Clinical reasoning in Internal Medicine: the crucial role of synthesis as a cognitive skill in an era of specialisation

Jayasinghe S*

Introduction

The origins of General Physicians or Specialists in Internal Medicine or Specialists in General (Internal) Medicine date back to several decades and the roles of physicians have differed across different countries. (1,2) The argument to support training of more generalists has spanned for more than a quarter century! The recently developed curriculum of the MD in General (Internal) Medicine was based on the foundation of defining a role of a 'general physician' as "those with expertise in the diagnosis and management of acute and complex, chronic and multisystem disorders in adult patients". (3) The definition then includes several descriptions that are common to any specialty: "They undertake a comprehensive assessment of a patient's problems, both biomedical and psychosocial. They are competent to provide coordinated care with the assistance of multidisciplinary teams to optimise health outcomes while working in hospitals and clinics". (3)

A recent review described the stages in the development of the specialty of internal medicine, its key drivers, and its role in the health care system in resource poor settings such as Sri Lanka. (4) It was also proposed to base the clinical practice of internal medicine using a transdisciplinary approach, with two key goals related to clinical reasoning: to be master diagnosticians (by 'taking a global comprehensive approach...') and master the science of therapeutics to manage multimorbidity (i.e., 'treatment of complex problems affecting different organs of the body').

Do Internal Medicine physicians need any special cognitive skills to achieve these two goals in clinical reasoning?

Patients seen by Internal Medicine physicians are presenting with an increasingly complex set of disorders and problems. This is related to a rapidly increasing proportion of elderly patients who are more vulnerable to dysfunction in multiple organs. For example, the declining renal function with ageing makes individuals more susceptible to acute kidney injury, even from the newer non-steroidal anti-inflammatory drugs. (5) Similarly, with the availability of more effective treatment, those having chronic illnesses (e.g., diabetes) survive longer, resulting in an increased risk of developing complications (e.g., coronary artery disease and chronic kidney disease).

Another factor contributing to the complexity of clinical diagnosis is the advances in knowledge and technologies that have led to the detection of novel syndromes and disorders. (6) This situation is further compounded by the emergence and discovery of novel infections such as COVID-19.

Synthesis as a cognitive skill in clinical reasoning

The diagnostic thinking process is often characterised by two main strategies: pattern recognition or hypothetico-deductive approach (HAD). (7-9) These strategies are utilised to varying degrees depending on the expertise of the clinician and the type of
clinical encounter. For example, novices tend to rely more on the HAD approach while experts in the field can arrive at diagnoses almost instantaneously through pattern recognition. These two strategies (i.e. pattern recognition and HAD) closely correspond to System 1 (intuitive, emotional and fast) and System 2 type thinking (logical reasoning out which is deliberative) respectively, as described in the field of behavioural economics.(10)

In a recent paper we proposed that the cognitive process of synthesis plays a key role in encounters with patients having multimorbidity, or complex clinical problems.(11) Synthesis is a higher-order level of a hierarchy of cognitive functioning in Bloom's Taxonomy of educational objectives.(12) It is described by a series of verbs: combine, compile, organise, explain, reorganise, and summarise. There is increasing recognition of the role of synthesis in psychology.(13,14)

In my view, specialists in internal medicine should invest time in developing the cognitive skill of synthesis in their clinical reasoning. This is necessary to address the emerging challenges faced by the specialty, including increased case complexity, advancing knowledge and increased specialisation. The role of synthesis can be illustrated in the following example and figure:

A 70-year-old man was admitted with exacerbation of back pain followed by oliguria, lower limb swelling and was found to have high serum creatinine due to acute kidney injury (AKI). He had COPD, type-2 diabetes mellitus (T2DM), ischaemic heart disease (IHD), and backache from osteoporotic fractures. In the past he was prescribed long-term corticosteroids for COPD, diclofenac for his backache due to osteoporotic fractures, and recently treated with celecoxib for exacerbation of back pain.

The multiple pathologies and disorders must be viewed as a coherent whole. This process involves cognitive synthesis, wherein the clinical picture is described as an 'organic whole' and the case history is reframed using specific phrases. For instance: "The 70-year-old has COPD treated with several courses of corticosteroids that led to the development of osteoporosis and T2DM. As a result of the former he developed microfractures and back ache. The corticosteroid induced T2DM progressed to nephropathy and declining renal function. He was prescribed celecoxib for an acute exacerbation of back pain which precipitated acute kidney injury (AKI)"

Figure 1 presents a graphical representation of the links across different clinical features, with arrows indicating causative pathways, and three individual pathways of pathogenesis shown in dashed arrows. This is an application of systems science thinking to understand a complex clinical scenario in the form of a networked diagram known as a Clinical Reasoning Map.(15, 16)

Without understanding these interactions as shown in figure 1, a novice clinician may disregard the

![Figure 1 - The links between individual clinical features and their pathways in pathogenesis](image-url)
opportunity to treat a holistic set of problems. Understanding these interactions is required of specialists in internal medicine to take ‘a global comprehensive approach’ and become master diagnosticians, experts in the ‘treatment of complex problems affecting different organs of the body’. (4)

Figure 2 shows the contrast between cognitive synthesis of a specialist in internal medicine from the more limited domain of expertise found in specialties such as nephrology, rheumatology and cardiology. While the individual competencies of these specialists in their respective organ-systems are invaluable to the team managing the patient, it is the specialist in internal medicine who must detect and characterise the interactions and links among them. It is the specialist in internal medicine who then synthesises this specialist knowledge to develop a holistic picture and approach to the patient’s set of problems. This holistic and comprehensive synthesis goes beyond addressing a mere bundle of individual problems.

This practice deviates from instances when a patient is referred to multiple specialists for their opinions on management, with less effort paid to synthesise the different viewpoints and produce a cohesive plan of management. Such an integrated, leadership role is essential for optimising care and preventing unnecessary drug interactions and medical errors (for example, in this instance act as a caution against future use of NSAIDs in the patient).

Implications

Accepting synthesis as a key cognitive skill carries several implications for professional training and practice of internal medicine. In clinical practice, synthesis requires a holistic approach that is enriched by a transdisciplinary approach, involving close collaboration with multiple disciplines. In most instances, such multidisciplinary teams should be led by a generalist who has the mindset and capacity to synthesise knowledge. Medical education and postgraduate training should promote synthesis, and give due emphasis to deliberative clinical reasoning. (17, 18) Another strategy is to use more graphical methods such as Clinical Reasoning Maps to promote synthesis. (15, 16)

The assessment of clinical skills [e.g.: OSCEs, Mini-Clinical Evaluation Exercise (mini-CEX), and Practical Assessment of Clinical Examination Skills – PACES- in the MRCP (UK)] must be revisited because these fragment cognitive competencies and work against synthesis. In contrast, traditional long case and case-based assessments provide more opportunities to assess synthesis and a comprehensive approach that reflects real-life clinical practice.

Figure 2 - Domains of expertise of other specialists in the clinical example
A role for the College of Internal Medicine

The establishment of the Sri Lanka College of Internal Medicine (SLCIM) was a significant step in Sri Lanka aimed at delineating and describing the clinical and other roles of a specialist in Internal Medicine. In fact, some would agree with the statement that the SLCIM was a response to concerns that specialties were ‘taking over’ some of the knowledge domains and clinical roles of a ‘general physician’. Synthesis could therefore be considered a ‘new’ domain of expertise for the specialist in Internal Medicine. Recognising synthesis as a cognitive skill would be the first step in advancing a new field of thinking, research and evaluation.

It is opportune for the Sri Lankan College of Internal Medicine to build on this initiative and recognise and promote the cognitive skill of synthesis in clinical practice, education, and training. The challenge is for the College to take global leadership and rescue internal medicine from the clutches of Evidence-Based-Medicine (EBM) that has colonised our minds. The latter is fragmenting and systematically destroying the ‘holistic clinician’, especially in internal medicine. We are ideally placed to lead a global revival of clinical reasoning as a core competency. This will also enable us to develop expertise as ‘synthesisers of knowledge’ and navigate through the next wave of challenges, including the emerging era of artificial intelligence (AI), machine learning and its algorithms. This will be an epic battle, a clash between a natural synthesiser honed by millions of years of evolution, and an artificial system created by human ingenuity. More on that later!

References


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