CLINICAL REASONING & CRITICAL THINKING

Learning Objectives:

1. Define clinical reasoning & critical thinking
2. Apply systematic thinking frameworks to patient care
3. Recognize cognitive biases and error patterns
4. Improve patient outcomes through structured reasoning

Based on: Chest (2020); BJORN (2021); Nurse Education Today (2014)

WHY DOES THIS MATTER?

40-70%

of diagnostic errors
are cognitive in origin

12%

of patients affected
by diagnostic error

80,000+

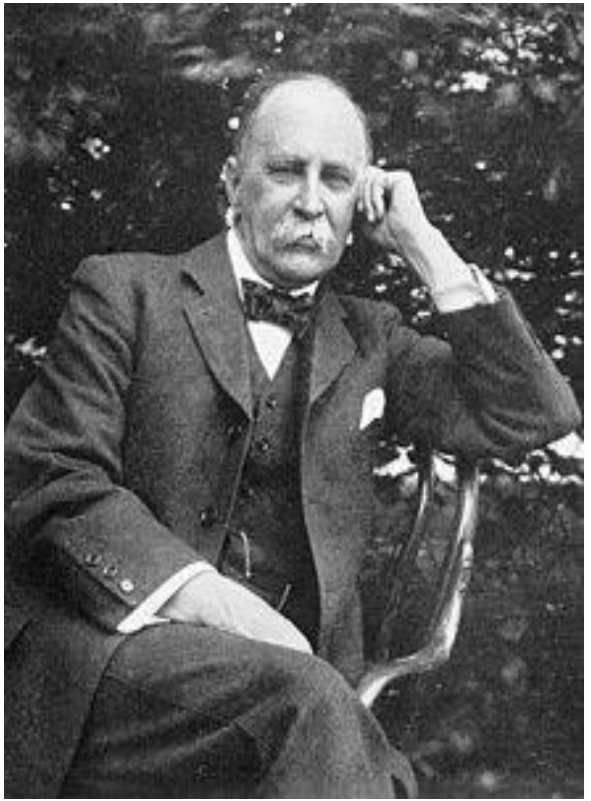
preventable deaths/year
from diagnostic errors (US)

"Most diagnostic errors result not from lack of knowledge, but from faulty reasoning processes."

Graber ML et al. Arch Intern Med 2005; Singh H et al. BMJ Qual Saf 2014

“*Medicine is a science of unscertinity , and art of probabilty”*

♣ (Sir William Osler).



SECTION 1

Definitions & Foundations

Understanding the core concepts

CRITICAL THINKING — DEFINED

> The intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information to reach a well-reasoned conclusion.

Analysis

Break down complex clinical data into components

Synthesis

Integrate findings into coherent clinical picture

Evaluation

Judge quality of evidence and reasoning

Application

Translate reasoning into clinical decisions

CLINICAL REASONING — DEFINED

The process by which clinicians gather and integrate data, generate and test hypotheses, and arrive cognitive at a diagnosis or management plan — while accounting for uncertainty.

TWO SYSTEMS OF THINKING

System 1: Fast / Intuitive

- Pattern recognition
- Automatic, effortless
- Heuristics & shortcuts
- Experienced clinicians
- ⚠️ Prone to bias

System 2: Slow / Analytical

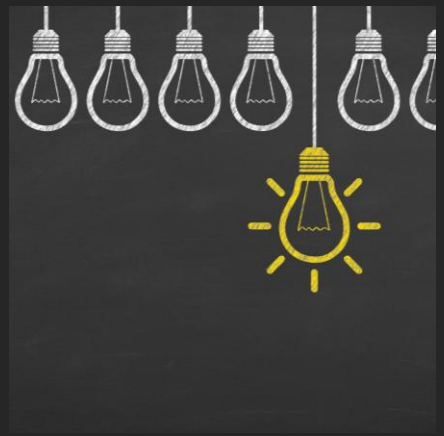
- Deliberate reasoning
- Step-by-step logic
- Evidence-based analysis
- Novice learners lean here
- ✅ More error-resistant

CRITICAL THINKING vs CLINICAL REASONING

Dimension	Critical Thinking	Clinical Reasoning
Scope	Broad — any domain	Specific to clinical practice
Focus	Logic & argument quality	Diagnosis & management
Data Type	Any information	Patient history, exam, labs
Outcome	Well-reasoned judgment	Clinical decision / action plan
Overlap	Foundation of analytical skill	Applied critical thinking

Key Insight: Clinical reasoning IS applied critical thinking in a patient-centered context.

Critical thinking and decision-making are closely linked skills that involve



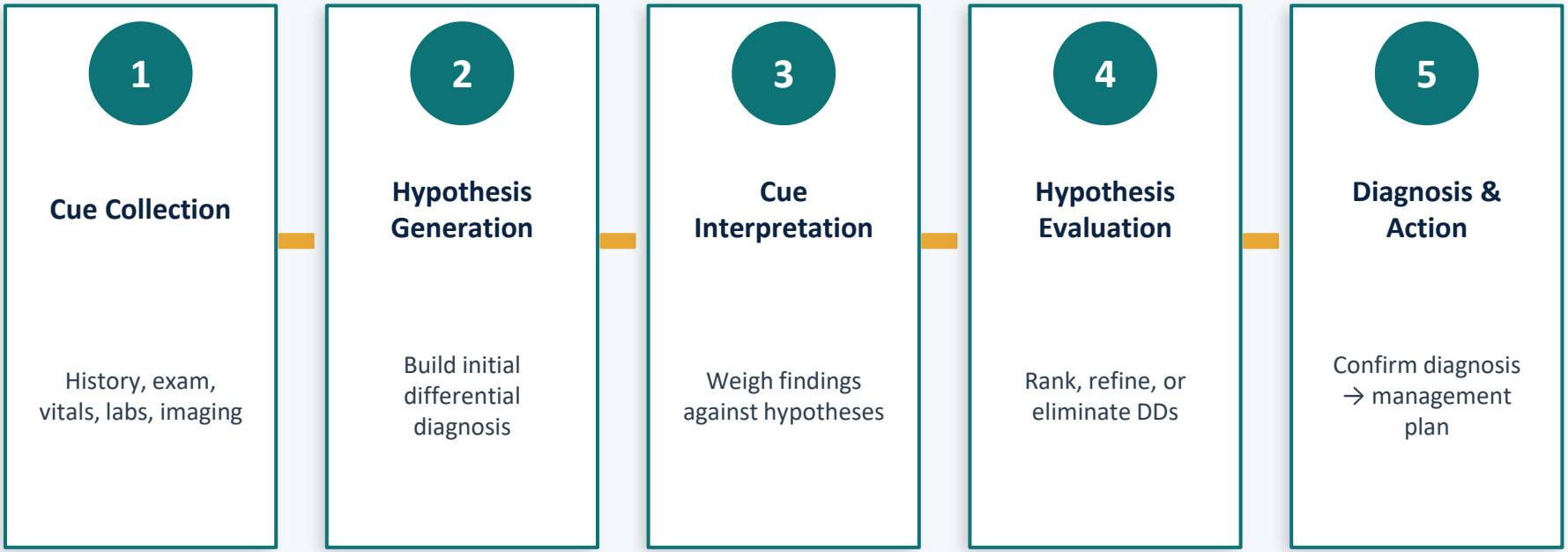
Analyzing	• analyzing information.
Evaluating	• evaluating options.
Choosing	• choosing the best course of action.

SECTION 2

The Clinical Reasoning Process

From data to diagnosis to action

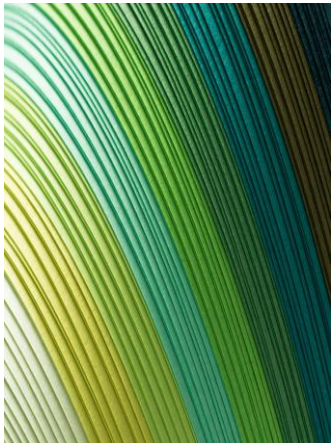
THE CLINICAL REASONING CYCLE



← Iterative feedback loop — cycle repeats as new data emerges

Example

♣ -An 80-year-old man is brought in by his daughter, who reports sudden confusion and difficulty following commands.



Assessment:

Gather Data: Recent urinary tract infection (UTI) diagnosed; vital signs stable.

Physical Exam: Neurological exam shows disorientation, but no focal deficits.

Diagnosis: Delirium secondary to UTI.

Plan:

Treat the UTI with appropriate antibiotics.

Ensure a safe environment and orient the patient regularly.

Assess for potential dehydration and provide fluids as needed.

Evaluation: Monitor cognitive status post-treatment and ensure follow-up on the UTI.

DIAGNOSTIC FRAMEWORKS: VINDICATE

V **Vascular** *PE, MI, stroke, DVT*	**I** **Infectious** *Sepsis, pneumonia, endocarditis*	**N** **Neoplastic** *Primary/metastatic cancer*
D **Degenerative** *Dementia, OA, osteoporosis*	**I** **Iatrogenic / Idiopathic** *Drug reactions, unexplained*	**C** **Congenital** *Structural defects, genetic*
A **Autoimmune / Allergic** *Lupus, vasculitis, anaphylaxis*	**T** **Traumatic / Toxic** *Injuries, poisoning*	**E** **Endocrine / Environmental** *DM, thyroid, exposures*

SECTION 3

Cognitive Biases & Error Types

Knowing your blind spots

TOP COGNITIVE BIASES IN CLINICAL MEDICINE

Anchoring
High

Fixating on initial data; failing to update with new info

Availability
Moderate

Overweighting recently seen or memorable diagnoses

Confirmation Bias
High

Seeking info that confirms rather than refutes hypothesis

Affective Bias
Moderate

Letting emotional response to patient influence thinking

Premature Closure
High

Stopping the diagnostic search once one diagnosis fits

Framing Effect
Moderate

Being influenced by how information is presented

Diagnosis Momentum
High

Carrying forward an incorrect label from prior providers

Representativeness
Moderate

Matching to a prototype, missing atypical presentations

Croskerry P. A universal model of diagnostic reasoning. Acad Med 2009

DEBIASING STRATEGIES

🔄 Step Back

Metacognition

Actively thinking about your own thinking. Ask: 'Am I being biased right now?'

📋 Broaden

Forced Differential

Always generate ≥3 diagnoses before committing. Use VINDICATE or similar.

❌ Challenge

Disconfirmatory Thinking

Deliberately seek evidence AGAINST your working diagnosis.

⏱️ Pause

Slow Down

Switch from System 1 to System 2 for high-stakes decisions. Use checklists.

👥 Consult

Seek Second Opinion

Discuss with colleagues. Team-based reasoning reduces individual bias.

📊 Quantify

Probability Anchorin

Use pre-test probability tools (Wells, HEART, CURB-65) to calibrate.

SECTION 4

Clinical Reasoning in Patient Care

Translating thinking into outcomes

IMPACT ON PATIENT OUTCOMES

Effect of Improved Clinical Reasoning:

- ✅ Earlier, more accurate diagnosis
- ✅ Appropriate, targeted treatment
- ✅ Fewer unnecessary investigations
- ✅ Reduced patient harm
- ✅ Increased patient trust & satisfaction
- ✅ Better resource utilization

Consequences of Poor Reasoning:

- ❌ Delayed or missed diagnosis
- ❌ Inappropriate treatment & harm
- ❌ Overtesting and cost burden
- ❌ Prolonged hospital stays
- ❌ Decreased patient safety
- ❌ Medicolegal consequences

Kostopoulou O et al. Diagnostic efficiency and patient outcomes. BMJ 2017; Nurse Educ Today 2014

COMMUNICATING CLINICAL REASONING: SBAR

S	SITUATION	B	BACKGROUND	A	ASSESSMENT	R	RECOMMENDATION
State the problem concisely. "Mr. Jones, 72M, is in acute respiratory distress."		Relevant history, medications, PMH. "He has CHF and COPD, currently on furosemide."		Your clinical reasoning & working diagnosis. "I believe he is in acute decompensated heart failure."		What action you are requesting. "I am recommending IV furosemide 80mg and O2 support."	

Strong clinical reasoning is only valuable when communicated clearly to the care team.

DEVELOPING CLINICAL REASONING — PRACTICAL TIPS

01

Think Out Loud

Verbalize your reasoning during rounds. Transparency invites correction and teaching moments.

02

Post-Encounter Reflection

After each patient, review: What did I get right/wrong? What would I do differently?

03

Study Illness Scripts

Build detailed mental models of diseases including atypical presentations and mimics.

04

Embrace Uncertainty

Medicine has irreducible uncertainty. Good clinicians make calibrated decisions, not perfect ones.

05

Learn from Errors

Morbidity & Mortality conferences, case reviews, and near-miss analysis are gold standards.

06

Use Decision Aids

Clinical prediction rules (Wells, CURB-65, HEART) reduce cognitive load and anchor probability.

Audétat M-C et al. Teaching clinical reasoning. Med Teach 2017; Chest 2020

KEY TAKEAWAYS

- Clinical reasoning is the applied form of critical thinking — both are learnable skills.
- System 1 (fast) thinking is powerful but bias-prone. Use System 2 for complex or high-stakes cases.
- Always maintain a broad differential. Premature closure is the most dangerous diagnostic error.
- Use structured frameworks (VINDICATE, illness scripts, SBAR) to organize your thinking.
- Metacognition — thinking about your own thinking — is the #1 debiasing strategy.
- Communicate your reasoning clearly. Great thinking only helps patients when shared with the team.
- Clinical reasoning improves with deliberate practice, reflection, and feedback.

References: Chest 2020 | BJORN 2021 | Nurse Educ Today 2014 | Croskerry 2003 | Kahneman 2011

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