



**DIAGNOSTIC REASONING CURRICULUM WITH  
FOCUS ON PREVENTING DIAGNOSTIC ERRORS**

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**INTERESTS: PASSIONATE ABOUT MEDICAL EDUCATION WITH SPECIAL INTEREST IN TEACHING AND LEARNING ABOUT “HOW A PHYSICIAN THINK?” I SINCERELY BELIEVE IN A STEP BACK STANCE IN CONTEMPLATION ABOUT DIAGNOSIS, BEFORE WE UNLEASH THE EVER-EXPANDING ARMAMENTARIUM OF TREATMENT OPTIONS.**

**Questions, Challenges and obstacles:**

- 1) Is this Curriculum going to be an additional cognitive load or a reinforcement?**
- 2) Will there be a schedule conflict with other learning activities based on current Internal medicine Rotation Structure?**
- 3) How Much time and effort will be needed to train the preceptors of the course?**
- 4) How relevant is this education module for 3<sup>rd</sup> and 4<sup>th</sup> year medical students?**

## **Background:**

Major diagnostic errors are found in 10% to 20% of autopsies, suggesting that 40,000 to 80,000 patients die annually in the U.S. from diagnostic errors, which is more than surgical mistakes or medication overdoses. Largest fraction of malpractice claims, and the highest total of penalty payouts are also related to Diagnostic Errors. This appears to be, an important safety problem in healthcare today. While healthcare professionals learn the basics and clinical reasoning, most medical schools do not offer training on how to avoid diagnostic errors. The goal of this curriculum is improving patient safety by reducing diagnostic errors through new education and training standards.

## **Intended Audience:**

3<sup>rd</sup> Year and 4<sup>th</sup> year Medical Students during their internal Medicine Rotation/General Medicine C.

## **Objectives of the Program:**

- Understanding the magnitude of morbidity and mortality caused by diagnostic errors.
- Demonstrate advanced diagnostic reasoning skills in actual patient care setting.
- Identify the cognitive errors encountered in diagnostic reasoning process leading to diagnostic errors.

## **Methods:**

Learner population will include third- and fourth-year medical students. Teaching methods will be based on a combination of Flipped Classroom method with Case Based Learning. A total of six class room sessions, as laid out below, spanning over a six-week time period, is planned during the students' internal medicine rotation. Short video modules, evidence-based articles and practice cases are provided as pre-class assignment, depending on the focus of that session. Major component of this educational activity is a case-based discussion. The plan is to promote behavior to critically approach once on diagnostic reasoning, focusing on each component of the Medical Decision Making. Cognitive forcing strategies to improve metacognition is the crucial skill intentioned to develop in learners by this curriculum. Multiple Choice Question format pre testing will be used to improve pre-class assignment compliance. Critical evaluation of practice case and actual case discussions focusing on preventing cognitive errors will be the center theme of the curriculum. Detailed layout of the schema is given below.

## Session 1:

### Introduction: Understanding the magnitude of morbidity and mortality involved in Diagnostic Errors.

**Structure and Duration:** 60 minutes which includes reflection on a case, Pre-Test Multiple Choice Questions and an interactive video lecture followed by Post-Test MCQ

**Session Objectives:** 1) Describe and identify the consequences of diagnostic errors in the patients, providers and healthcare system.2) Identify potential diagnostic error in various phases of Medical Decision-Making process (MDM)

## Session 2:

### Assessment of Diagnostic reasoning abilities of the Learners based on their current level of expertise.

**Structure and Duration:** 60 minutes Flip Classroom Model with in class case-based learning. Grading based on Assessment of Reasoning Tool (ART by SIDM). Grading will be done by both peers and preceptors. Post class case wright up in preparation to session 5

**Session Objectives:**1) Assessment of learner's diagnostic reasoning abilities and awareness about diagnostic errors.2) Remember different components of diagnostic reasoning and understand standardized approach to evaluate it using ART tool.

## Session 3:

### Type 1 and Type 2 Thinking process

**Structure and Duration:** 60 minutes Flip Class room model with Pre-Class reading based on Daniel Kahneman famous work "Thinking Fast and Slow". In class, 40 minutes case-based group discussion on Type 1 and type 2 thinking. This would be followed by a 20 minutes interactive lecture with examples and audience response system.

**Session Objectives:** 1) Understand strength, weakness and simplicity of Type 1 Thinking2) Understand strength, weakness and complexity of Type 2 Thinking.

## Session 4:

### Introduction to Cognitive Biases

**Structure and Duration:** 60 Minutes Flip class room model with Pre class assignment Reading on common Cognitive Biases in medicine with In-class case-based exercise of cognitive bias cases focusing on Type 1 and Type 2 Thinking. This will be followed by a 20 minutes Post-Test MCQ session.

**Session Objectives** 1) Understand important cognitive biases involved in diagnostic reasoning.2) Extrapolate that knowledge to identify actual and potential cognitive biases in case-based discussions

## **Session 5:**

### **Review of potential Diagnostic Errors by “Reflecting on Cases presented in Session 2”**

**Structure and Duration:** 60 minutes Flip Class model with Pre Class Reading assignment on : Team based, and patient centered diagnostic reasoning. Concept of Cognitive autopsy and introduction of fishbone diagram. In class learners will do Cognitive Autopsy of Case from Session 2

**Session Objectives:** 1) Understand the importance of involving non-physician members of health care team and patient/family members in diagnostic reasoning.3)Apply principles of cognitive autopsy in critical evaluation of diagnostic reasoning.3)Understand the fundamentals of root cause analysis.

## **Session 6:**

### **Post Program Assessment of Diagnostic reasoning Individual Learners**

**Structure and Duration:**120 minutes ,Flip Class Room Model with in class Case Based assessment -Class assignment: Format of diagnostic reasoning based on MDM (Medical Decision Making) thread developed for School of Medicine ,Video lecture: Recapitulating basic principles of diagnostic reasoning approach learned at MS1 and MS2 stages (Illness script, Problem representation and Differential Diagnosis)

**Session Objective:** Advanced skill in diagnostic reasoning with abilities to minimize cognitive errors and ultimately prevent diagnostic errors.

**Evaluation Plan:** Semi quantitative assessment of illness scripts and its evolution during and after the course will be assessed by the peers and instructor independently. Comparison of the Evaluation Scores based on assessment in Session 2 and Session 6 will be used as measure of effectiveness of the curriculum. Comprehensive Feedback survey information will be compiled to see the effectiveness of the learning activity from all the learners and instructors. This will also be used for program evaluation. Student evaluation will be based on semi quantitative evaluation score from session 6 and post-test MCQs from all sessions. A passing score of 80% will be the goal.

## **Conclusions:**

Clinical reasoning in a step-by-step fashion constitutes the lion share of Medical Decision Making. This process is a complex cognitive exercise with potential for errors at each step of the way. Educating future physicians to avoid such errors need to start with teaching them concepts of metacognition and practical training in cognitive forcing strategies.

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