Educational Strategies to Improve Diagnostic Performance

OPSI Audio Conference Series

Andrew P.J. Olson, MD, FACP, FAAP
Assistant Professor
Medicine and Pediatrics
University of Minnesota Medical School
@andrewolsonMD
Disclosure

• No relevant conflicts of interest
Objectives

1. Discuss the development of expertise in professional practice.
2. Identify the importance of feedback in improving performance over time.
3. Identify rapidly implementable strategies to improve diagnostic performance.
The Diagnostic Process

1. **Patient Experiences a Health Problem**
   - Patient engages with Health Care System

2. **Information Gathering**
   - Patient History and Interview
   - Physical Exam
   - Referral and Consultation
   - Diagnostic Testing
   - Has sufficient information been collected?

3. **Information Integration & Interpretation**
   - Communication of the Diagnosis
   - The planned path of care based on the diagnosis
   - Learning from diagnostic errors, near misses, and accurate, timely diagnoses

4. **Treatment**
   - Outcomes
What Is Diagnostic Error?

• The failure to establish an accurate and timely explanation of a patient’s health problem(s) or communicate that to the patient.

• A missed opportunity to make a diagnosis

• A diagnosis that is wrong, missed or delayed

• Overdiagnosis: Labeling a patient with a condition that will have no impact on a patient’s health.
Opinion Paper

Mark L. Graber*, Joseph Rencic, Diana Rusz, Frank Papa, Pat Croskerry, Brenda Zierler, Gene Harkless, Michael Giuliano, Stephen Schoenbaum, Cristin Colford, Maureen Cahill and Andrew P.J. Olson

Improving diagnosis by improving education: a policy brief on education in healthcare professions
Figure 2: A ‘driver diagram’ illustrating how education could improve diagnostic performance. Five primary drivers are indicated by the circles, and secondary drivers in the accompanying lists.
# Course Credits

## FALL TERM

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INMD 6801</td>
<td>Human Structure and Function</td>
<td>6</td>
</tr>
<tr>
<td>INMD 6802</td>
<td>Science of Medical Practice</td>
<td>7</td>
</tr>
<tr>
<td>INMD 6803</td>
<td>Essentials of Clinical Medicine Part 1</td>
<td>5</td>
</tr>
</tbody>
</table>

**Fall Total Credits:** 18

## SPRING TERM

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INMD 6812</td>
<td>Microbiology &amp; Immunology</td>
<td>5</td>
</tr>
<tr>
<td>INMD 6813</td>
<td>Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>INMD 6814</td>
<td>Physiology</td>
<td>3</td>
</tr>
<tr>
<td>INMD 6804</td>
<td>Essentials of Clinical Medicine Part 2</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring Total Credits:** 14

## SUMMER TERM

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INMD 6815</td>
<td>Human Behavior</td>
<td>1</td>
</tr>
<tr>
<td>INMD 6816</td>
<td>Human Sexuality</td>
<td>1</td>
</tr>
<tr>
<td>INMD 6817</td>
<td>Principles of Pathology</td>
<td>1</td>
</tr>
<tr>
<td>INMD 6818</td>
<td>Principles of Pharmacology</td>
<td>1</td>
</tr>
<tr>
<td>INMD 6805</td>
<td>Essentials of Clinical Medicine Part 3, Block A</td>
<td>5</td>
</tr>
</tbody>
</table>

**Summer Total Credits:** 9

**Total Credits for Year One = 41**
Individual competencies for diagnosis (I-competencies)

I. Demonstrate clinical reasoning to arrive at a justifiable diagnosis (an explanation for a health-related condition)

I-1. Accurately and efficiently collect key clinical findings needed to inform diagnostic hypotheses.

Use these tools appropriately and efficiently in the diagnostic process: Effective interpersonal communication skills, history-taking, the physical examination, and record review; diagnostic testing; and the electronic health record and health IT resources.

I-2. Formulate, or contribute to, an accurate problem representation expressed in a concise summary statement that includes essential epidemiological, clinical, and psychosocial information.

I-3. Produce, or contribute to, a correctly prioritized, relevant differential diagnosis, including can’t miss diagnoses.

I-4. Explain and justify the prioritization of the differential diagnosis by comparing and contrasting the patient’s findings and test results with accurate knowledge about prototypical or characteristic disease manifestations and atypical presentations, and considering pathophysiology, disease likelihood, and clinical experience.

I-5. Use decision support tools, including point-of-care resources, checklists, consultation, and second opinions to improve diagnostic accuracy and timeliness.

1-6. Use reflection, surveillance, and critical thinking to improve diagnostic performance and mitigate detrimental cognitive bias throughout the clinical encounter. Discuss and reflect on the strengths and weaknesses of cognition, the impact of contextual factors on diagnosis, and the challenges of uncertainty. Demonstrate awareness of atypical presentations, information that is missing, and key findings that don’t ‘fit’.
Team-based competencies for diagnosis   (T-competencies)

T. Partner effectively as part of an interprofessional diagnostic team. Communicate effectively and solicit information from all members of the team (including the patient and family) to create a shared mental model of a patient’s illness and the plan for diagnostic evaluation.

T-1. Engage and collaborate with patients and families, in accordance with their values and preferences when making a plan for diagnostic evaluation. Listen actively, encourage questions, and be alert to new or changing information. Explain the diagnostic process, including the patient’s and family’s role in helping to identify the most likely diagnosis. Share appropriately when diagnostic uncertainty exists.

T-2. Collaborate with other healthcare professionals (including nurses, physicians, physician assistants, radiologists, laboratory professionals, pharmacists, social workers, physical therapists, medical librarians, and others) and communicate effectively throughout the diagnostic process. Acknowledge and challenge authority gradients, especially between clinicians and patients\families, constructively.

T-3. Apply effective strategies at transitions of care to facilitate accurate and sufficient information transfer about the diagnosis, including any pending workup and areas of uncertainty. Close the loop on test result communication and clarify expectations with the team for test result follow-up.
System-related competencies for diagnosis  (S-competencies)

S. Identify and understand the systems factors that facilitate and contribute to timely, accurate diagnoses and error avoidance.

S-1. Discuss how human factors contribute to diagnostic safety and error by identifying how the work environment influences human performance. Take steps to mitigate common systems factors that detract from diagnostic quality and safety.

Use local resources (including people, teams and technology, especially the electronic health record) effectively and efficiently to optimize patients’ access to care, diagnostic testing services, and appropriate experts for consultation.

S-2. **Advance a culture of diagnostic safety** that encourages open dialogue and continuous learning from analysis and discussion of excellent diagnostic performance, near misses and errors.

Give and receive feedback at an individual and team level to improve subsequent diagnostic performance.

S-3. Disclose diagnostic errors and missed opportunities transparently and in a timely manner to patients, families, team members, supervisors, and appropriate quality and risk management staff.
How Does Expertise Develop?

• We spend years of effort learning the biochemical and pathophysiological basis of health and disease.

• This knowledge is retained but is less frequently explicitly involved in decision making.
An expert

Not an expert

Can you spot the difference?
Let’s think about practice and improving….

- When did you learn to diagnose pneumonia?
- How do you know you are good at it?
- What are you going to keep getting better at it?
the more you practice, the better you get.
PRACTICE
makes perfect!
Outliers

The Story of Success

Malcolm Gladwell

Author of *David and Goliath*
Performance

Experience

Expert Performance

Arrested Development

Everyday Skills

Cognitive/Associative

Associative

Autonomous
“I HAVE MISSED MORE THAN 9000 SHOTS IN MY CAREER. I HAVE LOST ALMOST 300 GAMES. 26 TIMES, I’VE BEEN TRUSTED TO TAKE THE GAME WINNING SHOT AND MISSED. I’VE FAILED OVER AND OVER AND OVER AGAIN IN MY LIFE. AND THAT IS WHY I SUCCEED.”

- Michael Jordan
How expertise develops in medicine: knowledge encapsulation and illness script formation

Henk G Schmidt & Remy M J P Rikers

CONTEXT For over 30 years, research has focused on the question of how knowledge is organised in the doctor’s mind. The development of encapsulated knowledge, followed by the formation of illness scripts, may both be considered as important stages in the development of medical expertise.

KEYWORDS *clinical competence; *problem solving; clinical clerkship/*methods; curriculum; group processes; peer group; teaching/*methods.

Medical Education 2007: 41: 1133–1139
doi:10.1111/j.1365-2923.2007.02915.x
Table 1. Transitory stages in the development of medical expertise

1. Development of elaborate declarative networks explaining the causes and consequences of disease in terms of general underlying pathophysiological processes
2. 'Encapsulation' of these declarative networks into a limited number of diagnostic labels, syndromes or high-level, simplified causal models, explaining signs and symptoms
3. Transition into 'illness scripts' through the acquisition of experience-based, contextual or 'enabling conditions' knowledge
4. Storage of interpreted instances of these scripts as exemplars of the particular illness
Imagined desired musical experience

Desired Performance Goal

Representation for Executing Performance
Playing the piece of music

Representation for Monitoring One’s Performance
Listening to the played music as experienced by an audience

Academic Medicine 2015: 90(11) 1471-1486
Imagined diagnostic process

Desired Performance Goal

Representation for Executing Performance

Going through the diagnostic process
“What is the next step?”

Representation for Monitoring One’s Performance

Tracking outcomes and revising plans
Illness Scripts

- Illness scripts are abstract cognitive structures that allow us to categorize complicated information into a useable format to make medical decisions.

- Created with effort and through experience and modified through experience.

- Learners at different levels are working on writing and revising different parts of their scripts.
Assessment of Fit

Chest Pain

Risk Factors

Anxiety
Dyspnea

Hemoptysis
Troponin
Cognitive Dissonance

• The discomfort that results from competing thoughts being active in one’s mind.

• We “work through” cases until we can resolve this dissonance

• Biases can lead you to ignore or not have this dissonance
Decision-Making Process

Outcome

Maintain Calibration

Recalibrate

Unfavorable

Unknown

Favorable

Health Care Professional

Unknown

Recalibrate

Night Team

Day Team

Feedback

Admission
Diagnostic Change based on Feedback Forms

- No Change: 56%
- Diagnostic Refinement: 21%
- Disease Evolution: 11%
- Major Diagnostic Change: 12%

N=478
• What are your open loops?
• Who are your stakeholders?
• What loop can you close?
• How can you make it sustainable?
I think about baseball when I wake up in the morning. I think about it all day and I dream about it at night. The only time I don’t think about is when I’m playing it.

-Bob Feller
A Grammar Lesson?

Diagnosis as outcome (noun):

An explanation of a patient’s health problem.

Diagnosis as process (verb):

The process used to arrive at an explanation for a patient’s health problem.
You Are An Example

Whether you are a good example or not is up to you.

Steve Ferrante
Physician → Decision Making Process → Outcome → Maintain Calibration → Re-calibrate

Unknown → Unfavorable Unexpected → Favorable Expected

Sociotechnical Work System* †

Diagnostic Process Dimensions

- Patient-provider encounter & initial diagnostic assessment
- Diagnostic test performance & interpretation
- Follow-up and tracking of diagnostic information
- Subspecialty consultation/ referral issues

Measurement of diagnostic errors
- Reliable
- Valid
- Retrospective
- Prospective

Changes in policy and practice to reduce preventable harm from missed, delayed, wrong or over diagnosis

- Collective mindfulness
- Organizational learning
- Improved calibration
- Better measurement tools and definitions

Safer Diagnosis

Feedback for improvement

- Improved value of health care
- Improved Patient Outcomes

* Includes 8 technological and non-technical dimensions
† Includes external factors affecting diagnostic performance and measurement such as payment systems, legal factors, national quality measurement initiatives, accreditation, and other policy and regulatory requirements.
Diagnostic Team Members

Health care professionals who support the diagnostic process

- Diagnosticians
- Patient & Family Members

The National Academies of
SCiences • Engineering • Medicine

SOURCE: National Academies of Sciences, Engineering, and Medicine, 2015,
Expanding the Diagnostic Team

• What doesn’t fit in this explanation for you?
• Given your experience with this, what do you think about our current approach?
• What have you read about your condition?
Say “I Don’t Know”
We know what we know, we know there are things we do not know, and we know there are things we don’t know we don’t know.

Donald Rumsfeld
WHAT IF....?
Ask “What If?”

• What if this actually isn’t [X]?

• **What if we are wrong?**

• What if the patient didn’t have:
  – Mental illness
  – Genetic syndrome
  – Cancer
  – Substance dependence
  – Annoying parents

• What if the thing that doesn’t fit **really matters**?
Thank you!

olso5714@umn.edu