

## Chapter 12

# Teaching and Assessing Critical Thinking and Clinical Reasoning Skills in Medical Education

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### ABSTRACT

*In recent years, there has been more emphasis on developing higher order thinking (e.g., critical thinking and clinical reasoning) processes to tackle the recent trends and challenges in medical education. Critical thinking and clinical reasoning are considered to be the cornerstones for teaching and training tomorrow's doctors. Lack of training of critical thinking and clinical reasoning in medical curricula causes medical students and physicians to use cognitive biases in problem solving which ultimately leads to diagnostic errors later in their professional practice. Moreover, there is no consensus on the most effective teaching model to teach the critical thinking and clinical reasoning skills and even the skill is not effectively tested in medical schools. This chapter will focus on concepts, contemporary theories, implications, issues and challenges, characteristics, various steps, teaching models and strategies, measuring and intervention tools, and assessment modalities of critical thinking and clinical reasoning in medical education settings.*

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## **INTRODUCTION AND BACKGROUND OF THE CHAPTER**

It has been recognized internationally that undergraduate medical education must adapt to changing needs to equip students with a number of desired transferrable skills including clinical reasoning and critical thinking (Majumder, D'Souza, & Rahman, 2004). According to Facione (1990), critical thinking is "Purposeful, self-regulatory judgment that uses cognitive tools such as interpretation, analysis, evaluation, inference, and explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations on which judgment is based" (p. 3). Though clinical reasoning and critical thinking are interchangeably used in the literature, "Critical thinking involves some skills and attitudes necessary for the development of clinical reasoning, which is based on existing knowledge and context" (da Silva Bastos Cerullo & da Cruz D, 2010, p. 126). Critical thinking includes "analysis, inference, interpretation, explanation, synthesis and self-regulation" (Facione, 2011, p. 21). Clinical reasoning, as Victor-Chmil (2013) mentioned, is the "*application* of critical thinking to the clinical situation" (p. 34). Clinical judgment is also one of frequently used terms in health profession education. Tanner explained the clinical judgment as "an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (Tanner, 2006, p. 206). Other terms which are used in relation to critical thinking and clinical reasoning in the literature include: clinical decision-making, diagnostic reasoning, analytical thinking, critical judgment, creative thinking, problem solving, reflective thinking etc. (da Silva Bastos Cerullo & da Cruz D, 2010).

In recent years, there has been more emphasis on developing higher order thinking (e.g. critical thinking and clinical reasoning) processes to tackle the recent trends and challenges in medical education (Redecker et al., 2011; Scott, 2015). Higher order thinking has become one of the essential features for tomorrow's doctors for maintaining clinical competence and medical professionalism (Trowbridge, Joseph, & Durning, 2015; Victor-Chmil, 2013). These skills traditionally are taught in clinical placements; however, students in many schools receive limited practice and suboptimal supervision. As a result, more than two-thirds of the diagnostic failures are attributed to physicians' lack of critical thinking ability at the given situation (Royce et al., 2018). Medical schools should begin to address these limitations by designing courses with specific learning outcomes that cater to the critical thinking abilities and skills. Critical thinking and clinical reasoning skills could be nurtured by encouraging students to more actively participate in learning activities (Amey, Donald, & Teodorczuk, 2017). Medical educators need to interact with students, more to them often listen, encourage questioning, challenge students, and encourage them to reflect, and explore the answers for themselves (Scott & Chafe, 1997).

This chapter will focus on concepts, contemporary theories, implications, issues and challenges, characteristics, various steps, teaching models and strategies, measuring and intervention tools, and assessment modalities of critical thinking and clinical reasoning in medical education settings. Appropriate recommendations will also be generated for policy makers and medical educators to develop a strategic direction to produce evidence-based critical thinking in undergraduate medical curriculum and training.

## **CONCEPTS OF CRITICAL THINKING AND CLINICAL REASONING**

Critical thinking, the capacity to be deliberate about thinking, is considered as a cornerstone for teaching and training tomorrow's doctors. Critical thinking is an important feature of the Socratic method

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