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# Clinical reasoning

## A guide to improving teaching and practice

### Background

The process of clinical reasoning is undertaken by all clinicians, often automatically, and is the cognitive process that underlies diagnosis and management of a patient's presenting problem. The teaching of clinical reasoning can pose a challenge to the clinical teacher.

### Objective

This article reviews the process of clinical reasoning and provides the teacher with a framework to teach clinical reasoning to students and junior doctors.

### Discussion

By considering clinical reasoning as a skill to be learnt rather than a concept to be understood, a framework for teaching this skill can be developed. The learner initially observes a consultation by the teaching clinician, followed by the teacher explaining the reasoning processes used including hypothesising, hypothesis testing, re-analysis and differential diagnosis. The student then comments on the reasoning of the teacher in a subsequent consultation, followed by feedback from the teacher on the student's reasoning in a third consultation.

### Keywords

education, medical; clinical competence; models, educational; general practice



Clinical reasoning is seemingly as difficult to define as it is to teach. Clinicians generally 'know it when they see it', but rarely stop to consider what is meant by it, and more importantly, how to teach it to the next generation of clinicians. A definition of clinical reasoning includes an ability to integrate and apply different types of knowledge, to weigh evidence, critically think about arguments and to reflect upon the process used to arrive at a diagnosis.<sup>1</sup> Clinical reasoning therefore requires not only an accumulation of knowledge but also a level of experience, which is generally what sets apart a practising clinician from a medical student or junior doctor. There is also a degree of automation<sup>2-4</sup> that occurs when clinicians consult, which to the observing student is difficult to grasp and can be a barrier to learning.

Various theories have been proposed relating to how a clinician reasons through a clinical consultation and how 'expert' clinicians reason differently to novice learners. The evolution of these theories are described well by Elstein,<sup>5</sup> with the most recent being a unified 'dual theory' of clinical reasoning,<sup>4</sup> which suggests that clinicians use a combination of intuition and analysis in their consultations. The general practitioner who sees several patients with upper respiratory tract infections every day would very quickly make this diagnosis in another patient (experiential/intuition), however if a more unfamiliar or unusual patient problem is encountered they may require more detailed questioning and analysis of the problem (analysis). Novice learners, such as medical students, have limited clinical experience and therefore need to approach most consultations in a more analytical ('hypothetico-deductive') way,<sup>3,4</sup> and a teaching approach using this framework is proposed to assist in the development of clinical reasoning ability.

### Understanding the clinical reasoning process

The clinical consultation is the practical embodiment of the clinical reasoning process by which data are gathered, considered, challenged and integrated to form a diagnosis that can lead to appropriate management. The main components of a clinical consultation, when considered in this construct, include:

- a thorough but directed clinical history, with initial hypothesis



- generation and subsequent testing through specific questioning
- selection of a primary diagnosis and differential diagnosis in order of likelihood
- physical examination directed at gathering further data necessary to confirm or refute the hypotheses
- thoughtful and critical selection of investigations to gather additional data
- implementation of a targeted and rationalised management plan.

The other more hidden aspect of this process is the weighting of evidence as provided by a patient:

- Is this piece of data important or irrelevant?
- Does this piece of data make the hypothesis more or less likely?
- How does the data interrelate with the other data already gathered?
- Which data is the most critical (both positive and negative)?

This basic model also informs the theory behind the problem-based learning (or case-based learning) approach to teaching medical students.<sup>6,7</sup> The majority of academic institutions in Australia are utilising these teaching methods as they not only contribute to knowledge development, but also encourage the early development of diagnostic and communication skills, cultural sensitivity and tolerance of uncertainty in clinical practice.<sup>7</sup>

## Teaching clinical reasoning in the consulting room

The process of integrating knowledge and applying it to patient care is complex and challenging for students to learn, but is ideally taught in a clinical context such as the consulting room. Clinical reasoning should not be considered as something tacit that students simply ‘pick up as they go along’, and clinical teachers can greatly enhance students’ ability to reason.

Clinical reasoning is a skill to be learnt, not unlike driving a car. Knowing about the mechanics and understanding the functions of a car is quite different to driving one across town in peak hour traffic. So too, medical students are armed with knowledge helpful to patient diagnosis. But they can find it challenging to know how to navigate the information during a patient interaction. Junior doctors similarly are developing these skills and would benefit from clear guidance on the reasoning process.

A proposed strategy for teaching clinical reasoning is therefore to teach it within a skill framework in the clinical consultation room. This has been used with success by the authors in teaching medical students how to reason. A similar strategy has been described by Kassirer,<sup>8</sup> designed for larger groups of students, however this approach used with a single student would remain beneficial, even potentially enhanced. The idea of a ‘coach’ to assist the student during an evolving consultation is highlighted as essential to monitor the student’s questions and responses and commenting on their relevance and accuracy with instant feedback during the consultation. There are also arguments for students having a basic understanding of the theoretical concepts behind clinical reasoning to improve understanding of what they are learning and why.<sup>8</sup> Clinical teachers

may wish to encourage students to undertake some basic readings on clinical reasoning theory, and to do so themselves.<sup>3-5</sup>

Frameworks for teaching a clinical skill have been devised,<sup>9-11</sup> including the Peyton model, which uses the four steps of demonstration, deconstruction, comprehension and performance. An adaptation of this can be used as a model to teaching the skill of clinical reasoning across three consultations.

## Consultation 1: Demonstration and deconstruction

The clinician demonstrates a clinical consultation at normal speed as they would in regular practice, taking care to clearly consider a range of hypotheses and differential diagnoses in the consultation.

Following the consultation, the clinician then deconstructs the consultation with the student. This is to assist the student to understand what the clinician was thinking and how they were reasoning. A deconstructed consultation focusing on the clinical reasoning pathway is presented in *Figure 1*.

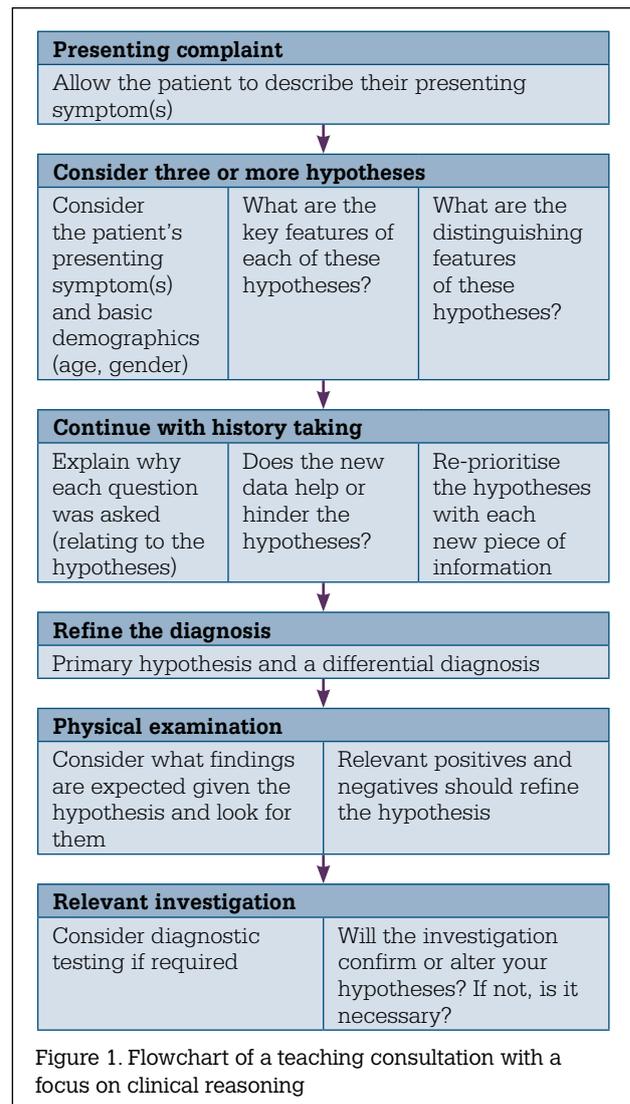


Figure 1. Flowchart of a teaching consultation with a focus on clinical reasoning



## Consultation 2: Comprehension

Following the demonstration and deconstruction phase, the next consultation should again be performed by the teaching clinician, but with the student actively tracking the consultation and outlining the clinical reasoning being demonstrated. This can follow a similar structure to that outlined in *Figure 1*, with the teacher pausing to allow the student to explain what is happening. For example:

- After the patient's presenting complaint, the clinician pauses to allow the student to list three or more hypotheses (differential diagnoses)
- The student then briefly outlines these conditions, in particular the key features and distinguishing features of each, and the clinician then proceeds to enquire about these features to the patient (including any others that are important but not considered by the student)
- The clinician may pause after certain critical questions to ask the student 'Why did I ask that?' or after a patient response to ask 'How does that affect the hypotheses?'
- Continue working through the consultation as above, and allow the student to determine the primary hypothesis and differential diagnosis following the history taking
- Ask the student which physical examination findings would be expected (positive and negative) given these hypotheses, and examine for them
- Ask the student which definitive or helpful investigations would be warranted following these findings, and to explain what the results would mean.

## Consultation 3: Performance

The student should now be familiar with how the clinician reasons through a clinical consultation. In the third consultation, the student follows the model outlined in the first and second consultations (*Figure 1*) by performing the history, physical examination and directing investigations, explaining to the clinical teacher their reasoning as they proceed. If the student's reasoning is unclear, the clinical teacher can interject with questions such as 'Why did you ask that?' or 'How does that information help you?' to keep the student on track.

## Clinical reasoning and impact on practice

Teaching clinical reasoning also provides an excellent opportunity for clinicians to consider and review their own clinical reasoning pathways. Automation of clinical reasoning allows clinicians to undertake consultations in a timely and streamlined fashion, but does so at the risk of missing critical information, and therefore the diagnosis, if care is not taken.<sup>3,5</sup>

A different situation resulting in the same risk can arise for clinicians seeing a long-term patient and failing to consider alternate diagnoses other than those previously made in the patient. A diagnosis that could have been made with a careful history and physical examination in one consultation may end up taking two or three consultations and several unnecessary investigations to reach if differential diagnoses are not

considered early.

The benefits of reflecting upon and improving one's own reasoning may include:

- improving time to diagnosis
- avoiding assumptions
- reducing unnecessary investigation and the costs these incur
- improving patient satisfaction and being branded with the 'good doctor' label.

## Key points

- The process of clinical reasoning is critical to making a timely and accurate diagnosis in a clinical consultation.
- Clinical reasoning can best be taught as a skill within a skill-teaching framework.
- Teaching clinical reasoning encourages personal reflection and refinement of the clinician's own clinical reasoning skills to improve patient outcomes.

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