# Impact of Multidisciplinary Collaborative CBL Teaching Method on Improving Clinical Consultation Competence of General Practitioners (Postprint)

**Authors:** Yang Shifang, Ji Lupeng, Li Xiaoming, Chen Xueying, Zhao Manzhi, Huang Guohua, Cui Jinghua, Chen Lian, Li Jing, Chen Lian, Li Jing

**Date:** 2024-07-02T00:00:00+00:00

## Abstract

**Background** Cultivating high-quality general practice talents is fundamental to safeguarding public health. However, existing training methods for general practitioners in China remain inadequate, leading to insufficient job competency among GPs in primary healthcare services. Therefore, enhancing the job competency of general practitioners represents the foremost priority in general practice education.

**Objective** To investigate the impact of a multidisciplinary collaboration-based Case-Based Learning (CBL) teaching methodology on improving the clinical consultation capabilities of general practitioners.

**Methods** Twenty-six general practitioners undergoing training in the Department of Respiratory and Critical Care Medicine from July 2020 to July 2023 were enrolled as study subjects, all providing informed consent. Participants were stratified by cohort into three groups: traditional teaching group, CBL teaching group, and Multidisciplinary Team (MDT)+CBL teaching group, with uniform teaching methods applied within each cohort. The traditional teaching method, CBL teaching method, and MDT+CBL teaching method were implemented respectively. The Leicester Assessment Package (LAP) was utilized to evaluate trainees' clinical consultation abilities, and a self-designed anonymous questionnaire was administered to assess teaching satisfaction.

**Results** Theoretical assessment scores: The MDT+CBL teaching group demonstrated superior performance compared to both the traditional teaching group and the CBL-only teaching group ($P<0.05$). Clinical consultation ability assessment: The MDT+CBL teaching group achieved higher total LAP scores than the traditional teaching group and CBL teaching group ($P<0.05$). The

MDT+CBL teaching group also attained higher scores in consultation and history taking, patient management, problem-solving, physician behavior and patient relationships, and preventive treatment compared to the traditional teaching group and CBL teaching group ($P<0.05$). Teaching effectiveness satisfaction: Among the three teaching modalities, the MDT+CBL teaching model yielded higher overall satisfaction scores than the CBL teaching group and traditional teaching group ($P<0.05$). Additionally, the MDT+CBL teaching group exhibited higher scores in knowledge extension ability, ability to guide healthy lifestyle choices, ability to manage comorbidities, ability to guide patient rehabilitation, and ability to ensure rational medication use in community settings ($P<0.05$).

**Conclusion** The multidisciplinary collaboration-based CBL teaching methodology is conducive to improving the clinical consultation abilities of general practitioners and enhancing their job competency, representing a novel model for general practice education.

## Full Text

## Introduction

High-quality general practice education is fundamental to strengthening primary healthcare systems and safeguarding public health. However, current training approaches for general practitioners in China remain inadequate. Most training follows a specialist-oriented model, with instruction delivered by mentors from disease-specific departments and clinical rotations confined to corresponding specialties. This fragmented approach fails to cultivate the "person-centered" and "prevention-oriented" mindset essential for general practice, leaving many trainees feeling ill-equipped for primary care roles and demonstrating insufficient clinical competency. Enhancing the clinical competency of general practitioners has thus become a paramount priority in general practice education.

This study examines three distinct teaching methodologies—traditional instruction, case-based learning (CBL), and multidisciplinary team (MDT)-based CBL—to explore how to better stimulate trainee interest and improve academic performance, clinical consultation skills, and overall job competency.

## 1. Subjects and Methods

### 1.1 Study Subjects

We selected 26 general practitioner trainees who underwent training in the Department of Pulmonary and Critical Care Medicine from July 2020 to July 2023. All participants provided informed consent and were divided into three batch-matched groups: traditional teaching group, CBL teaching group, and MDT+CBL teaching group, with each batch receiving uniform instruction. The traditional teaching group comprised 8 trainees with a mean age of $(23.7 \pm 0.7)$ years, including 3 males and 5 females, with educational backgrounds of 2 master' s degree holders and 6 bachelor' s degree holders. The CBL teaching group

included 9 trainees with a mean age of $(23.7 \pm 0.8)$ years, including 3 males and 6 females, with 2 master' s degree holders and 7 bachelor' s degree holders. The MDT+CBL teaching group consisted of 9 trainees with a mean age of $(23.8 \pm 0.7)$ years, including 2 males and 7 females, with 2 master' s degree holders and 7 bachelor' s degree holders. No statistically significant differences were observed among the three groups in terms of gender, age, or educational background ($P > 0.05$).

### 1.2 Teaching Methods

Teaching content followed the standardized training requirements for general practice residents (2019 revised edition), covering five common respiratory diseases that general practitioners must master: bronchial asthma, chronic obstructive pulmonary disease, pneumonia, sleep apnea-hypopnea syndrome, and acute pulmonary embolism. All instruction was delivered by attending physicians or higher-level physicians who had completed general practice teaching certification, with consistent teaching frequency and duration across all three groups.

The **traditional teaching group** received instruction through PowerPoint presentations prepared according to standardized training requirements and the fifth edition of *Introduction to General Practice*, followed by organized discussion and Q&A sessions.

The **CBL teaching group** received complete case information upfront, with trainees analyzing and discussing cases in small groups, identifying key issues, and conducting literature searches for optimal solutions. When discussions reached an impasse, instructors provided guidance, culminating in student-led case summaries.

The **MDT+CBL teaching group** utilized active clinical cases selected by mentors. Trainees supplemented medical histories and relevant clinical examinations, compiled case materials based on textbooks, guidelines, expert consensus, and literature, and developed treatment plans through group discussion presented as PowerPoint presentations. During formal MDT discussions, mentors invited qualified attending physicians or higher-level physicians from rehabilitation, nutrition, cardiology, thoracic surgery, neurology, interventional radiology, radiology, and pharmacy departments based on case characteristics. Trainees presented medical histories and proposed treatment plans, followed by departmental faculty critiques, question-and-answer sessions, and perspectives grounded in current guidelines and research from a general practice viewpoint. Trainees then synthesized conclusions supplemented by mentors to formulate final MDT recommendations. Each general practice trainee participated in at least five MDT sessions during their pulmonary and critical care rotation.

### 1.3 Assessment Methods

**Theoretical knowledge assessment** employed a closed-book format combining multiple-choice and short-answer questions, with emphasis on MDT case

discussion scenarios, for a total score of 100 points.

**Clinical consultation skills assessment** utilized the Leicester Assessment Package (LAP), a validated tool for formative and summative evaluation of general practitioner consultation skills widely recognized in Europe, America, and Hong Kong. The LAP comprises 39 items across seven categories: patient reception and history taking, physical examination, patient management, problem-solving, physician behavior and patient relationship, preventive therapy, and medical record documentation. Items are graded on a six-level scale: Level A ($\geq 85\%$) indicates mastery of all assessment items (standard proficiency); Level B (75%-84%) indicates proficiency in most items; Level C+ (65%-74%) indicates high or satisfactory standards for most items in appropriate cases; Level C (55%-64%) indicates satisfactory standards for most items with minor omissions; Level D (45%-54%) indicates inadequate mastery in several items without core content omissions; Level E ($\leq 44\%$) indicates unacceptable performance with major omissions. Assessment involved two senior general practitioners evaluating trainees during consultations with standardized patients, with evaluators observing without intervening. Final scores represented the mean of both evaluators' ratings, weighted by case difficulty, required LAP items, and frequency.

**Teaching satisfaction survey** utilized a self-designed anonymous questionnaire covering ten domains: stimulation of learning interest, learning initiative, knowledge extension ability, clinical thinking improvement, health lifestyle guidance ability, comorbidity management ability, patient rehabilitation guidance ability, community rational drug use ability, teamwork awareness, and willingness to continue with the teaching method. Each domain scored 10 points for a total of 100 points.

### 1.4 Statistical Analysis

Data analysis was performed using SPSS 23.0 statistical software. Categorical data were expressed as relative frequencies and compared using the $^2$ test. Normally distributed continuous data were expressed as $(\bar{x} \pm s)$ and compared among groups using one-way ANOVA, with pairwise comparisons conducted using LSD-t tests. Statistical significance was defined as $P < 0.05$.

## 2. Results

### 2.1 Theoretical Knowledge Assessment Scores

The MDT+CBL teaching group demonstrated superior theoretical examination performance compared to both the traditional teaching group and the CBL teaching group, with statistically significant differences ($P < 0.05$) .

**Table 1. Comparison of Examination Scores Among Three Groups $(\bar{x} \pm s)$**

| Group | Theoretical Examination Score |
|---|---|
| Traditional teaching group | 80.73$±5.94\|\|*CBLteachinggroup*\|85.88±5.76\|\|*MDT* + *CBLteachinggroup*\|92.45±$4.98ab |

Note: a indicates $P < 0.05$ compared with traditional teaching group; b indicates $P < 0.05$ compared with CBL teaching group.

### 2.2 LAP Scores for Clinical Consultation Skills Assessment

The MDT+CBL teaching group achieved significantly higher total LAP scores compared to the traditional and CBL teaching groups ($P < 0.05$). The mean total LAP score for the MDT+CBL group reached Level A, with minimum scores of 79 (Level B). The CBL group mean reached Level B, with minimum scores of 71 (Level C+). The traditional group mean reached Level C+, with minimum scores of 66 (Level C).

The MDT+CBL teaching group scored higher than both traditional and CBL groups in patient reception and history taking, patient management, problem-solving, physician behavior and patient relationship, and preventive therapy ($P < 0.05$). The CBL teaching group outperformed the traditional group in physical examination and problem-solving ($P < 0.05$) .

**Table 2. Comparison of LAP Scores for Clinical Practice Skills Among Three Groups ($\bar{x} \pm s$, points)**

| Category | Traditional Teaching Group | CBL Teaching Group | MDT+CBL Teaching Group |
|---|---|---|---|
| Patient reception and history taking | 14.72$±0.71\|15.44±0.82\|16.44±0.91*ab*\|\|*Physicalexamination*\|6.63±0.72\|7.44±0.62*a*\|7.67±0.78*a*\|\|*P* | | |
| | *solving*\|15.68±1.78\|17.72±1.13*ab*\|17.77±1.27*ab*\|\|*Physicianbehaviorandpatientrelationship*\|7.12±( | | |

Note: a indicates $P < 0.05$ compared with traditional teaching group; b indicates $P < 0.05$ compared with CBL teaching group.

### 2.3 Teaching Satisfaction Survey

The MDT+CBL teaching group demonstrated significantly higher overall satisfaction compared to both CBL and traditional teaching groups ($P < 0.05$). The CBL teaching group showed higher overall satisfaction than the traditional group, particularly in improving learning initiative, clinical thinking ability, and teamwork awareness ($P < 0.05$). Compared to the traditional group, the

MDT+CBL group scored higher in stimulating learning interest, learning initiative, knowledge extension ability, clinical thinking improvement, health lifestyle guidance ability, comorbidity management ability, patient rehabilitation guidance ability, community rational drug use ability, and teamwork awareness ($P < 0.05$). Compared to the CBL group, the MDT+CBL group achieved higher scores in knowledge extension ability, health lifestyle guidance ability, comorbidity management ability, patient rehabilitation guidance ability, and community rational drug use ability ($P < 0.05$) .

**Table 3. Comparison of Teaching Satisfaction Scores Among Three Groups ($\bar{x} \pm s$, points)**

| Domain | Traditional Teaching Group | CBL Teaching Group | MDT+CBL Teaching Group |
|---|---|---|---|
| Stimulation of learning interest | 7.09$±0.82 | 8.45±0.66*a* | 8.72±0.79*a* |
| *Learninginitiative* | 7.61±0.71 | 8.79±0.76*a* | 9.02±0.72*a* |
| *Knowled* | | | |

Note: a indicates $P < 0.05$ compared with traditional teaching group; b indicates $P < 0.05$ compared with CBL teaching group.

## Discussion

General practitioners serve as gatekeepers for public health. National health authorities have repeatedly emphasized the importance of accelerating the cultivation of qualified general practitioners to strengthen primary healthcare systems, promote family doctor contract services, establish tiered diagnosis and treatment systems, and safeguard public health. However, despite progress in general practitioner training in China, significant challenges persist, including insufficient numbers of practitioners and inadequate clinical competency relative to growing healthcare demands.

General practitioners must provide continuous, comprehensive, and integrated medical services, requiring six core competencies: clinical skills, medical knowledge, communication ability, humanistic care, learning capacity, and teamwork. They must develop clinical reasoning skills to effectively treat minor illnesses, recognize serious conditions, refer critical cases appropriately, and manage chronic diseases. Among these competencies, clinical skills and medical knowledge are paramount, as practitioners must earn patient trust through professional competence and effective communication to improve treatment adherence and healthcare quality. Current training models remain specialty-focused, emphasizing theoretical knowledge from individual disciplines while neglecting

practical skills and generalist thinking, resulting in suboptimal training quality. Unlike specialists, general practitioners require person-centered thinking and broader medical knowledge, making single-discipline-centered teaching models inadequate for their training needs.

Traditional teaching models, centered on instructors and relying primarily on lectures, offer advantages in knowledge coverage and theoretical coherence but limit student creativity and initiative. Case-based learning (CBL), a discussion-based approach centered on students with instructor guidance, enhances understanding of abstract clinical concepts while strengthening autonomous learning and clinical reasoning. CBL has gained widespread application in medical education. However, CBL instruction remains guided by single-department mentors, offering sufficient depth but insufficient breadth—critical for general practitioners who require extensive knowledge breadth for daily practice. Multidisciplinary treatment (MDT), recognized as the optimal model for complex disease management, involves expert working groups from multiple specialties developing individualized treatment plans. This approach, initially promoted in oncology, combines holistic and personalized care that aligns perfectly with general practice philosophy.

This study integrated MDT with CBL teaching in general practice education, examining theoretical knowledge, clinical consultation skills, and teaching satisfaction across three modalities. Results demonstrate that MDT+CBL not only enhances theoretical knowledge mastery but also significantly improves clinical consultation skills, particularly in patient reception and history taking, patient management, problem-solving, physician behavior and patient relationships, and preventive therapy. Furthermore, MDT+CBL significantly improved trainees' knowledge extension ability, health lifestyle guidance capacity, comorbidity management skills, patient rehabilitation guidance ability, and community rational drug use capability—all essential components of general practitioner competency and prerequisites for earning patient trust and improving healthcare quality.

While CBL showed advantages over traditional teaching in improving clinical practice and problem-solving abilities, along with higher satisfaction in learning initiative, clinical thinking, and teamwork, it still failed to fully meet general practice training needs, particularly in comorbidity management, preventive therapy, health education, and long-term rehabilitation. These gaps prevent high-quality whole-course health management.

The MDT+CBL teaching model integrates MDT concepts into general practice education through instructional design, assessment modalities, and practical skill reinforcement. This approach better facilitates mastery of general practice philosophy, deepens understanding of common community diseases and their whole-course management, continuously improves clinical competency, and enables practitioners to truly serve as guardians of public health.

## References

[1] YANG H, HAN J J, XU Y L. Development, challenges, and prospects of general practitioner workforce construction in China[J]. Chinese General Practice, 2019, 22(19): 2267-2279. DOI:10.12114/j.issn.1007-9572.2019.00.351.

[2] WANG D, ZHOU J H, WU Q H, et al. Enhancement of medical students' performance and motivation in pathophysiology courses: shifting from traditional instruction to blended learning[J]. Front Public Health, 2022, 9: 813577. DOI:10.3389/fpubh.2021.813577.

[3] CEN X Y, HUA Y, NIU S, et al. Application of case-based learning in medical student education: a meta-analysis[J]. Eur Rev Med Pharmacol Sci, 2021, 25(8): 3173-3181. DOI:10.26355/eurrev_{{{202104}}_{{25726}}}.

[4] BROWN G T F, BEKKER H L, YOUNG A L. Quality and efficacy of Multidisciplinary Team (MDT) quality assessment tools and discussion checklists: a systematic review[J]. BMC Cancer, 2022, 22(1): 286. DOI:10.1186/s12885-022-09369-8.

[5] FRASER R C, MCKINLEY R K, MULHOLLAND H. Consultation competence in general practice: testing the reliability of the Leicester assessment package[J]. Br J Gen Pract, 1994, 44(384): 293-296.

[6] MCKINLEY R K, FRASER R C, VAN DER VLEUTEN C, et al. Formative assessment of the consultation performance of medical students in the setting of general practice using a modified version of the Leicester assessment package[J]. Med Educ, 2000, 34(7): 573-579. DOI:10.1046/j.1365-2923.2000.00490.x.

[7] General Office of the State Council. Opinions on reforming and improving the training and incentive mechanisms for general practitioners[EB/OL]. (2018-01-14)[2022-04-07]. http://www.gov.cn/zhengce/content/2018-01/24/content_{5260073}.htm.

[8] CHEN C, YU D H, LU Y, et al. Analysis of differences in standardized training and community practice cognition among general practice residents based on competency[J]. Chinese Journal of Graduate Medical Education, 2020, 4(4): 303-306, 319. DOI:10.3969/j.issn.2096-4293.2020.04.004.

[9] GREEN M L, AAGAARD E M, CAVERZAGIE K J, et al. Charting the road to competence: developmental milestones for internal medicine residency training[J]. J Grad Med Educ, 2009, 1(1): 5-20. DOI:10.4300/01.01.0003.

[10] ZHU L P, QI Z N, CHI C H, et al. Preliminary exploration of general practice postgraduate training based on competency of Royal College of General Practitioners[J]. Chinese General Practice, 2016, 19(7): 748-751. DOI:10.3969/j.issn.1007-9572.2016.07.002.

[11] ZHAN J Y, LOU J Q, WANG S K, et al. Research on teaching models and application effects of standardized residency training for general practice in China[J]. Chinese General Practice, 2021, 24(19): 2401-2407. DOI:10.12114/j.issn.1007-9572.2021.00.201.

[12] NANDI P L, CHAN J N, CHAN C P, et al. Undergraduate medical education: comparison of problem-based learning and conventional teaching[J]. Xianggang Yi Xue Za Zhi, 2000, 6(3): 273-276.

[13] IBRAHIM NK, BANJAR S, Al-GHAMDI A, et al. Medical students preference of problem-based learning or traditional lectures in King Abdulaziz University, Jeddah, Saudi Arabia[J]. Ann Saudi Med. 2014, 34(2): 128-133. DOI:10.5144/0256-4947.2014.128.

[14] DONKIN R, YULE H, FYFE T. Online case-based learning in medical education: a scoping review[J]. BMC Med Educ, 2023, 23(1): 564. DOI:10.1186/s12909-023-04520-w.

[15] GAO W Q, WANG L B, YANG J, et al. Application of CBL teaching model in standardized training of general practitioners[J]. China Continuing Medical Education, 2019, 11(10): 12-14. DOI:10.3969/j.issn.1674-9308.2019.10.006.

[16] MCLEAN S F. Case-based learning and its application in medical and health-care fields: a review of worldwide literature[J]. J Med Educ Curric Dev, 2016, 3: JMECD.S20377. DOI:10.4137/JMECD.S20377.

[17] ZHOU K, LIU X, HE X J, et al. Application and evaluation of multidisciplinary comprehensive diagnosis and treatment model in oncology clinical teaching[J]. China Continuing Medical Education, 2018, 10(1): 21-24. DOI:10.3969/j.issn.1674-9308.2018.01.011.

[18] EDISON M A, BROWNE B, FEHLER J. Implementation of a medical education programme for addictions MDT members to improve knowledge and confidence in managing substance users with complex comorbidities[J]. BMJ Open Qual, 2020, 9(4): e001112. DOI:10.1136/bmjoq-2020-001112.

**Author Contributions:** YANG Shifang and JI Lupeng conceptualized the study, designed the research protocol, implemented the study, and drafted the manuscript. LI Xiaoming, CHEN Xueying, HUANG Guohua, and CUI Jinghua implemented the study and collected and organized data. ZHAO Manzhi performed statistical analysis and prepared tables. CHEN Lian and LI Jing revised the manuscript, ensured quality control, and provided overall supervision.

**Conflicts of Interest:** None declared.

**Received:** 2023-12-10; **Revised:** 2024-06-11

**(Edited by CUI Sha)**

*Note: Figure translations are in progress. See original paper for figures.*