QFMCRC: Qatar Family Medicine Clinical Reasoning Cycle: An Integrated Clinical Reasoning Cycle for Family Medicine: Bridging Diagnosis, Management, and Reflection

Dr Hassan Tawfik[1], Dr Mohamed Salem[1], Dr Fawzia Al-Hor[1], Dr Mona Taher[1]

1 Senior Consultant Family Medicine – Family Medicine Program -PHCC/HMC – Qatar

Corresponding author:
Clinical Associate Professor
Qatar University Medical College,
Qatar
Email: m_salem1973@yahoo.com

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Abstract

Clinical reasoning is the intellectual foundation of family medicine. This paper reviews the evolution of clinical reasoning models and proposes an integrated Clinical Reasoning Cycle that unifies diagnostic reasoning, management planning, and reflective practice. The model emphasizes iterative thinking, contextual understanding, and patient-centered decision-making which are essential characteristics of Family Medicine. This integrated framework aims to enhance clinical education, strengthen physician decision making, and improve patient care outcomes.

Keywords: Clinical reasoning, family medicine, diagnostic reasoning, reflective practice, medical education

Introduction

Clinical reasoning is the central competency in family medicine, essential for managing undifferentiated clinical presentations, guiding safe and effective management, and delivering person centered and longitudinal management. Existing clinical reasoning models are often fragmented and do not fully capture the complex, iterative, and context dependent nature of primary care practice. Within Qatar's rapidly advancing healthcare system, Family Physicians require an integrated clinical reasoning approach that combines diagnostic thinking, management planning, and reflective practice. The Qatar Family Medicine Clinical Reasoning Cycle (QFMCRC) is proposed as a unified and practical framework designed to strengthen clinical decision making, enhance residency education, and improve the quality and safety of patient care.

Models of Clinical Reasoning in Family Medicine

Several theoretical models describe the cognitive processes underlying clinical reasoning. Each highlights different aspects of how clinicians gather information, generate hypotheses, and make clinical decisions.

1. Diagnostic Reasoning Models

- **Hypothetical–Deductive Model:** Clinicians generate early diagnostic hypothesis and test them through targeted data collection (1)
- **Pattern Recognition:** Experienced physicians rapidly identify familiar clinical patterns based on previous exposure (2)
- **Illness Script Theory:** Clinicians use structured mental representations that link risk factors, pathophysiology, and clinical features to guide diagnosis (3)
- **Dual-Process Theory:** Combines intuitive, fast reasoning (System 1) with slower, analytical reasoning (System 2) (4)

2. Contextual and Narrative Reasoning

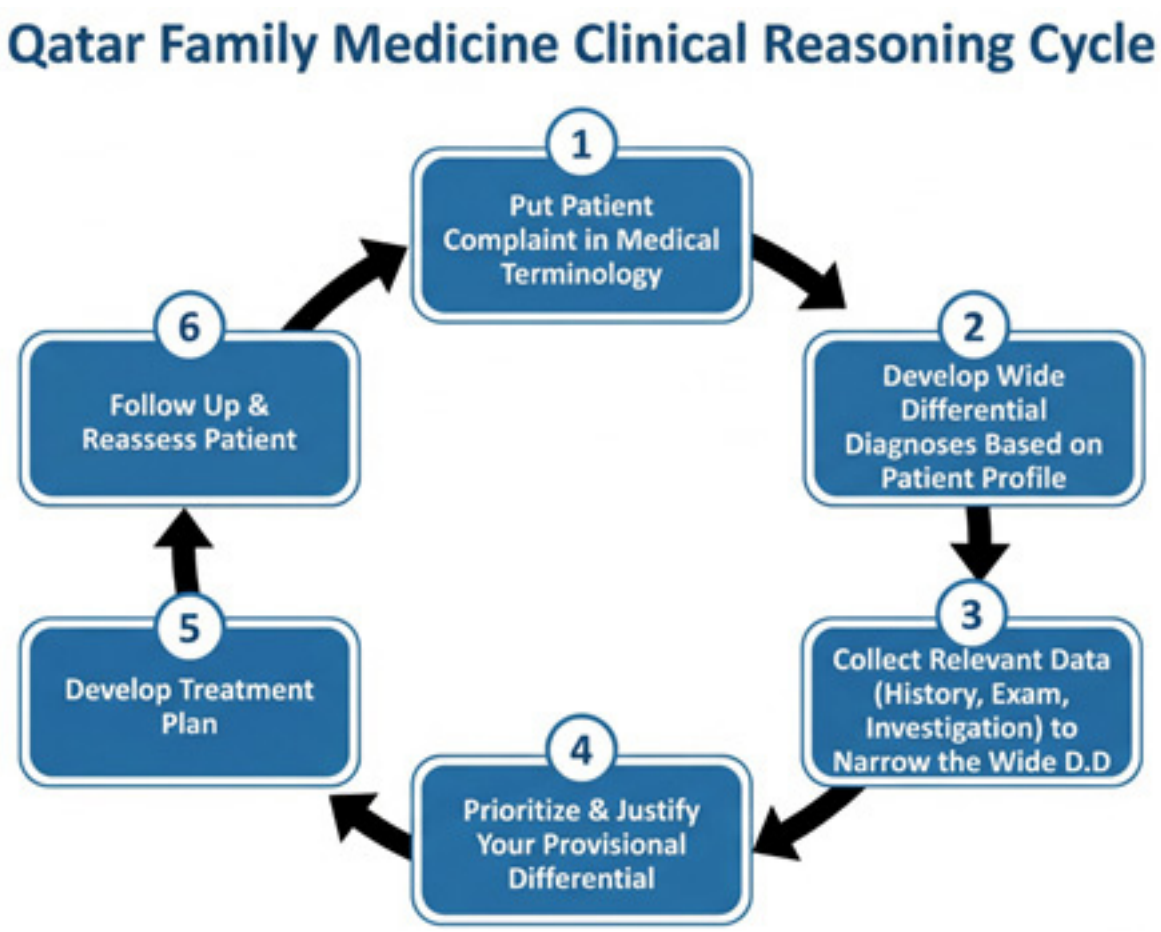
- This approach emphasizes understanding the patient's story, beliefs, cultural background, and psychosocial context, which is fundamental to person centered Family Medicine practice (5)

3. Clinical Judgement Models

- **Tanner's Model:** Describes clinical judgement as a process of noticing, interpreting, responding, and reflecting (6)
- **Levett-Jones' Clinical Reasoning Cycle:** An eight phase, cyclical model that mirrors continuous assessment and follow up in clinical care (7)

4. Educational and Teaching Models

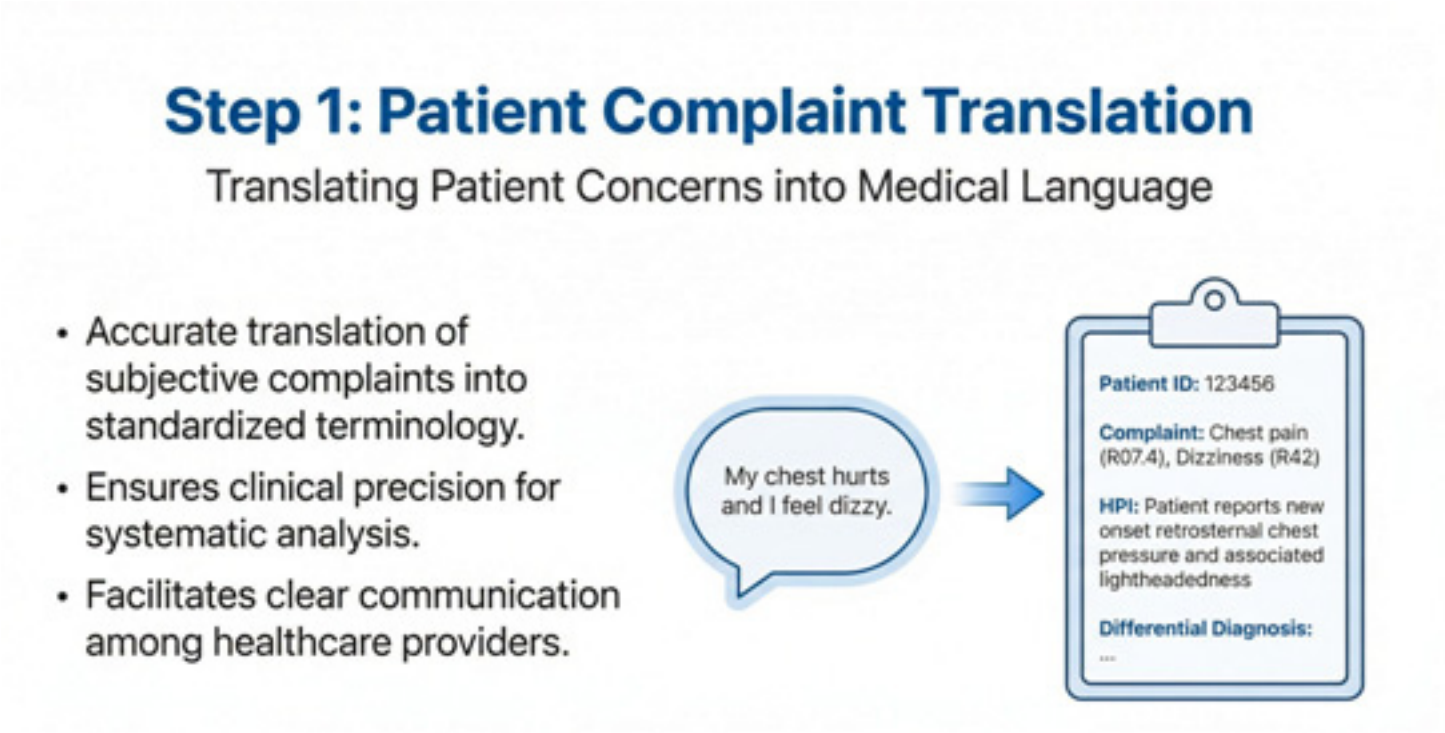
- **SNAPPS:** A learner centered framework that encourages trainees to analyze differential diagnoses, express uncertainty, and develop management plans (8)



The Qatar Family Medicine Clinical Reasoning Cycle
It is an integrated, practical framework that reflects the real flow of a family medicine consultation. It unifies diagnostic reasoning, management planning, and reflective practice into one continuous, iterative process. The cycle includes six key steps:

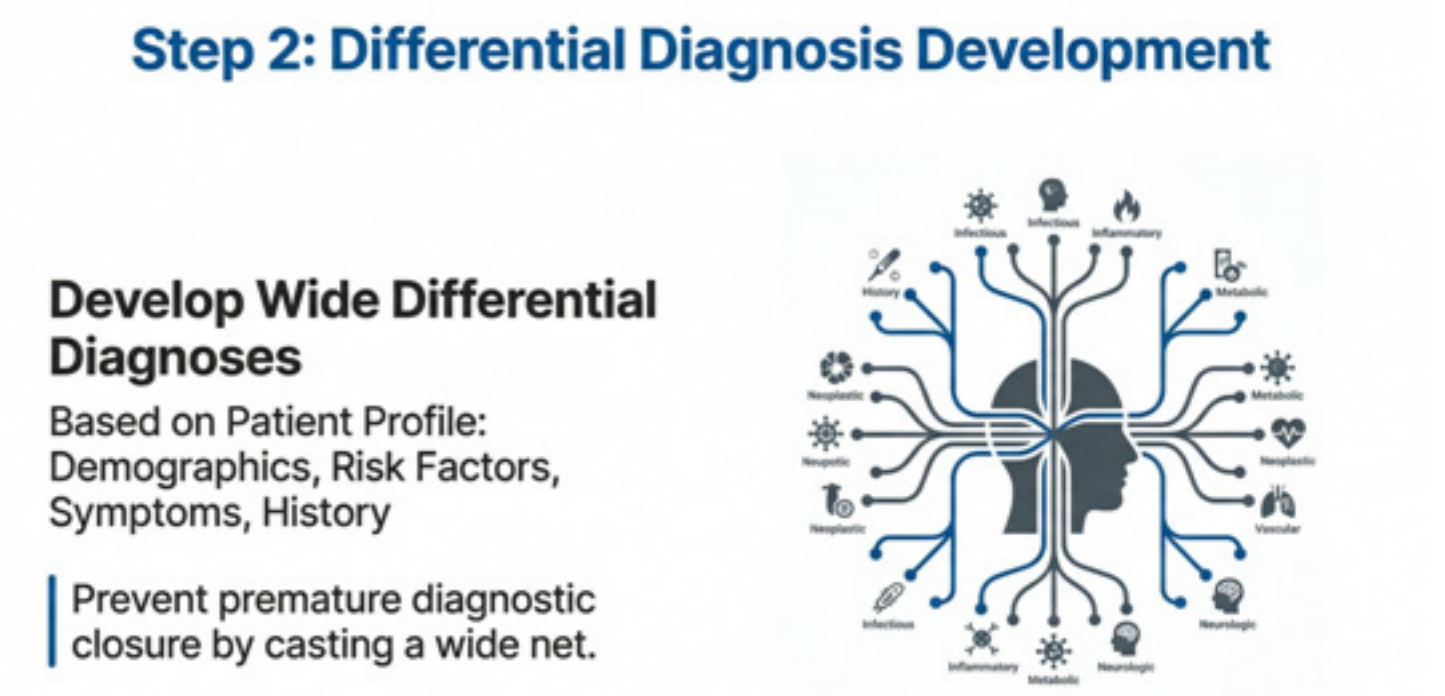
Step 1: Patient Complaint Translation

Translating Patient Complaints into Medical Language. The clinical reasoning process begins with accurately translating the patient's concerns into appropriate medical terminology. This step ensures that subjective experiences are captured with clinical precision, facilitating effective communication among healthcare professionals and enabling structured clinical analysis.

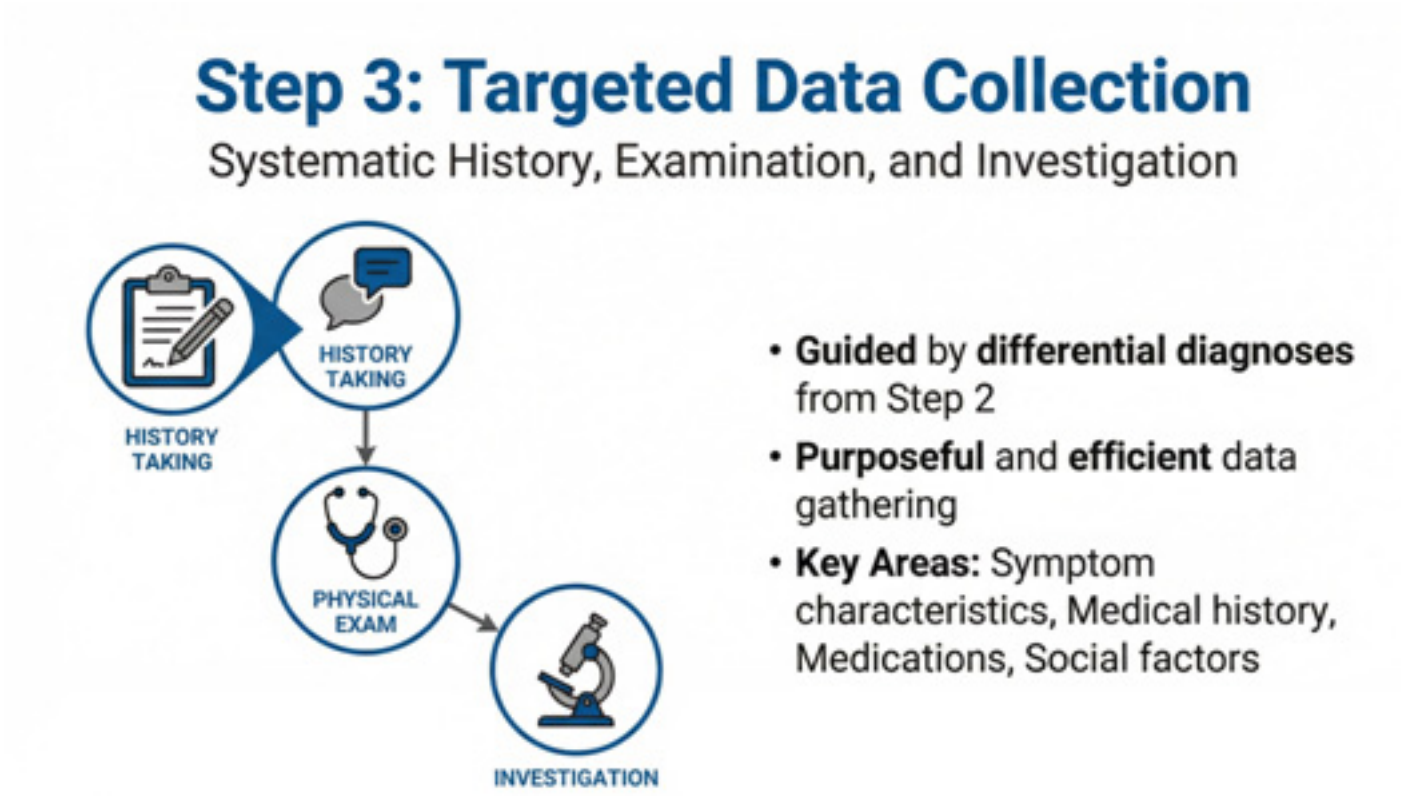


Step 2: Developing a Broad Differential Diagnosis

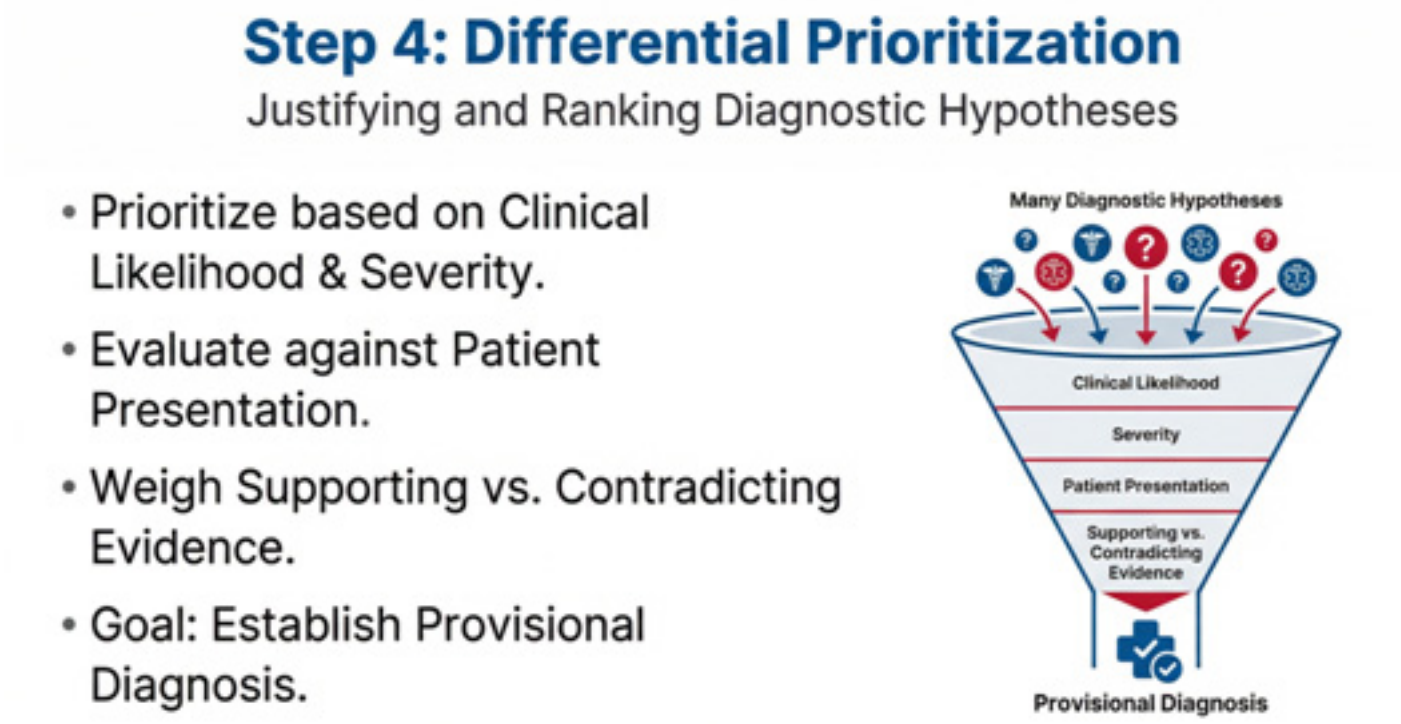
Developing a broad differential diagnosis based on the patient's demographics, risk factors, presenting symptoms, and relevant medical history, clinicians generate a comprehensive list of possible diagnoses. This approach reduces the risk of premature diagnostic closure and ensures that clinically significant conditions are considered.



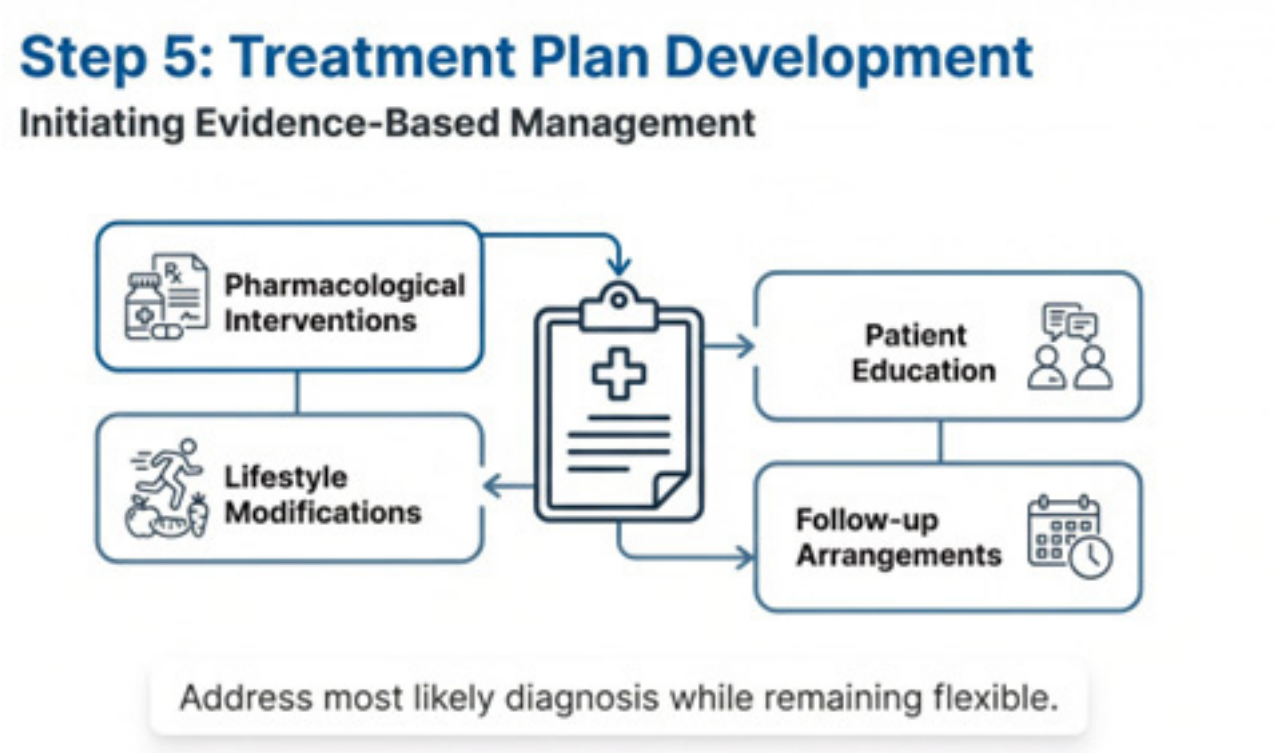
Step 3 - Targeted Data Collection
Clinicians gather relevant information through focused history taking, physical examination, and appropriate investigations. Data collection is guided by the differential diagnosis, ensuring efficiency and clinical relevance.



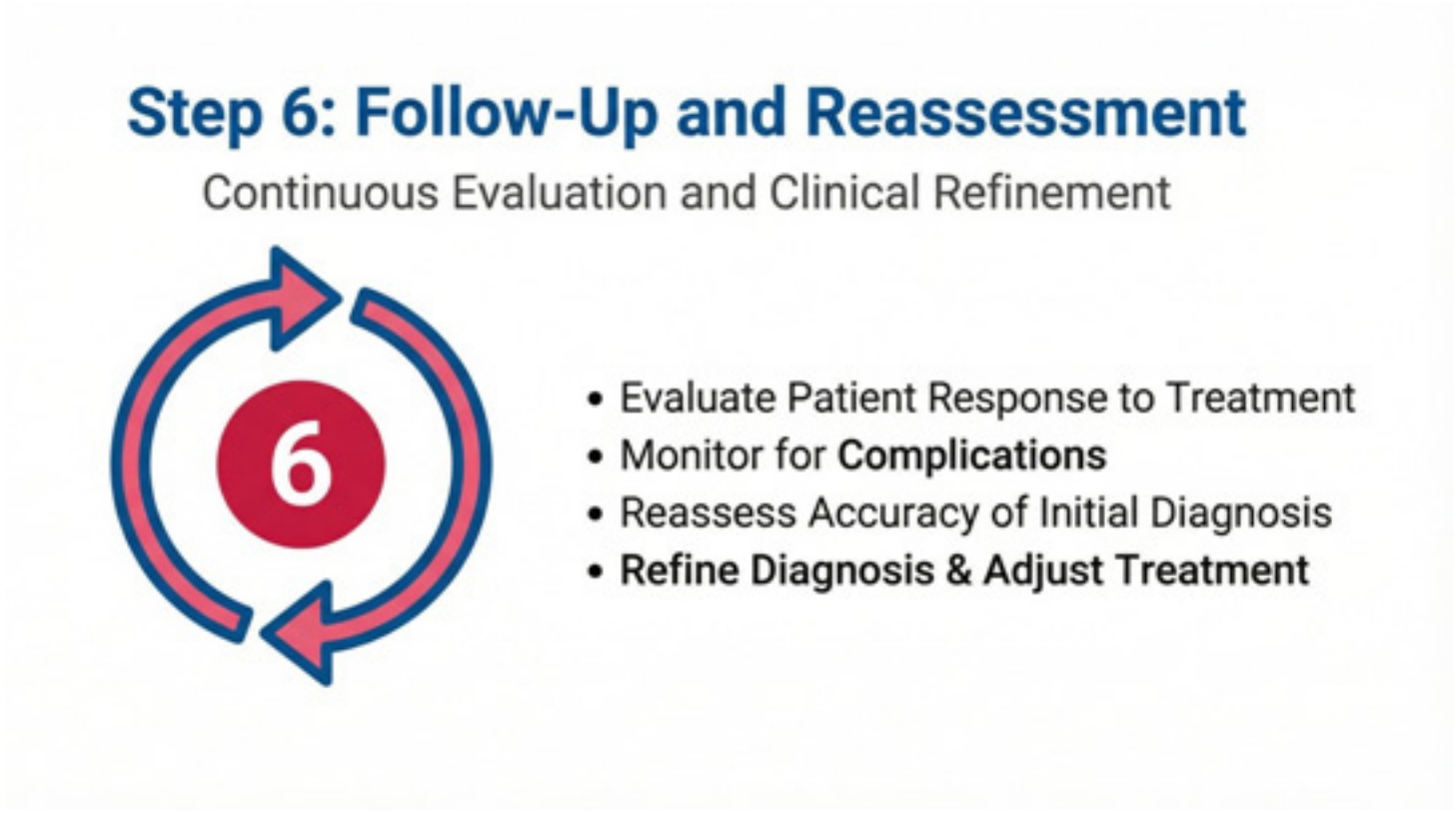
Step 4: Prioritizing and Justifying the Differential Diagnosis
Using the collected data, clinicians prioritize diagnostic possibilities based on likelihood, severity, and supporting evidence. Each diagnosis is evaluated against clinical findings to establish a provisional working diagnosis.



Step 5: Developing a Treatment and Management Plan
Initiating Evidence-Based Management based on the prioritized differential diagnosis, clinicians develop a comprehensive treatment plan. This plan addresses the most likely diagnosis while remaining flexible to accommodate alternative diagnoses if the patient does not respond as expected. The treatment plan integrates pharmacological interventions, lifestyle modifications, patient education, and follow-up arrangements to optimize patient outcomes.



Step 6 - Follow-Up and Reassessment
Ongoing follow up allows clinicians to evaluate treatment response, reassess diagnostic accuracy, and refine management plans. This step reinforces the cyclical nature of clinical reasoning and supports patient safety and continuity of care.



The Cyclical Nature of Clinical Reasoning
The QFMCRC is inherently cyclical rather than linear. New information obtained during follow up may prompt clinicians to revisit earlier steps, refine diagnostic hypotheses, and adjust management strategies. This iterative process reflects the dynamic reality of Family Medicine practice and promotes continuous professional development.

Core Purpose:
This model strengthens decision-making, supports resident training, and aligns with the holistic, contextual, and longitudinal nature of family medicine.

The proposed Qatar Family Medicine Clinical Reasoning Cycle aligns closely with established reasoning theories yet offers unique advantages that make it particularly suited to the realities of family medicine. Traditional models provide strong foundations for understanding how clinicians think, but many describe reasoning in fragmented components or focus primarily on diagnostic processes. In contrast, the proposed cycle integrates diagnostic reasoning, management planning, and reflective practice into one coherent, iterative framework.

Comparison with Established Models
The Qatar Family Medicine Clinical Reasoning Cycle (QFMCRC) aligns closely with several well-established clinical reasoning theories while offering a more integrated and practice-oriented structure. Many traditional models provide valuable insights into specific cognitive processes but often address diagnostic reasoning, management planning, and reflection as separate or loosely connected components.

The QFMCRC differs by explicitly integrating these elements into a single, continuous cycle that mirrors the real-world workflow of Family Medicine. It translates complex theoretical constructs into clearly defined, actionable steps that are easily understood by clinicians and trainees. This clarity makes the model particularly suitable for both daily clinical use and structured educational settings.

Clinical Reasoning Step	Corresponding Concepts in Established Models
1. Put patient complaints in medical terminology	Problem Representation (Integrative Model), Cue Acquisition (Hypothetico-Deductive), Noticing (Tanner's Model), Consider the patient situation (Levett-Jones Cycle)
2. Develop wide differential diagnoses list	Hypothesis Generation (Hypothetico-Deductive), Interpreting (Tanner's Model), Identify problems/issues (Levett-Jones Cycle)
3. Collect relevant data (history, exam, investigation)	Cue Interpretation (Hypothetico-Deductive), Information Gathering (Integrative Model), Collect cues/information (Levett-Jones Cycle)
4. Prioritize and justify provisional differential	Hypothesis Evaluation (Hypothetico-Deductive), Analyze Differentials (SNAPPS), Process information (Levett-Jones Cycle)
5. Develop treatment plan	Plan Management (SNAPPS), Take Action (Levett-Jones Cycle), Responding (Tanner's Model)
6. Follow up and reassess the patient	Evaluate Outcomes & Reflect (Levett-Jones Cycle), Reflection (Tanner's Model)

Clarity, Practicality, and Cyclical Design

A key strength of the QFMCRC is its clarity and direct applicability. While some models are primarily descriptive and focus on explaining how clinicians think, this cycle provides a prescriptive guide outlining what clinicians should do at each stage of patient care. Although the steps may appear linear, the model is inherently cyclical. Follow-up and reassessment generate new clinical information that prompts reconsideration of earlier steps, reinforcing reflective practice and continuous learning.

Unlike dual-process theory, the QFMCRC does not explicitly label intuitive and analytical reasoning. Instead, it accommodates both modes naturally within the workflow. Experienced clinicians may rely on pattern recognition to move quickly toward a provisional diagnosis, while trainees may engage more deliberately in analytical reasoning. This flexibility allows the model to support clinicians at different levels of experience.

Diagnostic Framework for Identifying Physician Competency Gaps

Beyond guiding clinical care, the QFMCRC can function as a diagnostic framework for identifying gaps in physician competence. Failure at specific stages of the cycle may reflect distinct educational or performance deficiencies, allowing for targeted feedback and remediation.

Failure to accurately translate patient complaints into medical terminology may indicate difficulties in communication skills, problem representation, or empathic engagement. An inability to generate a broad differential diagnosis may suggest limited medical knowledge, cognitive bias such as premature closure, or overreliance on intuitive reasoning. Inadequate data collection can reflect weaknesses in history-taking, physical examination skills, or hypothesis-driven information gathering.

Difficulty prioritizing and justifying differential diagnoses often points to challenges in analytical reasoning, data synthesis, or probabilistic thinking. Deficiencies in management planning may indicate gaps in therapeutic knowledge, limited application of evidence-based medicine, or insufficient shared decision-making skills. Failure to conduct appropriate follow-up and reassessment suggests weaknesses in reflective practice, clinical ownership, or systems-based care.

By mapping observed performance issues to specific steps in the cycle, educators can provide focused feedback and design individualized learning plans that address underlying reasoning deficits rather than isolated errors.

Step in clinical reasoning Cycle	Potential Physician Defect if Not Done Properly	Supporting Rationale from Clinical Reasoning Literature
1. Put complaint in medical terminology	Defect: Poor communication and interpersonal skills; weak problem representation; lack of empathy.	This initial step is about creating an accurate problem representation, a critical phase in the Integrative Model (9). Failure here suggests the physician cannot effectively translate the patient's narrative into a clinically meaningful context, a process Tanner's model calls Noticing and which requires engagement with the patient's concerns (6).
2. Develop wide differential diagnoses list	Defect: Deficient medical knowledge base; cognitive biases (e.g., premature closure, availability heuristic); over-reliance on non-analytical reasoning.	This is the Hypothesis Generation phase from the Hypothetico-Deductive model (1). A narrow list points to a limited knowledge of disease scripts or being unduly influenced by recent or memorable cases. It indicates a failure to engage System 2 (analytical) thinking to consider a broad range of possibilities (4).
3. Collect relevant data	Defect: Poor clinical skills (history-taking, physical exam); inefficient data gathering; inability to test hypotheses.	This step involves Cue Interpretation and information gathering to test the generated hypotheses (9,1). A physician who collects irrelevant data or performs a poor examination lacks the procedural skills and the strategic thinking needed to narrow the differential diagnosis efficiently.
4. Prioritize and justify provisional differential	Defect: Flawed analytical and critical thinking skills; poor synthesis of clinical data; difficulty with probabilistic reasoning.	This is the core of Hypothesis Evaluation (1). The inability to weigh evidence, consider disease prevalence, and justify a leading diagnosis indicates failure in higher-order analytical reasoning. The physician may have the data but cannot synthesize it into a coherent and defensible conclusion.
5. Develop treatment plan	Defect: Lack of knowledge of therapeutic guidelines; inability to apply evidence-based medicine; poor shared decision-making.	This step, corresponding to Responding or Taking Action (6), requires more than just a diagnosis. It involves translating the diagnosis into a practical, evidence-based plan that considers the patient's context and preferences. Failure here can indicate a gap between knowing *what* the patient has and knowing *what to do* about it.
6. Follow up and reassess the patient	Defect: Lack of metacognitive skills (reflection); poor sense of responsibility and ownership; systems-based practice issues.	This final step is crucial for learning and safety. It aligns with Reflection in Tanner's model and the Levett-Jones cycle (6). A failure to follow up and learn from outcomes indicates a breakdown in metacognition, the ability to think about one's own thinking, which is critical for continuous professional development and error prevention.

Educational Implications

Integrating the QFMCRC into Family Medicine residency training has the potential to strengthen clinical reasoning skills across all levels of learners. The model can be used as a framework for case-based discussions, structured clinical encounters, reflective writing, simulation exercises, and longitudinal patient follow-up. It also offers faculty a shared language for teaching and assessing reasoning processes.

Assessment strategies aligned with the QFMCRC should emphasize reasoning pathways, adaptability, and reflection rather than diagnostic accuracy alone. Tools such as case-based discussions, Mini-CEX, direct observation, and reflective portfolios can be mapped to specific steps of the cycle, enhancing both formative and summative assessment.

A risk in all of these efforts is that we come to believe we are teaching "clinical reasoning" as a generalizable skill that can be applied to any clinical problem. Unfortunately, this fond hope has little empirical support. From the earliest studies of medical problem solving to the present, the most reproducible result is that clinical reasoning performance is highly content (and context) specific (10,1).

Obtaining a good grasp of clinical reasoning processes and principles in medical school is important to safeguard patients after graduation. There is an emerging stance that clinical reasoning should be taught more explicitly in medical education (11).

In fact, it is recognized that most clinical reasoning errors are not merely attributed to physician incompetence or lack of knowledge, but rather the 'frailty of human thinking under conditions of complexity, uncertainty, and pressure of time' (12).

The cultivation of clinical reasoning in medical training is achieved through deliberate practice and dialectical instruction in naturalistic settings but can be supported with simulated learning (13). Broadly, clinical clerkship attachments are most effective when trainees are immersed in an iterative process of direct observation, deliberate practice and receiving feedback, with further consolidation of learning achieved through dialectical methods of instruction such as Socratic/clinical questioning (13), chart review or chart-stimulated recall (14) and mini-CEX (clinical evaluation exercise) assessments (15).

Summary

The ability to articulate a patient's complaint using appropriate medical terminology may vary depending on whether the resident is a native English speaker and their level of cognitive functioning. A structured assessment cycle can help identify specific deficiencies at each stage of clinical evaluation:

- **History taking:** Difficulty in generating a broad differential diagnosis may indicate a gap in foundational medical knowledge. Challenges in data collection could stem from language barriers, poor communication skills, or an inability to formulate appropriate questions.
- **Physical examination:** Deficiencies may be observed in either technique (a skill-based issue) or interpretation (a knowledge-based issue).
- **Investigations**: Ordering appropriate tests reflects clinical reasoning and judgement. Errors here may point to deficits in medical knowledge or critical thinking.
- **Diagnostic reasoning:** Difficulty in narrowing down the differential diagnosis often suggests a flaw in the resident's analytical thinking process.
- **Management planning:** Inability to formulate a suitable treatment plan may again highlight gaps in medical knowledge.

Conclusion

Clinical reasoning in Family Medicine is a multidimensional process that integrates analytical thinking, intuition, contextual awareness, and reflection over time. The Qatar Family Medicine Clinical Reasoning Cycle offers a unified, practical framework that aligns closely with the philosophy and clinical realities of Family Medicine practice. By integrating diagnostic reasoning, management planning, and reflective practice into a single cyclical process, this model has the potential to enhance clinical education, support faculty development, and improve patient-centered care. Future work should focus on implementation, validation, and evaluation of the model's impact on learner development and clinical outcomes.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process
During the preparation of this work the author(s) used [Chat GPT and Copilot] in order to [generate data]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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