Diagnosing the Diagnostic Dilemma
Part Two
Institute of Medicine Report and Recommendations ...and Beyond

Gordon Schiff MD

Wednesday, Dec 9th
9:30 and 11:15 AM

IOM Quality Reports

The IOM Health Care Quality Initiative

6 aims for improvement
- Safe
- Effective
- Patient-centered
- Timely
- Efficient
- Equitable

1999
2001
Definition of Diagnostic Error

The failure to:

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

or

(b) **communicate** that explanation to the patient
What is a Diagnostic Error?

Adverse Outcomes

Delayed, Missed, Misdiagnosis

Diagnostic Process Failures

Modified from
Schiff Advances in Patient Safety AHRQ 2005,
Schiff & Leape Acad Med 2012
What is a “Diagnosis”?

- Preliminary diagnosis
- Working diagnosis
- Differential diagnosis
- Syndromic diagnosis
- Etiologic diagnosis
- Possible diagnosis
- Problem on Problem List
- Tissue diagnosis
- Computer diagnosis (EKG read)
- Deferred diagnosis
- Multiple/dual diagnoses
- Preclinical diagnosis
- Diagnosis/disease risk factor

- Incidental finding
- Diagnosis complication
- Billing diagnosis
- Telephone diagnosis
- Postmortem diagnosis
- Prenatal diagnosis
- Rare diagnosis
- Difficult/challenging diagnosis
- Undiagnosed disease
- Contested diagnoses
- Novel diagnosis
- Futile diagnosis
- Erroneous diagnosis
Use of health information technology to reduce diagnostic errors

Robert El-Kareh,1,2 Omar Hasan,3 Gordon D Schiff4,5

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 diagnostic errors. Vulnerable to fallible human memory, variable disease presentation, clinical processes plagued by communication lapses, and a series of well-documented 'heuristics', biases and disease-specific fallacies, ensuring reliable and timely diagnosis represents a major challenge.1,2 HIT, information technology (HIT) tools and systems have the potential to enable physicians to overcome—or at least minimize—these human limitations.

Despite substantial progress during the 1970s and 1980s in modelling and systems

Box 1 Condensed set of categories describing different steps in diagnosis targeted by diagnostic health information technology (HIT) tools

- Tools that assist in information gathering
- Cognition facilitation by enhanced organisation and display of information
- Aids to generation of a differential diagnosis
- Tools and calculators to assist in weighing diagnoses
- Support for intelligent selection of diagnostic tests/plans
- Enhanced access to diagnostic reference information and guidelines
- Tools to facilitate reliable follow-up, assessment of patient course and response
- Tools/alerts that support screening for early detection of disease in asymptomatic patients
- Tools that facilitate diagnostic collaboration, particularly with specialists
- Systems that facilitate feedback and insight into diagnostic performance

El-Kareh Schiff
BMJ QS 2013
### 8 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

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**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
DIAGNOSTIC PITFALLS

CRICO

Identifying and Understanding Malpractice-Prone Diagnostic Pitfalls

Principal Investigator
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Associate Director, Center for Patient Safety Research and Practice
Division of General Internal Medicine and Primary Care
Brigham and Women's Hospital
Harvard Medical School
What is a **Diagnostic Pitfall**?

Need for/Value of **Situational Awareness**

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**Diagnostic Pitfalls**

- Overall aim: develop new construct – diagnostic pitfalls – then test ways to electronically screen

- Examples of diagnostic pitfalls include:
  - Failure to pursue further evaluation of breast lump in light of normal mammogram
  - Attributing rectal bleeding to hemorrhoids
  - Failure to take seriously symptoms in patient with underlying psychosocial problems
  - Stasis dermatitis misdiagnosed as “bilateral cellulitis”
CRICO Project --Specific Aims

1. Delineate construct of “diagnostic pitfalls” & compile prioritized list of leading pitfalls posing safety and malpractice risks

2. Design and test accuracy of electronic screens (triggers) using EMR data for frequency and vulnerability for selected group of diagnostic pitfalls (~15)

3. Disseminate clinical pitfall list and lessons, plus algorithms for trigger screening tools

Strategy, Framework, and Approach

Phase 1 - Develop list of diagnostic pitfalls from:
- CRICO, Coverys ambulatory “diagnostic” failure closed claims
- BWH risk management diagnosis-related reports
- BWH and MGH ambulatory M&M conferences
- Specialist focus groups about errors committed by PCPs/others
  – Neurology, Oral Medicine, Pulmonary, Rheumatology, G.I., Dermatology
DEER Taxonomy: Localizing What Went Wrong

Frequency of DEER Taxonomy Errors/Delays (n = 582)

RDC Classification: Why? Diagnostic Errors Contributing Factors

Frequency of RDC Taxonomy Barriers (n = 581)
DIAGNOSIS IMPROVEMENT AND OPEN NOTES

AHRQ PROPOSAL

IOM Diagnosis Conceptual Model overlaid with key DIVON touch-points of significance (see Research Proposal Significance Section for explanation of numbered items)
## APPENDIX A – Patient survey questions ('one week' AND 'three week' surveys)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Options</th>
<th>Secondary Questions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Since you visited our clinic about one week ago, which best describes the status of your problem today? (If there was more than one reason for your visit, please consider the most important one).</td>
<td>Completely resolved</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improved</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problem is not improved</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A plan is in place to address the problem.</td>
<td>True</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>False</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I know it will take time for the problem to improve.</td>
<td>True</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>False</td>
</tr>
<tr>
<td></td>
<td>I didn’t have a problem but I had a question or concern or I needed something else (such as a prescription refill)</td>
<td>I had a question or concern and I am still concerned.</td>
<td>True</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>False</td>
</tr>
<tr>
<td></td>
<td>I prefer to skip this question</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Have you contacted a healthcare provider about that problem since your visit?</td>
<td>Yes, I contacted my Primary Care Provider (PCP) or another member of my primary care team</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, I contacted a provider other than my PCP</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No, I haven’t contacted any provider</td>
<td>Please share why you did not contact any provider.</td>
</tr>
<tr>
<td></td>
<td>I prefer to skip this question</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Gross, Schiff et al. Unpublished 5/2015
Given the stresses of busy practice what levers can be pulled to change culture of diagnostic work

Richard Kronick  AHRQ  DEM Keynote Address 9/28/2015
DIAGNOSIS ERROR VS./AND OVERDIAGNOSIS?
Berwick, who also reviewed the report for the institute, cited one crucial omission—the committee decided not to address over-diagnosis, a diagnosis that is made that is not helpful to patients. "They might not define that as an error," he says, "But I think the task of addressing over-diagnosis is critical."

US News and World Report
9/22/2015

**WSJ**: How can doctors avoid overdiagnosing and incurring unnecessary costs for overtesting?

**DR. SINGH**: Doctors usually need to balance between ordering additional tests or procedures that often come with their own risks versus risking "underdiagnoses" by not investigating. There is so much national conversation now on overdiagnosis, overtesting, overtreatment and health-care costs. The midpoint of the pendulum is what we need to strive for, and that’s not going to be easy.
Diagnosis Errors and Over-diagnosis: Two Sides of Same Coin

CAN ELECTRONIC CLINICAL DOCUMENTATION HELP PREVENT DIAGNOSTIC ERRORS
<table>
<thead>
<tr>
<th>Role for Electronic Documentation</th>
<th>Goals and Features of Redesigned Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing access to information</td>
<td>Ensure ease, speed, and selectivity of information searches; aid cognition through aggregation, trending, contextual relevance, and minimizing of superfluous data.</td>
</tr>
<tr>
<td>Recording and sharing assessments</td>
<td>Provide a space for recording thoughtful, succinct assessments, differential diagnoses, contingencies, and unanswered questions; facilitate sharing and review of assessments by both patient and other clinicians.</td>
</tr>
<tr>
<td>Maintaining dynamic patient history</td>
<td>Carry forward information for recall, avoiding repetitive pt querying and recording while minimizing erroneous copying and pasting</td>
</tr>
<tr>
<td>Maintaining problem lists</td>
<td>Ensure that problem lists are integrated into workflow to allow for continuous updating.</td>
</tr>
<tr>
<td>Tracking medications</td>
<td>Record medications patient is actually taking, patient responses to medications, and adverse effects to avert misdiagnoses and ensure timely recognition of medication problems.</td>
</tr>
<tr>
<td>Tracking tests</td>
<td>Integrate management of diagnostic test results into note workflow to facilitate review, assessment, and responsive action as well as documentation of these steps.</td>
</tr>
</tbody>
</table>

Clinical Documentation

CYA
Canvass for Your Assessment

- Differential Diagnosis
- Weighing Likelihoods
- Etiology
- Urgency
- Degree of certainty
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<tr>
<td>Ensuring coordination and continuity</td>
<td>Aggregate and integrate data from all care episodes and fragmented encounters to permit thoughtful synthesis.</td>
</tr>
<tr>
<td>Enabling follow-up</td>
<td>Facilitate patient education about potential red-flag symptoms; track follow-up.</td>
</tr>
<tr>
<td>Providing feedback</td>
<td>Automatically provide feedback to clinicians upstream, facilitating learning from outcomes of diagnostic decisions.</td>
</tr>
<tr>
<td>Providing prompts</td>
<td>Provide checklists to minimize reliance on memory and directed questioning to aid in diagnostic thoroughness and problem solving.</td>
</tr>
<tr>
<td>Providing placeholder for resumption of work</td>
<td>Delineate clearly in the record where clinician should resume work after interruption, preventing lapses in data collection and thought process.</td>
</tr>
</tbody>
</table>

Schiff & Bates NEJM 2010
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 nonspecifed 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
55/338 (16%) \( \rightarrow \) not improved of whom only 21 (38%) had contacted any clinician
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 Berner 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
Feedback- Challenges

- Effort, time, support required
- Discontinuities
- Can convey non-reassuring message
- Feedback fatigue
- Non-response not always good predictor of misdiagnosis as multiple confounders
- Tampering – form of availability bias

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<td>Calculating Bayesian probabilities</td>
<td>Embed calculator into notes to reduce errors and minimize biases in subjective estimation of diagnostic probabilities.</td>
</tr>
<tr>
<td>Providing access to information sources</td>
<td>Provide instant access to knowledge resources through context-specific “info buttons” triggered by keywords in notes that link user to relevant textbooks and guidelines.</td>
</tr>
<tr>
<td>Offering second opinion or consultation</td>
<td>Integrate immediate online or telephone access to consultants to answer questions related to referral triage, testing strategies, or definitive diagnostic assessments.</td>
</tr>
<tr>
<td>Increasing efficiency</td>
<td>More thoughtful design, workflow integration, easing and distribution of documentation burden could speed up charting, freeing time for communication and cognition.</td>
</tr>
</tbody>
</table>

Schiff & Bates NEJM 2010