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The Application of Mind Map Combined with Case Teaching Model in Neurosurgery Nursing Teaching

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Abstract: *The purpose is to explore the practical clinical application effect of mind mapping combined with case teaching mode in neurosurgery nursing teaching. Therefore, 48 nursing students who interned in the neurosurgery department of our hospital from June 2022 to May 2023 were selected and randomly divided into two groups for teaching research. The control group of 24 nursing students received traditional neurosurgical teaching mode, while the observation group of 24 nursing students received a combination of mind mapping and case teaching mode. Compare the teaching effects of two groups of nursing students. The results showed that the theoretical assessment and skill operation assessment scores of the observation group nursing students were significantly higher than those of the control group, with P<0.05. The observation group of nursing students had more discussions, speeches, and questions than the control group, and their self-learning time and information retrieval time were longer than the control group, with P<0.05. The satisfaction level of the observation group nursing students in promoting learning interest, enhancing critical thinking ability, strengthening knowledge memory, fully utilizing learning resources, solving practical problems, and enhancing team collaboration ability was significantly higher than that of the control group, P<0.05. It can be concluded that the combination of mind mapping and case teaching mode has outstanding clinical application effects in neurosurgery nursing teaching and is worth recommending.*

Keywords: *Neurosurgical nursing; Mind mapping; Case teaching; Clinical teaching*

1. Introduction

With the continuous development of medical education, clinical nursing teaching is facing new challenges and opportunities. Neurosurgical diseases are highly complex and specialized, requiring medical staff to possess profound medical knowledge and rich clinical experience to provide effective treatment [1]. Neurosurgical nursing is a discipline that involves a wide range of knowledge fields and practical skills, requiring high comprehensive quality of nursing staff. At the same time, for patient care, nurses are required to have solid theoretical knowledge and advanced nursing techniques, otherwise it may cause adverse events such as improper nursing and worsening of the condition [2]. Therefore, clinical teaching is highly valued in neurosurgery nursing teaching, and appropriate and scientific teaching methods are used to ensure the quality of teaching. Traditional clinical teaching focuses on imparting knowledge, neglecting theory over practice, and neglecting the cultivation of students' subjectivity, practical ability, and innovative thinking, which leads to the inability to mobilize the learning enthusiasm of nursing interns and results in poor quality of clinical nursing teaching [3]. Therefore, exploring new teaching modes and improving teaching effectiveness has important practical significance. This study considers the complexity of neurosurgical nursing knowledge and proposes a mind map teaching model to enhance the independent thinking ability, learning ability, and memory of nursing students [4]. The combined case teaching model is used to stimulate the learning enthusiasm of internship nursing students, exercise their observation and practical abilities.

2. Materials and Methods

2.1 Clinical data

Select 48 nursing students who interned in the neurosurgery department of our hospital between June 2022 and May 2023 were randomly divided into two groups. The age of 24 nursing students in the control group is 18-22 years old, with an average of (20.18 ± 3.87) years old; The educational

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background includes 1 vocational school (4.17%), 4 associate degrees (16.67%), and 19 undergraduate degrees (79.17%). The age range of observation group nursing students is 18-22 years old, with an average of (20.21 ± 3.83) years old; The educational background includes 2 vocational schools (8.33%), 5 junior colleges (20.83%), and 17 undergraduate students (75.00%). There was no statistically significant difference in basic data such as gender, age, education level, and admission exam scores between the two groups of intern nursing students, with P>0.05, indicating comparability.

2.2 Research Methods

(1) Traditional Neurosurgical Teaching Model

The control group of nursing students received traditional neurosurgery teaching mode, as follows: the teaching teacher used the teaching outline and relevant materials as the teaching basis, formulated a teaching plan, informed the intern nursing students in advance of the content to be learned, and made relevant preparations[5]. In class, the lead teacher will demonstrate, and then the intern nursing students will demonstrate and practice in groups. The teaching mode during the internship is led by the teacher and supplemented by students.

(2) Mind mapping combined with case teaching mode

The observation group of nursing students adopted a mind map combined with case teaching mode. The method is to introduce real-life neurosurgery cases to nursing students one week after their enrollment, allowing them to learn in real-life situations; Using mind maps to systematically and hierarchically organize the specialized knowledge points involved in the case can help nursing students have a clearer understanding and memory [5]. Nursing students combine case studies and mind maps to sort out case information, analyze the condition, develop treatment plans and nursing plans, and list the nursing measures that need to be taken. At the same time, during the teaching process, organize nursing students to participate in role-playing and simulation training to improve their skill hardness and cooperation abilities. After the teaching is completed, organize nursing students to conduct case analysis and summary to improve their ability to analyze and solve problems [6].

2.3 Observation indicators

Both groups of nursing students are divided into groups of four, with each group interning for four weeks. At the end of the internship, theoretical and operational assessments will be conducted, as well as overall patient care assessments.

(1) Compare the assessment scores of two groups of nursing students: after the internship, the mastery of theoretical knowledge and skill operations by interns will be evaluated in the form of written tests and skill operations, with 100 points for each subject. The higher the score, the higher the level of mastery of theoretical knowledge or skill operations by interns. Key points of skill operation assessment: Intern nursing students will personally operate and point out the key points of operation, and neurosurgical nursing teachers will provide feedback and scoring[7].

(2) Compare the learning situation of two groups of nursing students: Collect and count the learning situation of the two groups of intern nursing students during the teaching period, including the number of discussions and speeches, self-directed learning time, information retrieval, and questioning times.

(3) Comparing the satisfaction of two groups of nursing students with teaching modes: A questionnaire survey was used to measure the satisfaction of two groups of intern nursing students with teaching modes. The questionnaire content includes the satisfaction survey of intern nursing students in promoting learning interest, enhancing critical thinking ability, strengthening knowledge memory, fully utilizing learning resources, solving practical problems, and improving team collaboration ability. A total of 48 questionnaires were distributed, and 48 valid questionnaires were collected, The effective rate is 100%, and the satisfaction between the two groups is statistically analyzed and compared [8].

2.4 Statistical methods

SPSS 26.0 statistical software was used for data processing.The count data was expressed as [n (%)] and tested with x2; Quantitative data is represented by (mean ± standard) and t-test, with P<0.05 indicating statistical significance..

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3. Results

3.1 Comparison of assessment scores between two groups

The written test scores and skill operation scores of the observation group's intern nursing students were significantly higher than those of the control group, with P<0.05. As shown in Table 1.

Table 1: Comparison of Assessment Scores between Two Groups

	Written test score	Skill operation score	Teaching quality rating
Experimental group	89.54±5.29	85.66±5.13	56.73±3.29
Control group	80.62±5.31	68.89±5.44	50.11±3.25
T	5.830	10.987	7.012
P	0.000	0.000	0.000

3.2 Comparison of learning situations between two groups of intern nursing students

The observation group of intern nursing students had more discussions, speeches, and questions than the control group, and their self-directed learning time and information retrieval time were longer than the control group, with P<0.05. As shown in Table 2.

Table 2: Comparison of learning situations between two groups of intern nursing students

	Discussion speech (times/class hour)	Self study time (h/d)	Search for information (h/d)	Number of Questions (times/class hour)
Experimental group	89.54±5.29	85.66±5.13	56.73±3.29	4.55±1.11
Control group	80.62±5.31	68.89±5.44	50.11±3.25	2.01±0.98
T	5.830	10.987	7.012	8.403
P	0.000	0.000	0.000	0.000

3.3 Comparison of satisfaction levels between two groups of intern nursing students with teaching modes

The satisfaction levels of the observation group's internship nursing students in promoting learning interest, enhancing critical thinking ability, strengthening knowledge memory, fully utilizing learning resources, solving practical problems, and improving team collaboration ability were significantly higher than those of the control group (70.83%), (66.67%), (75.00%), (54.17%), (50.00%), and (58.33%), with P<0.05. As shown in Table 3.

Table 3: Comparison of satisfaction levels between two groups of intern nursing students with teaching modes

	Promoting interest in learning	Enhance critical thinking skills	Strengthen the memory of knowledge	Make full use of learning resources	Ability to solve practical problems	Enhance team collaboration skills
Experimental group	23(95.83)	22(91.67)	22(91.67)	23(95.83)	21(87.50)	22(91.67)
Control group	17(70.83)	16(66.67)	18(75.00)	13(54.17)	12(50.00)	14(58.33)
T	22.496	18.949	10.004	46.281	32.727	29.641
P	0.000	0.000	0.001	0.000	0.000	0.000

4. Discussion

Clinical teaching is an important stage for intern nursing students to apply theoretical knowledge to practice, and it is also an important stage for them to transform into nurses. Neurosurgery is a highly specialized new field in current surgery, characterized by high difficulty in observing the condition, urgency, rapid progression, high mortality rate, high disability rate, and high medical risk [9]. It requires nurses to have a strong sense of responsibility and comprehensive skills due to the large amount of basic nursing [10]. Therefore, neurosurgical nursing interns need to undergo serious

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internship training during the internship stage and undergo strict assessment before they can be competent in neurosurgical nursing work. Due to the complexity of the content of neurosurgical nursing work, high workload, and high requirements for nursing level, the traditional teaching mode has a single content, single teaching form, and low teaching level, which cannot meet the current requirements for the quality of neurosurgical nursing teaching [11]. The traditional teaching model is indoctrination based education, emphasizing the teacher's leadership while neglecting the subjectivity of interns, resulting in low learning enthusiasm of interns and affecting teaching effectiveness. Therefore, in the process of neurosurgical nursing teaching, it is necessary to strengthen the emphasis on the subjectivity of interns, pay attention to changing the traditional degree and mechanization teaching mode, integrate diverse teaching content and forms, stimulate the learning interest of interns, and achieve the effect of improving their professional skills [12].

4.1 The combination of mind mapping and case teaching has improved the theoretical and operational exam scores of nursing students, and improved the quality of teaching

A mind map systematically and structurally organizes scattered knowledge points, which helps to form a clear knowledge framework for student care. By drawing mind maps, nursing students can deeply understand the internal connections between knowledge points, form a complete knowledge framework, and better grasp and remember theoretical knowledge [13]. Mind maps present knowledge in an intuitive and vivid graphical way, which conforms to the memory rules of the brain and helps nursing students remember and understand knowledge more quickly and accurately. Through the study of mind maps, nursing students can gain a deeper understanding of the connotation and essence of theoretical knowledge, providing a solid theoretical foundation for exams. Case teaching combines theoretical knowledge with practical operations by introducing real clinical cases, allowing nursing students to analyze, discuss, and solve problems [14]. This teaching method helps nursing students better understand and apply theoretical knowledge, and improve their ability to solve practical problems. Through case studies, nursing students can apply their learned knowledge more flexibly in exams, improving the accuracy and completeness of their answers [15]. The combination of mind mapping and case teaching can stimulate the learning interest and initiative of nursing students, making them more actively participate in the learning process. By analyzing the problems and challenges in case studies, nursing students can learn to think about problems from different perspectives and propose effective solutions [16]. The cultivation of this ability helps nursing students to analyze problems more deeply in their daily work, propose targeted answers, strengthen understanding and memory, improve practical application ability, stimulate learning interest, and cultivate thinking ability. It can effectively improve the theoretical and operational exam scores of nursing students [17].

4.2 The combination of mind mapping and case teaching has improved the learning enthusiasm and thinking ability of nursing students

Mind maps, as a visual thinking tool, can present complex knowledge systems in an intuitive and visual way, helping students better understand and remember knowledge. In the teaching of neurosurgery nursing, the knowledge system is complex and interrelated [18]. By using mind maps, various knowledge points can be organized and classified in a tree like structure, forming a clear knowledge context. This can not only help students better understand the connections between knowledge, but also deepen their memory of the knowledge points. During the teaching process, teachers can guide students to draw mind maps based on the teaching content. Students can categorize and connect knowledge points through their own thinking and organization, forming personalized learning notes. At the same time, teachers can also use mind maps to connect and expand knowledge points, guiding students to conduct in-depth exploration and thinking [19].

The case teaching mode emphasizes the use of specific case analysis to enable students to learn and master knowledge in practice, and improve their practical and problem-solving abilities [20]. The selection of cases is the key to case teaching. The teaching teacher selects representative, typical, and inspiring cases based on the teaching objectives and the actual situation of the students. At the same time, the case is carefully designed to ensure that the content of the case matches the knowledge reserve and cognitive level of the students. In the process of case teaching, the lead teacher first introduces the background and basic information of the case to the students, guiding them to conduct in-depth analysis and discussion of the case [21]. Then, based on the student's discussion, the teaching teacher proposes relevant questions and directions of thinking, guiding the students to further deepen their thinking and exploration. Finally, the lead teacher summarizes and evaluates the discussion results of the students, points out their strengths and weaknesses, and proposes suggestions for improvement.

In this study, the teaching instructor combined mind mapping with case teaching mode and carried out a series of teaching activities. The teaching teacher selected appropriate cases based on the teaching

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content and guided students to use mind maps to analyze and organize the cases [22]. Then, organize students to have group discussions and exchanges, sharing their analysis results and insights. Finally, summarize and evaluate the discussion results of the students, and propose suggestions for improvement [23]. The results showed that the observation group had more discussions, speeches, and questions than the control group, and the time for self-learning and data review was longer than the control group, with $P<0.05$; The satisfaction level of the observation group's internship nursing students in promoting learning interest, enhancing critical thinking ability, strengthening knowledge memory, fully utilizing learning resources, solving practical problems, and enhancing team collaboration ability was significantly higher than that of the control group; The teaching effect of the combination of mind mapping and case teaching mode is more prominent. In the 1980s, British psychologist Tony Bozan was the first to propose a mind map, also known as a mind map, which refers to expanding multiple knowledge points around a central keyword through divergent thinking [24]. Different knowledge points are expressed using different colors, numbers, or images, and each knowledge point belongs to each other, progresses layer by layer, and is interconnected. Compared with traditional teaching methods, this model can activate the energy stored in the human brain, facilitate the development of the left and right brain, and promote faster "whole brain thinking". In addition, information color maps, knowledge trees, etc. make originally dull and boring knowledge interesting, which not only stimulates students' learning enthusiasm but also helps them understand and remember knowledge points [25]. Mind mapping is suitable for teaching neurosurgery nursing with complex learning content, high difficulty in nursing skills, and high difficulty in memory. It is beneficial for teachers to understand students' learning of neurosurgery nursing knowledge through the mind mapping of interns, and provide targeted teaching for their learning problems, which helps to improve teaching quality [26]. Case study teaching method is a new teaching model that, compared with traditional teaching methods, emphasizes the connection between theory and practice, breaking the limitations of traditional teaching that emphasizes theory over practice [27]. In the teaching of neurosurgery nursing, teachers can make full use of multimedia, audio-visual and other means to present actual cases to interns, guide them to group discuss cases, and create a real teaching situation for interns, which is conducive to stimulating their learning initiative and enthusiasm, and enhancing teaching effectiveness [28]. In addition, case analysis is beneficial for cultivating interns' independent thinking ability, analytical and problem-solving ability, and practical operation ability, with outstanding teaching advantages. The combined application of mind mapping and case teaching method, the two modes complement each other, can ensure the quality of teaching [29].

4.3 The combination of mind mapping and case teaching mode has improved the satisfaction of nursing students with nursing teaching.

Mind maps, as a visual learning tool, can present complex knowledge systems in an intuitive and clear manner, helping nursing students better understand and remember knowledge points [30]. By drawing mind maps, nursing students can actively participate in the process of organizing and summarizing knowledge, thereby deepening their understanding and impression of knowledge [31]. This proactive learning approach is more effective in stimulating the learning interest and enthusiasm of nursing students compared to traditional passive knowledge acquisition. Case teaching is a teaching method based on real-life situations. By analyzing and discussing practical cases, nursing students can have a more intuitive understanding of the application and practice of knowledge. This teaching method not only helps to cultivate the clinical thinking and problem-solving abilities of nursing students, but also enables them to gain a sense of achievement and confidence in the learning process. At the same time, case teaching also promotes communication and interaction between teachers and students, enhances classroom activity and participation, thereby improving the learning satisfaction of nursing students [32]. When mind mapping is combined with case teaching, the advantages of both can be fully utilized. Mind mapping can help nursing students systematically sort out and summarize the knowledge points in cases, forming a complete knowledge framework. Case teaching can provide rich practical materials for mind maps, making them more vivid and specific [33]. This joint teaching method not only improves the learning effectiveness of nursing students, but also allows them to feel more fun and a sense of achievement in the learning process, thereby increasing their satisfaction with teaching. In addition, the combination of mind mapping and case teaching can also help nursing students form personalized learning methods. Each nursing student can draw a suitable mind map based on their learning characteristics and needs, and select interesting cases for analysis and discussion. This personalized learning approach helps to meet the different needs of nursing students and improve their learning satisfaction [34].

In summary, the combination of mind mapping and case teaching can enhance the satisfaction of nursing students with teaching by stimulating their learning interest, improving learning effectiveness, promoting teacher-student communication, and meeting personalized learning needs. This teaching method is worthy of further promotion and application in the field of nursing education [35]. In the

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future, we will continuously optimize and improve teaching content and methods, provide nursing students with efficient and practical learning experiences, and cultivate more excellent and practical clinical nurses[36].

5. Conclusion

In summary, the combination of mind mapping and case teaching mode has outstanding clinical application effects in neurosurgery nursing teaching and has broad application prospects. In the future, we will continuously optimize and improve teaching content and methods, provide nursing students with efficient and practical learning experiences, and cultivate more excellent and practical clinical nurses.

Author contributions

All authors have designed the study, developed the methodology, performed the analysis, and written the manuscript. All authors have read and agreed to the published version of the manuscript.

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