- Develop a plan for recruitment
  - Leadership support and visibility in promotional materials
  - Promotional methods
  - Incentivizing tactics
    - Continuing Medical Education (CME) credits, Maintenance of Certification (MOC) points or other similar certification requirements
    - Opportunity to collaborate with colleagues
    - Fun and friendly competition
- Develop a plan for ongoing communication with participants to maintain engagement and achieve completion of intervention
  - Provide count-down to critical deadlines
  - Provide calendar reminders
  - Be creative
  - Keep it fun and friendly

⇀ Go

4. Implement Plan

- Put plan(s) into action
- Regularly monitor participant engagement and adherence to deadlines

5. Measure Effectiveness

- Qualitative—questionnaires, short surveys, online forum
  - Include participants who did not complete intervention to understand “why”
  - Where possible, involve patient/family representatives in the evaluation
- Quantitative—measure pre- and post- efficiency and accuracy in solving Human Dx GMR cases

6. Analyze, Assess and Improve

- Compare outcomes to Aims statement(s)
- Assess what went well and improvements that can be made
- Analyze unanticipated consequences or barriers encountered and determine how to mitigate them in future interventions

Additional Resources

1. The Human Diagnosis Project
2. Improving Diagnosis in Medicine Change Package
3. Kaiser Permanente Diagnostic Excellence Video Series
4. Diagnostic Reasoning Challenge Recruitment Flyer
5. Diagnostic Reasoning Challenge Weekly Assignment Template
6. QI/Change Management Resources
   a. IHI Science of Improvement: Setting Aims
   b. IHI Quality Improvement Essentials Toolkit
   c. Developing Aims Statements
   d. AHRQ Diagnostic Safety and Quality
   e. How to Get Health Care Employees Onboard with Change
   f. The DMAIC Model for Improvement
7. Creating Psychological Safety
   a. Delizonna: High-Performing Teams Need Psychological Safety. Here’s How to Create It
   b. Edmonson: Psychological Safety—Scholarly Articles
   c. Center for Creative Leadership: What is Psychological Safety at Work?

Acknowledgments

Southern California Permanente Medical Group

Kim-Huong Tran, MD FACP
Regional Assistant Medical Director, CME
Associate Clinical Professor, DGSOM at UCLA

Timothy Hsieh, MD
Endocrinology
Kaiser Permanente West Los Angeles Medical Center

Sameer Kulkarni, MD
Hematology and Oncology
Kaiser Permanente Los Angeles Medical Center

Mingsum Lee, MD PhD
Department of Cardiology
Program Director, Cardiovascular Disease
Fellowship Training Program
Kaiser Permanente Los Angeles Medical Center

Steve Lee, DO FACR
Associate Clinical Professor
Kaiser Permanente Fontana Medical Center

Society to Improve Diagnosis in Medicine

Gerry Castro, PhD, MPH, PMP
Director for Quality Improvement

Janet P. Mangun, MT(ASCP), MSA, CPHRM
Quality Improvement Consultant

Suz Schrandt, JD
Senior Patient Engagement Advisor

Jim Nomura, MD
Infectious Diseases
Kaiser Permanente Los Angeles Medical Center

Mimi Hugh, MA, MPH
Director, SCPMG Performance Assessment

Bridgette Wells
Consultant, Physician Education

Maricruz Arteaga-Garavito
Consultant, SCPMG Performance Assessment

In collaboration with
Ericka E. Tung, M.D., M.P.H.
Division of Community Internal Medicine
Division of Geriatric Medicine and Gerontology
Mayo Clinic – Rochester, Minnesota

The Human Diagnosis Project

Jayanth Komarneni
Founder and Chair

Christopher D. Jackson, MD, FSSCI
Assistant Professor of Medicine
Associate Program Director
University of Tennessee Health Science Center

Anand Patel, MD
Hematology-Oncology Fellow
University of Chicago

COVERYS
Coverys Community Healthcare Foundation

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