Effectiveness of teaching strategies to improve critical thinking in nurses in clinical practice: a systematic review protocol

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Objectives: The aim of this review is to identify and synthesize the best available evidence on the effectiveness of teaching strategies aimed at improving critical thinking (CT) in registered nurses who provide direct patient care. Specifically, the research question is: What are the best teaching strategies to improve CT skills in registered nurses who provide direct patient care?

Keywords: critical thinking in nurses; nurse practitioners; nursing education; Registered nurses


Background

Today, increasingly complex health care demands fast and effective decision making from nurses, which relies on strong critical thinking (CT) skills.1-3 The growth in health care complexity is associated with increasingly rapid technological evolution, thus necessitating continuous improvement of nurses’ cognitive and metacognitive skills, which are indispensable to CT.2,4-5 Training programs have invested in CT education for nurses, and through testing, these programs have sought to determine whether new professionals will enter the labor market with well-developed CT skills.1,6 Importantly, the acquisition of CT skills requires conscious commitment.

Critical thinking is a concept that is in constant development. It is not so much a method to be learned as a process or orientation of the mind, which incorporates both the affective and cognitive domains. It is developed through assessing the credibility of evidence; reflection on one’s own thoughts, life, and values; and teaching strategies that mobilize logical and analytical reasoning, among others. The characteristics of a desirable critical thinker are the necessary skills and disposition, namely, a willingness to learn and practice the skills.

In the nursing profession, the CT process is closely related to the assertive application of various cognitive, behavioral and instrumental aspects to pursue better results from patient care.7-8 In this respect, encouraging nurses to develop CT skills leads to an improvement in the skills and prerequisites that constitute an adept critical thinker. The skills and prerequisites are the structural elements of CT, and when continuously practiced in nursing, ensure effective and safe patient care.9

Critical thinking in nursing is particularly essential for correctly assessing, interpreting and analyzing information with discretion and without value judgments, with the goal of determining appropriate diagnostic and decision-making needs. These skills are desirable in all areas of nursing, especially direct patient care.

A past study10 conducted on nurses showed that the major CT skills are analysis, implementation of standards, discernment, research, logical thinking, knowledge prediction and transformation. Furthermore, the prerequisites of CT are confidence, contextual perspective, creativity, flexibility, inquisition, intellectual integrity, intuition, understanding, perseverance and reflection.10

It is noteworthy that, in order for CT to be a mediating tool in the improvement of care practices, effective clinical reasoning and decision making
skills must be established. It is important to be able to predict diagnoses and validate obtained conclusions through constant critical review.2-13 Such skills may be developed via continuing education and service training.

In a past randomized clinical trial (RCT),13 the effects of a case study program were tested separately and combined with conceptual maps to evaluate CT development in registered nurses who provide direct patient care. Those with the greatest CT skills and open-mindedness were identified and compared to case studies separately. The study supports the application of case studies combined with concept maps as a hospital-based teaching strategy to promote development of critical thinking skills and encourage the right disposition in nurses.

Studies6,12,14 have also indicated that a good critical thinker in nursing can articulate clinical reasoning based on scientific evidence. This promotes higher diagnostic accuracy and appropriate decision making, thus ensuring quality nursing care and significantly reducing iatrogenic events. Numerous researchers12-20 have further shown that CT skills might be developed and improved through a continuous and dynamic process that involves the application of appropriate teaching strategies.

Individuals have a number of sources and strategies, such as conceptual maps,13 simulations,25 problem-based learning (PBL),19,24 YouTube videos,17 video vignettes,21 and team-based learning (TBL),20 that can help in developing their CT skills.

A meta-analysis21,22 of 12 RCTs has been conducted, with the aim of evaluating the effectiveness of teaching strategies used for the development of CT in undergraduate nursing students. The teaching strategies used and tested in the RCTs included: PBL, conceptual maps, simulation, reflective writing, role modeling and animated pedagogical agents. The four studies included that compared PBL with lectures showed that PBL was significantly better in promoting CT development among undergraduate nursing students (SMD = 0.21 and 95% CI = 0.01 to 0.42; p = 0.0434). Furthermore, these studies were homogeneous (chi-square = 6.10, p = 0.106). The three studies that tested the conceptual map showed that it did not lead to significant improvements in CT (SMD = -0.53; 95%IC = -0.79 to 0.28; p < 0.0001) among undergraduate nursing students; these studies were heterogeneous (chi-square = 10.82, p = 0.0044).21 Thus, PBL led to a significant improvement in overall CT scores, which led the study13 to conclude that CT development might be improved with the use of this teaching strategy. This suggests that it is essential for educators to update their teaching methods and develop novel ones.16,20,23

However, a preliminary search of the JBI Database of Systematic Reviews and Implementation Reports and the Cochrane Collaboration, CINAHL, PubMed, and PROSPERO databases yielded no systematic reviews (published or in progress) on the effectiveness of teaching strategies for CT development in registered nurses who provide direct patient care; only systematic reviews that sought to evaluate the effectiveness of teaching strategies for CT development in undergraduate nursing students were identified.21,22,24-26 As such, it is important to assess the implementation of teaching strategies for nurses, considering that they have greater maturity (both scientifically and technically) than undergraduate students.

Therefore, this study will assess teaching strategies applied in courses, training and continuing education with registered nurses in health care settings. This will clarify which strategies are most effective for CT development in nurses who provide direct patient care, with the intention of improving clinical reasoning and decision making. This is important for achieving the goal of the continuous improvement of CT in nurses who provide direct patient care. Assessment of the efficacy of the strategies will be possible through our participation as researchers in an international research network on nursing education (Red Iberomericana de Investigación en Enfermería [RIIEE]). In addition, this study is necessary because CT research is the current focus of our multi-center research project, and no systematic reviews in this area were found.

Inclusion criteria

Types of participants
Studies that include registered nurses (RN) will be considered. We will exclude studies that involve enrolled nurses, licensed practical nurses, unlicensed assistive personnel and nursing students.

There are several systematic reviews22,27-28 that address the development of critical thinking in nursing students and studies indicate that the level of
critical thinking is related to age and professional experience; for this reason we will include only registered nurses in this systematic review.

**Types of intervention(s)/phenomena of interest**

This review will consider studies that evaluate the effectiveness of teaching strategies, which may include conceptual maps, simulations, PBL, YouTube videos, video vignettes, and TBI among others, with the aim of developing or enhancing the CT prerequisites and skills of registered nurses who provide direct patient care.

**Comparator/control intervention(s)**

The systematic review will examine studies that compare interventions based on certain teaching strategies with traditional teaching (lectures) or no specific intervention.

**Outcomes**

This review will consider studies that include CT as an outcome measure. Regarding CT skills, the psychometric parameters established for the following skills will be considered: inference, recognition of assumptions, deduction, interpretation and evaluation, analysis, induction, deduction and critical response development. Regarding CT prerequisites, the psychometric parameters established for the following will be considered: open-mindedness, fairness, willingness to determine the cause of a problem, curiosity, desire to be well-informed, respect and ability to consider other points of view. All these characteristics are desirable for good critical thinkers, and will be measured with the Watson-Glaser Critical Thinking Appraisal Instrument, California Critical Thinking Skills Test, Cornell Critical Thinking Test, Ennis-Weir Critical Thinking Essay Test, and California Critical Thinking Disposition Inventory. These measurements comprise both questionnaires and analyses of texts.

**Types of studies**

The quantitative component of the review will consider both experimental and epidemiological study designs, including RCTs, non-randomized controlled trials, quasi-experimental studies, before and after studies, prospective and retrospective cohort studies, case control studies, and analytical cross-sectional studies.

**Search strategy**

The search strategy was devised to find both published and unpublished studies. A three-step search strategy will be utilized in this review. An initial limited search of MEDLINE and CINAHL will be undertaken, followed by analysis of the words in the title and abstract as well as the index terms used to describe each article. A second search using all identified keywords and index terms will then be undertaken across all included databases. The third and final step will involve examining the reference list of all identified reports and articles for additional studies. Studies published in English, Spanish, and Portuguese will be considered for inclusion in this review. Studies published at any time will be considered for inclusion in this review.

The databases will include:
- CINAHL
- PubMed
- PsycINFO
- Cochrane Central Register of Controlled Trials (CENTRAL)
- ERIC
- LILACS
- Web of Science
- Scopus
- Embase.

The search for unpublished studies will include:
- ProQuest Dissertations and Theses
- Cybertesis
- Biblioteca Digital de Teses e Dissertações
- Trove
- Diva
- RCAAP – Repositório Científico de Acesso Alberto de Portugal
- Theses Canada
- Ethos
- DART – Europe E-Theses Portal
- National ETD Portal.

The initial keywords to be used are as follows: registered nurses, nurse practitioners, nurses, nursing staff, clinical nurse specialist, continuing nursing education, nursing education, nursing practice, education, staff development, teaching methods, concept map, problem-based learning, patient simulation, case studies, critical thinking, and decision making.

**Assessment of methodological quality**

The quantitative papers retrieved will be assessed by two independent reviewers for methodological
validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix I). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer. Appraisal will be performed independently by two reviewers.

Data extraction
Quantitative data will be extracted from the papers included in the review using the standardized data extraction tool from the JBI-MAStARI (Appendix II). The data extracted will include specific details about the interventions, populations, study methods, and outcomes of significance to the review question and specific objectives.

Data synthesis
Quantitative data will be assessed based on the overall CT score, and each skill and disposition of the various CT measurements. Furthermore, the quantitative data will, where possible, be pooled in a statistical meta-analysis using JBI-SUMARI. Effect sizes expressed as odds ratios (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard chi-square and explored using subgroup analyses based on the different quantitative study designs included in this review. Where statistical pooling is not possible, the findings will be presented in narrative form with tables and figures to aid in data presentation (where appropriate).

Acknowledgements
This study interfaces with a multi-center study being developed by members of the Red Iberomericana de Investigación en Enfermería.

References


Appendix I: Appraisal instruments  
MAStARI appraisal instrument  

**JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Unclear</th>
<th>Not Applicable</th>
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<tbody>
<tr>
<td>1. Was the assignment to treatment groups truly random?</td>
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<td>2. Were participants blinded to treatment allocation?</td>
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<td>3. Was allocation to treatment groups concealed from the allocator?</td>
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<td>4. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>5. Were those assessing outcomes blind to the treatment allocation?</td>
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<td>6. Were the control and treatment groups comparable at entry?</td>
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<td>7. Were groups treated identically other than for the named interventions</td>
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<td>8. Were outcomes measured in the same way for all groups?</td>
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<td>9. Were outcomes measured in a reliable way?</td>
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<td>10. Was appropriate statistical analysis used?</td>
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Overall appraisal:  Include ☐ Exclude ☐ Seek further info. ☐

Comments (Including reason for exclusion)

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________________________________________________________________________

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JBI Critical Appraisal Checklist for Descriptive / Case Series

Reviewer: __________________________  Date: __________________________
Author: __________________________  Year: ______  Record Number: ______

1. Was study based on a random or pseudo-random sample?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

2. Were the criteria for inclusion in the sample clearly defined?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

3. Were confounding factors identified and strategies to deal with them stated?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

4. Were outcomes assessed using objective criteria?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

5. If comparisons are being made, was there sufficient description of the groups?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

6. Was follow up carried out over a sufficient time period?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

7. Were the outcomes of people who withdrew described and included in the analysis?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

8. Were outcomes measured in a reliable way?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

9. Was appropriate statistical analysis used?  
   Yes ☐  No ☐  Unclear ☐  Not Applicable ☐

Overall appraisal:  Include ☐  Exclude ☐  Seek further info ☐

Comments (including reason for exclusion):

__________________________________________________________________________

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## JBI Critical Appraisal Checklist for Comparable Cohort/Case Control

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<thead>
<tr>
<th>Question</th>
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<th>No</th>
<th>Unclear</th>
<th>Not Applicable</th>
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<tr>
<td>1. Is the sample representative of patients in the population as a whole?</td>
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<td>2. Are the patients at a similar point in the course of their condition/illness?</td>
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<td>3. Has bias been minimised in relation to selection of cases and of controls?</td>
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<tr>
<td>4. Are confounding factors identified and strategies to deal with them stated?</td>
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<td>5. Are outcomes assessed using objective criteria?</td>
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<td>6. Was follow up carried out over a sufficient time period?</td>
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<td>7. Were the outcomes of people who withdrew described and included in the analysis?</td>
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<td>8. Were outcomes measured in a reliable way?</td>
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<td>9. Was appropriate statistical analysis used?</td>
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Overall appraisal: Include ☐ Exclude ☐ Seek further info. ☐

Comments (Including reason for exclusion)

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Appendix II: Data extraction instruments

MAStARI data extraction instrument

**JBI Data Extraction Form for Experimental / Observational Studies**

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<td>Author</td>
<td>Year</td>
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<td>Journal</td>
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<td>Other</td>
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<td><strong>Participants</strong></td>
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<td>Setting</td>
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<td>Population</td>
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<td><strong>Sample size</strong></td>
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<td>Group A</td>
<td>Group B</td>
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<tr>
<td><strong>Interventions</strong></td>
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<td>Intervention A</td>
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<td>Intervention B</td>
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<tr>
<td><strong>Authors Conclusions:</strong></td>
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<td><strong>Reviewers Conclusions:</strong></td>
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### Study results

#### Dichotomous data

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<th>Outcome</th>
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<th>Intervention ( ) number / total number</th>
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#### Continuous data

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