

# Application of BOPPPS + Mind Maps to Improve Clinical Competence of General Practitioner Residents: Taking Cough as an Example

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**Abstract:** *Objective:* To analyze the importance of general practitioner residents using the combined teaching method (BOPPPS + mind maps). *Methods:* From September 2023 to August 2024, a study was conducted with 6 control group participants receiving traditional teaching and 6 observation group participants receiving the combined teaching method (BOPPPS + mind maps). The study analyzed various indicators between the two groups (including mind map scores and assessment results). *Results:* Compared with the control group, the assessment scores of the observation group were significantly higher ( $P < 0.05$ ). *Conclusion:* The application of the combined teaching method (BOPPPS + mind maps) by general practitioner residents can significantly improve their comprehensive abilities.

**Keywords:** General practitioner residents; Combined teaching; BOPPPS; Mind maps

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## 1. Introduction

Cough is a common respiratory disease, caused by irritation of the bronchial mucosa, organs, physical stimuli, pleurisy, tracheal mucosa, or chemical stimuli. It is mainly manifested by glottal closure, followed by contraction of the respiratory muscles, continuous increase in lung pressure, and opening of the glottis, at which point all air in the lungs will be expelled with sound<sup>[1]</sup>. Although coughing can clear secretions or foreign objects from the airway, severe coughing can lead to the transition from acute coughing to chronic coughing, inducing symptoms such as throat itching, chest tightness, or wheezing. Therefore, understanding this disease is crucial, especially for general practitioner residents, who are involved in multiple disciplines. Improper training methods during their training period can lead to a decrease in overall diagnostic quality and hinder the establishment of good doctor-patient relationships<sup>[2,3]</sup>. In view of this, this study analyzes the importance of traditional teaching methods versus the fully integrated teaching method (BOPPPS + mind maps) and reports the specific effects.

## 2. Materials and methods

### 2.1. General information

A study was conducted from September 2023 to August 2024 involving 6 subjects in the traditional teaching control group and 6 subjects in the joint teaching group (BOPPPS + mind maps). The control group consisted of 3 males and 3 females, aged 22–31 years with a mean age of  $26.54 \pm 3.28$  years. The observation group consisted of 3 males and 3 females, aged 22–31 years with a mean age of  $26.41 \pm 3.19$  years. There was no statistically significant difference between the two groups ( $P > 0.05$ ). The inclusion criteria of this study included study subjects who voluntarily participated and signed the informed consent form. Exclusion criteria included those who left the study midway.

### 2.2. Methods

#### 2.2.1. Control group (traditional teaching)

Unified lesson preparation was conducted by teaching instructors, followed by summarizing cough cases. Trainees discussed and explained case interviews clinically in groups. During the teaching period, teaching instructors organized trainees to complete interview training or simulated patients, and then group members observed and provided relative opinions, followed by teacher feedback. Lastly, trainees were organized for group practice, followed by addressing any doubts.

#### 2.2.2. Observation group (joint BOPPPS and mind maps teaching)

- (1) Clinical physicians with extensive experience conducted this teaching model. They designed the comprehensive treatment plan for cough, informed all general practitioner residents of the teaching objectives, and completed related chapter previews, such as cough principles, common patterns, and treatment status.
- (2) The teaching is categorized into the following steps: (a) Course introduction: The purpose was to stimulate the interest of general practitioner residents, using clinical cases in the form of videos to illustrate the impact and threat of cough on the human body, explaining the relevance to the patient's quality of life and societal medical burden with the latest literature data; (b) Learning objectives: The final learning objectives of the course were reiterated using PPT, specifying the content to be mastered, familiarized with, and understood, while achieving both competency and knowledge objectives; (c) Pre-class assessment: Various methods were used to quickly assess the pre-class learning effectiveness of general practitioner residents, such as pre-class questioning or online exam apps. Based on their baseline, adjustments were made to the breadth and depth of the teaching content accordingly; (d) Participatory learning: To ensure high engagement and a good learning experience, teaching instructors needed to incorporate other learning methods into the teaching design while general practitioner residents led the teaching. For example, recent trends in cough symptoms and clinical treatment cases were used as guidance, allowing general practitioner residents to establish correct concepts. Simultaneously, during questioning, trainees deepened their understanding of cough-related pharmacology and characteristics and connected them to actual work. Subsequently, cough treatment-related precautions, methods, and medication characteristics were introduced. Finally, through group discussions, all general practitioner residents participated in the process of formulating actual treatment plans for cases. During the teaching period, teaching instructors interacted more with general practitioner residents, providing timely feedback and supplementing their statements; (e) Post-class assessment: General practitioner residents' mastery of basic theoretical knowledge and basic knowledge of the course was assessed using online exam apps, and the teaching effect was evaluated. If the overall mastery effect was poor, reasonable

explanations were provided to ensure an overall improvement in teaching effectiveness; (f) Summary: Teaching instructors summarized the knowledge absorption of all general practitioner residents during the course, systematically organizing the knowledge structure using mind maps or knowledge trees while summarizing the difficult points and key points of the teaching content.

- (3) The collected learning materials were promptly shared with all general practitioner residents to consolidate the teaching content. To expand the academic career of general practitioner residents, the latest academic monographs, clinical guidelines, or literature reviews could be recommended.

**Mind maps:** Before conducting the teaching, teaching instructors prioritized explaining the concept framework of mind maps, with the key starting point being the chief complaint, and the branching structure graphically depicting specific features of cough symptoms or differential diagnosis key points, etc. During the teaching, the patient's chief complaint was highlighted, and mind map examples were drawn based on cough treatment methods and content, which were then discussed by general practitioner residents in groups. At the same time, assignments related to mind maps were assigned, allowing general practitioner residents to independently complete cough mind map drawings and practical training. One general practitioner resident completed the treatment work according to the mind map drawn, while the teaching instructor played the role of the patient, allowing other general practitioner residents to observe and provide comments, followed by teacher feedback. Subsequently, general practitioner residents practiced in groups, and teaching instructors provided guidance or instruction based on the practice situation. If general practitioner residents thoroughly understood cough treatment pharmacology and theoretical knowledge, they were encouraged to use mind maps to record cough treatment content to ensure improved mind map training effectiveness.

### 2.3. Observational indicator

The observation indicator of the study is the assessment scores between the two groups. Scores were evaluated based on medical history collection, physical examination, clinical thinking ability, analysis of imaging reports, further auxiliary examinations and formulation of diagnosis and treatment plans, professional ethics, doctor-patient communication, and humanistic care, using a 9-level scoring system, with higher scores indicating better performance.

### 2.4. Statistical analysis

SPSS 24.0 was used for statistical analysis. Count data were expressed as [ $n$  (%)] and analyzed using chi-squared tests, while measurement data were expressed as mean  $\pm$  standard deviation (SD) and analyzed using  $t$ -tests. A significant difference level of  $P < 0.05$  was considered statistically significant.

## 3. Results

The control group had a comprehensive score after assessment of  $85.58 \pm 16.5$  points, while the observation group had a score of  $103.87 \pm 16.13$  points, which was significantly higher than the control group ( $t = 2.328$ ,  $P = 0.042$ ).

## 4. Discussion

The results of this study show that the overall teaching quality of the control group, which adopted traditional teaching methods, was lower than that of the observation group, which employed the combined teaching approach. Specifically, the assessment scores were higher in the observation group compared to the control group

after teaching ( $P < 0.05$ ). It can be seen that using the BOPPPS + mind maps method can effectively improve the ability of general practitioners to diagnose and treating coughs. The analysis suggests that the reason behind this improvement is the previous teaching methods were very monotonous and did not fully consider the needs and challenges faced by general practitioners in their daily work [4]. The BOPPPS teaching method mainly originates from Canadian teacher training, with its main focus being teaching objectives, while the teaching emphasis is on student teaching methods. It divides the entire teaching process into six stages: introduction, objectives, and summary aiming to stimulate students' enthusiasm and interest in learning. Before starting the teaching work, it is essential to inform the students truthfully about the objectives and teaching purposes and conduct a pre-test to grasp the students' actual abilities and knowledge reserves. Based on the test results, interactive and participatory teaching activities are formulated [5]. In recent years, as domestic teaching reforms have widely borrowed from this teaching method, a large number of studies have confirmed that by using this teaching method, students' autonomous learning ability and learning effectiveness can be significantly improved [6,7]. Mind maps, also known as mental maps, are graphical thinking tools that can effectively express divergent thinking. Their advantages lie in their efficiency and simplicity, fully utilizing brain functions and balancing development between ideas and logic, art, and science, thereby unlocking unlimited potential brain energy [8,9]. Establishing personalized mind maps based on the BOPPPS can ensure that elementary school students deeply study diseases while drawing mind maps, clarifying differences, relationships, and other information between diseases, which can greatly help in disease identification. During the "drawing" process, self-clinical ability and diagnosis and treatment capabilities are improved [10].

In summary, under the combined teaching mode of BOPPPS + mind map learning of cough-related knowledge, students make mind maps and take patients as examples to improve the clinical ability of general practitioners, enhance the teaching quality of our hospital, and increase the graduation rate and qualification rate of students.

## Disclosure statement

The author declares no conflict of interest.

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