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Conflicts of interest:
None declared.

The effects of different teaching methods on neurology teaching: a network meta-analysis

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Review question / Objective: To evaluate the influence of different teaching methods on the teaching effect of neurology by network meta-analysis. Subjects mainly include neurology trainees, interns and standardized training physicians. Intervention includes different teaching methods, such as Problem-Based Learning(PBL), Case-Based learning(CBL), Evidence-Based Medicine(EBM), Flipped-class Learning(FCM), Team-based Learning(TBL), Clinical Pathway(CP).The teaching method for comparator the control group is Lecture-based learning(LBL).The outcome indicators are the subject's theoretical exam scores and practical skills exam scores. The study design is a randomized controlled trial.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 08 April 2023 and was last updated on 08 April 2023 (registration number INPLASY202340025).

INTRODUCTION

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methods, such as Problem-Based Learning(PBL), Case-Based learning(CBL), Evidence-Based Medicine(EBM), Flipped-class Learning(FCM), Team-based Learning(TBL), Clinical Pathway(CP).The teaching method for comparator the control group is Lecture-based learning(LBL).The outcome indicators are the subject's theoretical exam scores and

practical skills exam scores. The study design is a randomized controlled trial.

Rationale: No network meta-analysis on teaching methods related to neurology was found in both Chinese and English databases. Formal screening of search results against eligibility criteria has been performed. Initially, 1701 relevant papers were obtained according to the search strategy. After rigorous de-duplication and screening, 31 papers were included, although all papers originated from Chinese databases. Extracting the data from the papers, processing the data, we found that the study was reasonable and feasible.

Condition being studied: The quality of teaching methods is closely related to the level of knowledge of neurology of the physicians. In China, we generally use theoretical exam results and practical skills exam results to assess students' knowledge of neurology. The higher the score of the exams, the better the students' knowledge of neurology and the more effective the teaching methods. Previous research lacks direct comparisons of different teaching methods of neurology. By network meta-analysis, we can compare the scores generated by different teaching methods, objectively evaluate the quality of teaching methods and understand their images of theoretical knowledge and practical skills.

METHODS

Search strategy: After de-duplication and filtering, all included papers originate from Chinese databases.

CNKI search method as an example: (SU%='神经内科' or SU%='神经病学') AND (SU%='问题导向教学' or SU%='案例教学' or SU%='循证医学' or SU%='翻转课堂' or SU%='临床路径' or SU%='PBL' or SU%='CBL' or SU%='EBM' or SU%='CP' or SU%='团队导向教学' or SU%='TBL') AND (SU%='实习' or SU%='进修' or SU%='见习' or SU%='规培' or SU%='规范化培训')

Pubmed search method as an example:

#1 neurology[MeSH Terms]
 #2 Problem-Based Learning[MeSH Terms] OR PBL[MeSH Terms] OR Case-based learning[MeSH Terms] OR CBL[MeSH Terms] OR Evidence-Based Medicine[MeSH Terms] OR EBM[MeSH Terms] OR Flipped-class learning[MeSH Terms] OR Clinical pathway learning[MeSH Terms] OR CP learning[MeSH Terms] OR Team-based Learning[MeSH Terms] OR TBL[MeSH Terms]
 #3 regulation training[MeSH Terms] OR graduate[MeSH Terms] OR undergraduate[MeSH Terms] OR apprentice[MeSH Terms]
 #4 neurology[Title/Abstract]
 #5 Problem-Based Learning[Title/Abstract] OR PBL[Title/Abstract] OR Case-based learning[Title/Abstract] OR CBL[Title/Abstract] OR Evidence-Based Medicine[Title/Abstract] OR EBM[Title/Abstract] OR Flipped-class learning[Title/Abstract] OR Clinical pathway learning[Title/Abstract] OR CP learning[Title/Abstract] OR Team-based Learning[Title/Abstract] OR TBL[Title/Abstract]
 #6 regulation training[Title/Abstract] OR graduate[Title/Abstract] OR undergraduate[Title/Abstract] OR apprentice[Title/Abstract]
 #7 (#1 OR #4) AND (#2 OR #5) AND (#3 OR #6).

Participant or population: neurology trainees, interns and standardized training physicians.

Intervention: Problem-Based Learning(PBL, 问题导向教学法), Case-Based learning(CBL, 案例教学法), Evidence-Based Medicine(EBM, 循证医学教学法), Flipped-class Learning(FCM, 翻转课堂教学法), Team-based Learning(TBL, 团队协作学习教学法), Clinical Pathway(CP, 临床路径教学法).

Comparator: Lecture-based learning(LBL, 传统教学法).

Study designs to be included: Randomised Controlled Trial.

Eligibility criteria: The exam score is 100 points. Duplicate literature was not included. Literature not available at baseline was not included. Poor quality literature was not included.

Information sources: Chinese Database: CNKI, Wanfang Data, VIP, Sinomed. English Database: Web of Science, Embase, Pubmed, the Coherence Library.

Main outcome(s): Theoretical examination score and practical skills examination score.

Additional outcome(s): There is no additional outcome.

Data management: Literature de-duplication: The researchers (LXY) imported the search results of different databases into EndNote X9 separately to eliminate duplicate literature.

Literature screening: 2 researchers (LXY, LY) independently read the titles and abstracts of the de-duplicated literature and excluded irrelevant literature according to the predetermined exclusion criteria; on this basis, 2 people downloaded and read the full text to further rigorously screen the literature, and in case of disagreement, other researchers (HX) were consulted to jointly negotiate and make the final decision on study inclusion.

Literature extraction: Excel was used to make a literature extraction table. The extracted information included author, year, title, study population, sample size of experimental and control groups, age, gender, intervention, control mode, and outcome indicators.

Quality assessment / Risk of bias analysis: Two researches (LXY, LY) completed the risk of bias assessment for the included literature using the risk of bias assessment tool, in which "low risk", "unclear" and "high risk" were rated with reference to the risk of bias assessment criteria in the Cochrane Handbook Version 5.1.0. The risk of bias assessment including random sequence generation, allocation concealment, blinding of patients, intervention implementers and data

analysts, blinding of outcome assessors, incomplete outcome data, selective reporting, and other biases.

Strategy of data synthesis: The BUGSnet package in R 4.2.2 software was used to analyze the data. Mean differences (MDs) and their associated 95% confidence intervals (CIs) were calculated to estimate the effect of different teaching method of neurology. The surface under the cumulative ranking curve (SUCRA) value is the probability each teaching method has of being among the best of those in the network, with larger values representing higher ranking probabilities. The robvis package was used for the risk of bias assessment.

Subgroup analysis: We do not do subgroup analysis.

Sensitivity analysis: We do not do sensitivity analysis.

Language restriction: Chinese and English.

Country(ies) involved: China.

Keywords: teaching method; Neurology; network meta-analysis; systematic review.

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