

Application of the System of One Major Tutor and Several Assistant Tutors Combined with PBL Teaching Method in the Normalized Training of General Practitioners*

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Abstract—The system of one major tutor and several assistant tutors is a kind of organizational teaching method, which consists of a whole-course tutor and several assistant tutors. The full-course tutor plays a dominant role in guiding, supervising and managing the general practitioners in an all-round way. Medical students are in charge of the teaching and guidance of various rotating disciplines at various stages in the process of department rotation and community internship. Combining the system of "one major tutor and several assistant tutors" with the goal of normalized training of general practitioners, this paper attempts to apply the system of "one major tutor and several assistant tutors" and the PBL teaching mode to teach the clinical knowledge and comprehensive skills of general practitioners, and explores the feasibility and effectiveness of the PBL teaching mode in the normalized training of general practitioners, so as to better train clinical comprehensive thinking of general practitioners, and effectively improve its ability to analyze and solve problems. This paper aims to provide a new attempt to optimize the normalized training of general practice resident doctors and train high-quality medical talents.

Keywords—the system of "one major tutor and several assistant tutors"; PBL teaching mode; general family medicine; normalized training of resident doctor

I. INTRODUCTION

General practitioner, also called family physician, is a new type of doctor specially trained in general medicine, a health service provider implementing general practice, a doctor who provides high-quality, convenient, economical and effective integrated health care services for individuals, families and communities and carries out all-round responsible management of life, health and disease. The training quality of general practitioners is of great significance to improve the quality of primary medical and health services. The tutor plays an important role in the

normalized training of resident doctors. The tutor's teaching level directly affects the effect of normalized training of general practitioners.

II. UNDERSTANDING OF RELATED CONCEPTS

A. The System of One Major Tutor and Several Assistant Tutors

The system of one major tutor and several assistant tutors is a kind of tutorial system which combines the modern management of hospitals in China and the administrative management led by the director of department, assisted by other doctors, with clear division of labor and clear responsibilities. The full-course tutor is the doctor or manager who has rich experience in teaching. In the process of normalized training, the full-course tutor guides and tracks the trainees from the aspects of professional ethics, diagnosis of illness, medical skills, doctor-patient communication and scientific research. The assistant tutor in other stages is responsible for the teaching guidance of various rotating disciplines. The intern becomes a qualified resident doctor who can work independently. [1] Therefore, the system of one major tutor and several assistant tutors is one of the key factors to optimize the training. It is particularly necessary to establish a group of one major tutor and several assistant tutors with good medical ethics, excellent medical skills, abundant clinical practice, solid professional knowledge, good doctor-patient communication and rich teaching experience in promoting normalized training.

B. PBL Teaching Method

Problem-based Learning (PBL) teaching mode is a learning mode in which medical students independently search for information and share and discuss information with team members under the guidance of one major tutor and several assistant tutors, so as to find the best way to solve the problem. [2] Since the introduction of PBL teaching model in 2004, most studies have confirmed that PBL teaching model is helpful to cultivate the comprehensive ability of medical students and overcome the drawbacks of traditional medical education theory (basic

*Fund: In 2018, Youth research fund for humanities and social sciences of the Ministry of Education for western China and border areas: Research on the Orders-oriented Training Model of Rural General Medical Students and the Adaptability of Basic Medical and Health Services; Project No. 18XJC630001.

medical knowledge) and practice (clinical skills). And more and more domestic research results show that the PBL teaching mode has obvious advantages over the traditional teaching mode in clinical teaching. Normalized resident training is an important part of clinical practice for medical students after graduation. It is very important to train high-level clinicians, standardize medical diagnostic skills, and improve medical quality for the general public. [4] However, compared with the resident training in developed countries, the implementation of the training system in China is late, and the regional development is unbalanced. The quality of training varies from place to place. Therefore, in order to improve the quality of training, a series of feasible training systems, programs and clinical teaching objectives are adopted at the national level. [5]

C. General Family Medicine

General family medicine is a comprehensive medical specialty, which is oriented to the community and family and integrates clinical medicine, preventive medicine, rehabilitation medicine and humanities and social sciences. It is a secondary clinical discipline. It covers all kinds of age, gender, organ systems and diseases. Its main purpose is to emphasize long-term comprehensive and responsible care with people as the center, family as the unit, community as the scope, and overall health maintenance and promotion as the direction, and to integrate individual and group health. Therefore, in the clinical teaching of general medicine, how to adopt a scientific and effective teaching mode to enhance the enthusiasm and initiative of regular training students, and then systematically cultivate the clinical thinking and practical ability of general medicine students is one of the important problems that need to be solved urgently by medical colleges and universities. This paper attempts to apply PBL teaching model to the training of general practitioners in order to effectively cultivate the application ability and clinical thinking of general practice knowledge in limited time, and effectively improve their ability to analyze and solve problems.

D. Normalized Training

The normalized training of resident doctors refers to the normalized and systematic training for the graduates of colleges and universities to cultivate their clinical competence after completing the basic medical education and clinical medical education in schools for 3-5 years. [6] The purpose of the training is to enable medical students to become a doctor with good medical ethics, solid theoretical basis and clinical skills, who can independently have a systematic and in-depth understanding of the treatment and prevention of common diseases and frequently-occurring diseases in their specialty. Normalized training is an important part of medical students' professional career after graduation. It is an important work related to the development of health care in China and the construction of doctors' team. It is also an important link and effective measure to train clinical medical talents and improve the medical level in various regions of China. At present, how to ensure the quality and effective operation of normalized training in hospitals has become a general concern of

construction and management issues in training bases (hospitals).

III. THE SPECIFIC APPLICATION OF PBL TEACHING MODEL OF "ONE MAJOR TUTOR AND SEVERAL ASSISTANT TUTORS " IN GENERAL PRACTICE TRAINING

A. Defining the Goal of General Practice Training According to the Requirement of Normalized Training

According to the existing teaching resources, the number of students trained by the Ministry of Medical Sciences will be arranged in a unified way for the batch of students to be trained in general medicine. Each batch of students will be trained in general medicine for about 4-5 persons, lasting 2-3 weeks in each department. Each batch consists of a team leader, and is taught by a full-course tutor throughout the training. At present, the requirement of regular training in general practice is to master the diagnosis and treatment of common diseases, and to cultivate the ability of normalized training students to use clinical knowledge independently to solve specific patients' diseases. The goal of normalized training is as follows:

- Serving patients as the center, normalized trained students can communicate with patients in an all-round way, care for patients, and build a harmonious doctor-patient relationship.
- Combining theory with practice, normalized trained students can master the basic knowledge, basic operation and basic skills needed in general practice.
- By contacting patients and inquiring about their past medical history, normalized trained students can conduct all-round physical examination and diagnosis, and collect effective clinical data, so as to avoid missing important diagnostic history and signs, or missed diagnosis and misdiagnosis.
- Establishing the clinical thinking of general practitioners, and cultivating their lateral thinking ability and vertical clinical thinking ability, normalized trained students can effectively apply the theoretical knowledge they have learned to analyze the specific situation of patients at present.
- The universities can help construct the systematicness and integrity of clinical thinking of normalized trained students through the process of presenting and solving specific problems in general practice, guide them to actively learn relevant knowledge, and cultivate their self-learning ability and a series of abilities such as asking questions, analyzing problems and solving problems.

B. Selecting Normalized Training Tutors and Establishing Effective Incentive Mechanism

The universities should establish a strict system for selecting full-course tutors and staged tutors. The selection of tutors needs to be based on the relevant management system. The conditions for the selection of tutors should be

clearly defined. At the same time, the mutual selection between tutors and normalized trained students should be established, and a system of mutual selection between normalized trained students and tutors should be established. [7] The corresponding measures should be set up to ensure the implementation of the two-way choice between tutors and students before the normalized training of students to the departments for training.

The lowest requirements for full-course tutors are as the follows: conscientious and responsible teaching, being fair and impartial, and being good at communicating with staged tutors and students; having at least vice-senior and above titles; being able to familiarize themselves with relevant contents and work of general resident standardization training; having time and energy to participate in the whole process of teaching and guidance of resident standardization training; having certain pedagogical basis and teaching design ability; being familiar with the study, life and employment of the students; and providing necessary counseling and assistance. The lowest requirements for staged tutors are as the follows: having strong sense of responsibility; being familiar with the various links of teaching in training; being rigorous in the teaching; having high academic attainment; having at least master and above titles; completing the entire tutor training task in time; enthusiastically and actively participating in the training work; mastering the PBL teaching method; being familiar with the theoretical knowledge of general practice; effectively setting up relevant teaching problems in the teaching process; organizing and training students for ward rounds, case discussion and analysis; and mastering the treatment thinking of common diseases and frequently-occurring diseases in this specialty. [8] The universities can strengthen the clinical operation of normalized training students through outpatient teaching, simulation teaching and skill training, such as "physical examination" and "cardiopulmonary resuscitation".

Because every tutor in the training base is responsible for the heavy clinical work and the teaching work of the normalized training students, it is a great challenge to them both in time and energy. Therefore, it is necessary to create an incentive system conducive to the development of the tutor, so that the tutor can get more sense of honor and responsibility. At the same time, it should link the tutor's teaching experience with the promotion of professional title, strengthen the tutor's sense of responsibility, conduct regular clinical professional training, and improve the tutor's professional level through skillful multi-disciplinary case discussion and national continuing education. And then, they can guide the training for students more effectively. Normalized training base also allocates a part of the funds to enhance tutors' participation in various training and business learning, in order to ensure the smooth progress of teacher training. [9], [10]

C. Selecting General Practice Cases and Cultivating Clinical Thinking Mode

The full-course tutor carefully selected some typical clinical cases according to the requirements of training. The

full-course tutor guided the students to contact the patients three times and discuss them three times. In the first contact with patients, the tutor will select a normalized trainee, and take him as the main and others as the supplement. The knowledge and skills acquired by the normalized trainee are applied to collect medical history and physical examination, and then the normalized trainees are immediately organized to make the discussion and analysis. In this discussion, the focus is to cultivate the ability of the normalized trainees to collect the medical history of common diseases and other diseases, and then to extract the main symptoms and complications described by patients, so as to form the core of the disease. Then, the normalized trainees should discuss these issues in groups, which can cultivate the communication ability among the normalized trainees, and their clinical comprehensive thinking abilities. For example: what are the common clinical manifestations of malignant tumors? What are the first symptoms of many cancer diseases in clinic? Therefore, in such a process of knowledge association, as long as the normalized training students see lymph node enlargement, it is easy to associate with lymph node metastasis of malignant tumors, and then associate with other common diseases, such as non-specific lymphadenitis, lymph node tuberculosis, infectious mononucleosis, systemic lupus erythematosus, lymphocytic leukemia, lymphoma and so on. Setting up typical cases of tumors, what diseases cause lymph node enlargement? Specifically, for the characteristics of lymph node enlargement and accompanying symptoms of the patient, the doctor should determine the specific disease of lymph node enlargement. Through setting up questions step by step and ingenious self-answers, the students can think effectively about the main symptoms of cancer in the process of collecting medical history, so as to obtain more comprehensive and systematic clinical data. For the disease and other related knowledge not obtained at the first time, the tutor should organize the normalized training students to contact with the patients to check the omission in the next day, so as to improve the collection of medical history, correct the mistakes made in the process of physical examination, and grasp the clinical diagnosis and differential diagnosis of cancer.

D. Setting up Relevant Problems and Guiding Students to Study Actively

Combining with the knowledge of general practice, the tutor should set up relevant problems skillfully, and guide students to study actively. PBL does not focus on the solution of the problem, but is around the feelings of the normalized training students that what they learn is what they need, to stimulate students' sense of exploring problems and trying to solve them, to make the normalized training students have learning tasks, to guide students to actively and independently think, to promote students to understand new knowledge and master new technology in the process of solving problems, and to change the original passive acceptance into active participation. After the second contact with patients, the normalized training students should have a second group discussion. They should give preliminary diagnostic results according to the patient's condition, and rethink what additional examinations needed to exclude

missed diagnosis and misdiagnosis in the first diagnosis. What kind of treatment should the doctor give the patient after the diagnosis is clear? What are the common and classical treatment options? What is the progress of treatment methods for this common disease in China and foreign countries? What are the therapeutic mechanisms and toxic side effects of the drugs used in these treatments? How can toxic and side effects of drugs and treatment programs be effectively prevented? What complications may occur during the treatment? Are these complications in conflict with the classic treatment? How to resolve these conflicts in clinical treatment? Combining the advantages and disadvantages of the main treatment schemes, considering the physical and economic conditions of patients, and respecting the treatment schemes chosen by patients, the tutor should set up a situational dialogue on how to communicate with patients and how to explain the situation with patients' families. These tutors needn't to give the answers directly, but ask the students to find the most valuable information through situational analysis and problem needs, self-learning, online search, and then make a comprehensive summary and collation, highlighting the dominance of the tutor and the subjectivity of students' learning.

E. Solving Related Problems, and Integrating Theory with Practice

After the second discussion, about 3 days later, the tutor organize the normalized training student to contact the patient for the third time and observe the effect of medication, changes of the patient's condition and the main problems that still exist at present. Meanwhile, the third group discussion should be conducted. During the discussion, every normalized training student is required to give a speech about the clinical analysis, diagnosis and treatment suggestions and opinions, and the process and methods of dealing with problems. The normalized training students can complement, correct and debate with each other. At this time, the full-course tutors and staged tutors mainly inspire and guide the normalized training students. After the discussion, the full-course tutors and the staged tutors make a summary to evaluate the scientificity and rationality of the scheme just discussed by the normalized training group, and the reasons for doing so. The advantages and disadvantages of the different drugs involved in the scheme are compared and analyzed. The full-course tutors and the staged tutors also should check and fill in the gaps in the solutions formulated by the members of normalized training group. Through group discussion and summary, the students can have a deeper clinical understanding of some standards and principles in books, so that theoretical knowledge can be

effectively applied to clinical practice, in order to help students achieve the goal of general practice learning.

F. Breaking the Traditional Teaching Mode and Providing Multi-channel Guidance

The full-course tutors and the staged tutors need to pay attention to their working methods and implement the PBL heuristic teaching. Through case discussion and on-the-spot ward rounds, the differentiation and diagnosis ability and clinical thinking diagnosis ability of the normalized training students are exercised. They can learn and understand how to diagnose and verify or exclude the possibility of a disease in the face of patients. [11] Traditional tutor teaching methods include face-to-face teaching, lectures, symposiums, academic salons, etc. Because of the heavy clinical workload in hospitals, the full-course tutors and the staged tutors are busy. Combining the characteristics and actual situation of their respective training bases, the traditional teaching mode should be changed. PBL teaching is carried out by means of modern communication means, and group tutoring is carried out through Wechat, QQ, etc. The universities should provide multi-directional, multi-angle and multi-channel communication methods for the normalized training students, so as to create a good teaching atmosphere that is willing to interact with students actively.

IV. ANALYSIS ON THE TEACHING EFFECT OF THE NORMALIZED TRAINING STUDENTS COMBINED WITH THE SYSTEM OF ONE MAJOR TUTOR AND SEVERAL ASSISTANT TUTORS WITH PBL TEACHING METHOD

In this study, 72 physicians who participated in the normalized training of residents from March 2016 to March 2018 were selected as the research objects. They were randomly divided into the control group and the experimental group, with 35 persons of the control group and 37 persons of the experimental group. There were 20 males and 17 females in the experimental group, aged 18-29 years, with an average age of (21.8±1.8) years. There were 19 males and 16 females in the control group, aged 18-28 years, with an average age of (20.9±1.6) years. There was no significant difference in age and gender between the two groups (P > 0.05). After training, information was collected and analyzed on the teaching effect and learning time of each group. The assessment of resident doctors' ability during the training period mainly includes the following four items: problem solving ability, cognitive ability, autonomous learning ability, team cooperation ability, and doctor-patient communication ability. Each item scores 50 points. The higher the score is, the stronger the ability will be.

TABLE I. A CONTRAST TABLE ON THE ABILITY OF NORMALIZED TRAINING STUDENTS COMBINING THE SYSTEM OF ONE MAJOR TUTOR AND SEVERAL ASSISTANT TUTORS WITH PBL TEACHING METHOD

Organizations	Number of people	Problem solving ability	Cognitive ability	Autonomous learning ability	Team cooperation ability	Doctor-patient communication ability
control group	35	34.8±3.7	38.2±3.5	36.8±3.8	36.7±5.4	37.5±4.2
experimental group	37	40.2±4.2	43.3±4.1	42.1±3.4	42.4±3.8	43.6±3.9
t		11.696	11.492	11.886	11.956	11.765
p		<0.05	<0.05	<0.05	<0.05	<0.05

Combing the system of one major tutor and several assistant tutors with PBL teaching method has a far-reaching impact on the normalized training of resident doctors. This teaching mode also links up the complex general practice knowledge through "disease", re-integrates the basic and clinical knowledge of general medicine, breaks through the demarcation line between doctors and teachers, doctors and patients, and carries out the normalized training of clinicians closely around improving the quality of medical and health services. The results of this study show that the combination of PBL teaching and the system of one major tutor and several assistant tutors is beneficial to improving the learning initiative of resident doctors, cultivating their autonomous learning ability, thinking integration ability, language expression ability of consultation communication and doctor-patient communication, team cooperation ability, analysis and utilization of effective medical information. Therefore, during the normalized training of resident doctors in general medicine, the combination of PBL teaching and the system of one major tutor and several assistant tutors is of great significance to improve the current medical education and clinical medical teaching problems which are disjointed from theory and practice. The combination of PBL teaching method and the system of one major tutor and several assistant tutors has a strong medical task, openness of clinical problems and inquiry of teaching. In this teaching mode, normalized training students can obtain the latest clinical medical information through various channels and methods, and conduct self-study and group discussion. For teachers, the PBL teaching method combined the system of one major tutor and several assistant tutors requires the full-course tutor and the staged tutor to carefully select and analyze the cases, and put forward the corresponding problems, which requires profound professional knowledge. For students, case studies can be used to analyze specific general practice problems, so that the knowledge points of general practice can converge and integrate until the problem is solved, so as to improve the clinical thinking of general practice students, and give full play to their enthusiasm, innovation and initiative.

V. REFLECTIONS ON THE APPLICATION OF PBL TEACHING MODEL COMBINED WITH THE SYSTEM OF ONE MAJOR TUTOR AND SEVERAL ASSISTANT TUTORS

The application of the system of one major tutor and several assistant tutors combined with PBL teaching mode in general practice training has improved the students' interest in learning and their initiative and task through the analysis of the specific problems of real cases. It has made the training goal clear, the train of thought clear and the clinical thinking perfect and strengthened. In the practice of participating in the training of general practitioners, the students have further deepened their understanding of the common diseases, multiple diseases, concurrent pathology and treatment basis involved in general medicine. Through the comprehensive reform of PBL teaching mode combined with the system of one major tutor and several assistant tutors, it has cultivated the ability of unity and cooperation of the training groups, the ability of communication between the students and patients, the students' subconscious of self-

learning, and their comprehensive clinical thinking ability, which have laid a solid foundation for their clinical work. The teaching reform of normalized training students based on the combination of PBL teaching method and the system of one major tutor and several assistant tutors puts forward higher requirements for the full-course process tutors and staged tutors. Firstly, it shows the improvement and transformation of the full-course and staged tutors' cognitive concept of PBL teaching mode, and understands that setting up PBL teaching mode is not a goal, but focuses on the process of analyzing and solving problems for normalized training students. Secondly, the system of one major tutor and several assistant tutors tests the unity and assistance of tutors, while PBL tests the cultivation of comprehensive abilities such as mutual learning, mutual promotion and mutual assistance of the members of the training group. It requires that the members of the training group should have the corresponding organizational ability and the ability to answer questions and solve doubts. From the process point of view, it focuses on mobilizing the awareness of discussion and participation of the normalized training students, so as to supplement their cognitive deficiencies in clinical practice learning, and improve their comprehensive quality. Thirdly, in the selection and design of classical cases of general family medicine, the full-course tutors and staged tutors put forward higher level of teaching design, which requires the combination of theory and practice, and also follows the cognitive starting point level and clinical cognitive law of normalized training students. In the future PBL teaching process, the corresponding teaching contents and teaching methods are constantly improved, which are easy for the tutors to produce the fear.

VI. CONCLUSION

In December 2013, the National Health and Family Planning Commission and other seven departments jointly promulgated the Guiding Opinions on Establishing a Normalized Training System for Residents. In the opinions, the importance of normalized resident training was clarified, and the status of normalized resident training in general medicine was affirmed before the education of medical students (basic education in medical colleges and universities) and after that (continuing medical education). The key to the formation of clinical specialist physicians is discussed. Under the guidance of the opinions, the university adopts the system of one major tutor and several assistant tutors" combined with PBL teaching mode to carry out theoretical knowledge teaching, and to teach clinical skills, which optimizes the training of students in all stages of clinical practice and improves their professional accomplishment. This has important regional development significance for local hospitals to train high-quality doctors, improve the quality of primary health services and ease the relationship between patients and patients. As for the effect of PBL teaching method combined with the system of one major tutor and several assistant tutors, the effect of normalized training of general medical residents needs to be further optimized. In the following work, it is proposed to make a comparative analysis between the system of one major tutor and several assistant tutors combined with PBL teaching

mode and the traditional lecture-based learning mode. To compare the differences and effectiveness of the two teaching methods, the results of the post competency-based examination for practicing physicians and the objective structured clinical examination (OSCE) are taken as objective evaluation indicators.

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