

# INPLASY

## Evaluating the Influence of Technology-Enhanced Teaching Methods on the Development of Clinical Reasoning Skills in Medical Education: A Qualitative Systematic Review

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### ADMINISTRATIVE INFORMATION

**Support** - None.

**Review Stage at time of this submission** - Preliminary searches.

**Conflicts of interest** - None declared.

**INPLASY registration number:** INPLASY202450030

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 07 May 2024 and was last updated on 07 May 2024.

### INTRODUCTION

**Review question / Objective** This study aims to conduct a systematic review to assess the influence of technology-enhanced pedagogical methods on the development of clinical reasoning skills in undergraduate and postgraduate medical education.

**Rationale** Clinical reasoning skills are essential for medical doctors, yet teaching them is challenging due to their complexity. Additionally, the reasoning processes of physicians differ from those of other healthcare providers, such as nurses. A well-recognized teaching strategy for enhancing clinical reasoning skills is the deliberate practice of clinical cases. However, access to a sufficient number of cases may not always be feasible. Consequently, many innovative technology-enhanced teaching

methods have been employed to address these challenges. Several systematic reviews have been conducted in the field of clinical reasoning, but none focused exclusively on medicine; all concentrated on single technology-enhanced teaching methods, such as virtual patients. These reviews do not comprehensively address various teaching methods that aim to enhance clinical reasoning skills. For instance, one systematic review assessed the effectiveness of using virtual patients to teach clinical reasoning skills, but it did not specifically focus on medical education. Thus, its conclusions may not be directly applicable to physician training. Given the multitude of technology-enhanced pedagogical methods and the scarcity of systematic reviews evaluating each new method, there is a clear need to conduct a systematic review that explores the impact of these methods on developing clinical reasoning skills in medical students and physicians.

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**Condition being studied** Not applicable.

**Sensitivity analysis** Not applicable.

## METHODS

**Language restriction** English.

**Search strategy** Following a PRISMA model, a Systematic search of six major databases will be conducted, including MEDLINE, EMBASE, CINAHL, ERIC, PsychINFO, and Scopus. I will focus on three primary search terms: "Medical education" AND "clinical reasoning," in combination with "artificial intelligence" or "Augmented reality" or "Virtual Reality" or "serious Game" or "Simulation" or "Virtual Patient Online Learning" or "Mobile Applications" or "Wearable Technology" or "Telemedicine / Telehealth". Both keywords and MeSH terms will be utilized.

**Country(ies) involved** Canada (The University of Western Ontario).

**Other relevant information** None.

**Participant or population** The eligible study participants span all levels of medical trainees and practitioners, including medical students, interns, residents, fellows and attending physicians.

**Keywords** Technology-enhanced, Clinical reasoning, Medical education.

**Intervention** Intervention includes experimental use of technology-enhanced teaching methods. Thus, studies that examined pedagogical intervention that did not utilize technology to enhance teaching were excluded.

**Dissemination plans** To be published in a peer-reviewed journal.

**Comparator** Traditional teaching methods.

### Contributions of each author

Author 1 - Mohammed Badawi - Study design, data analysis and writing the manuscript.

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Author 2 - Mi Song Kim - Study design, data analysis and writing the manuscript.

**Study designs to be included** All experimental and empirical studies will be included in this review.

**Eligibility criteria** In terms of time, starting from 1975 because it was the first published article, to the year 2023.

**Information sources** MEDLINE, EMBASE, CINAHL, ERIC, PsychINFO, Scopus.

**Main outcome(s)** Technology-enhanced teaching methods for clinical reasoning for medical students and medical doctors.

**Additional outcome(s)** None.

**Data management** Covidence and code books using Excell.

**Quality assessment / Risk of bias analysis** Not applicable.

**Strategy of data synthesis** Thematic analysis as described by Braun and Clarke 2022.

**Subgroup analysis** Not applicable.