Research on Application of micro assistant combined with PACS based virtual imaging system in teaching imaging internship

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Abstract. Objective: To investigate the effect of micro assistant combined with image storage and transmission system based virtual imaging system in medical imaging internship teaching. Methods: a total of 61 imaging professional students who entered the Department of imaging, the Second Affiliated Hospital of Qiqihar Medical College, from August 1st 2019, were randomly divided into test group and control group in the Department of trial. Results: The students in the test group were significantly better than the students in the control group in attendance examination performance, the difference was statistically significant, in the satisfaction survey of teaching methods, the micro - Assistant combined with PACS based virtual imaging system teaching methods were significantly higher in student satisfaction than the traditional teaching methods. Conclusions: the combination of micro assistant and PACS based virtual imaging system in medical imaging internship teaching can improve students' knowledge of the imaging characteristics of diseases.

Keywords: PACS; medical imaging; clinical placement.

1. Introduction

With the rapid development of network technology, medical education is also gradually reformed [1], the traditional teaching method integrated with the Internet application, has attracted the attention of many medical education practitioners. For medical imaging professional students to practice, is the preliminary stage that can be conducted through internships to diagnostic thinking of initial imaging material, examination report standardization writing awareness cultivation, combine online education with offline teaching, using micro assistant as the online teaching carrier[2], In combination with virtual imaging systems based on imaging storage and transmission systems (Picture Archiving and Communication System, PACS) it has been widely used in clinical medicine teaching.

2. Subjects and Methods

2.1 Subjects

Sixty one imaging professional students who entered the Department of imaging, the Second Affiliated Hospital of Qiqihar Medical College, from August 1st to October 1st 2019, were randomly divided into test group (31) and control group (30), and all students completed the study of basic theoretical knowledge of medical imaging diagnosis before the internship. Two groups of students were studied clinically for 7 months in the imaging department, and all were absentee. All imaging material in PACS was obtained from the imaging material uploaded into PACS in real time generated when patients came to our hospital for examination, the Department of the trial group used micro teaching combined with PACS based virtual imaging system novel teaching method, and the control group used PACS traditional teaching method. There were no significant differences

between the test group and the control group in basic theoretical examination scores of imaging before entering the Department of imaging in our hospital, age, gender, etc. (P > 0.05).

2.2 Methods

2.2.1 In the control group, traditional PACS teaching methods were used

Control group students during their 7-month imaging practice taught teachers to apply the PACS system to teach disease imaging, and teachers based on medical imaging diagnosis clinical practice syllabus requirements, and our hospital imaging department trainee training program, were drawn from the PACS system to meet pedagogical needs and diseases with typical imaging manifestations are common in clinical work, as the main content of clinical practice teaching, The outline and the training program require that the disease area that must be mastered at least 6 cases be taught in class, require that the familiar disease be explained at least 3 times in teaching, and require that at least 1 case be selected for the understood.

2.2.2 The experimental group adopts new teaching methods

The trial group students underwent the same process of teaching in the PACS system as the control group while teaching in the classroom. After classroom teaching was completed, teaching teachers transferred the images of diseases spoken in a class with patient privacy to a micro assistant to enable students to review various kinds of disease images spoken in class anytime, make mistakes while writing imaging reports, teach teachers' corrections of reports, The knowledge points in the micro assistant on imaging and the report or not understand to give the teachers the question confused, the teacher in the micro assistant can see the student message and respond, and the teacher can again from the PACS to find similar cases to the problems the students ask, through the network and transmitted by the PACS to the micro assistant, the data can also through the system for three-dimensional stereo display, the two-dimensional structure of the imaging image shows the stereo image, Also answered by the asked question students as a test again whether the students truly understood the point of knowledge.

2.2.3 Evaluation of teaching effectiveness

After 7 months of teaching, students in both groups were evaluated for their attendance at the theoretical examination (basic theoretical knowledge of medical imaging diagnosis) and practical competency assessment (imaging analysis, report writing, differential analysis), including the imaging manifestations, diagnosis and differential of clinically common diseases, with 100 points each, and the higher the score, the better the performance. At the same time, the satisfaction of teaching in the two groups was evaluated using questionnaires, using the 5-level scoring method, and classified as good, good, general, poor, and poor, with scores of 4, 3, 2, 1, and 0, respectively.

3. Result

3.1 Comparison of Attendance Scores Between the Two Groups

The mean assessment scores for theoretical knowledge of medical imaging (diagnostic fundamentals) for test group students and points for control group students were significantly higher (P < 0.05) for practical competency knowledge (imaging analysis, report writing, differential diagnosis) assessment in the test group. The test group was superior to the control group in terms of assessment of practical competence (P < 0.05), Table 1.

Table1. comparison of attendance scores between the two groups ($\bar{x} \pm s$,points)

Exam results	Theoretical knowledge	Practical competence knowledge		
	Diagnostic basics	Image analysis	Report writing	Identify
Experimental group	89.1±3.4	84.1±3.6	81.1±3.5	79.1±3.0
Control group	79.0±2.9	76.1±2.7	79.1±3.0	77.4±4.8
t	12.207	9.797	2.565	2.402
P	0.000	0.000	0.013	0.019

3.2 Comparison of Questionnaire Results Between the Two Groups

The experimental group scored higher than the control group in the evaluation of satisfaction with the teaching method with respect to enhancing the independent learning interest, the ability to read the film, the cultivation of clinical thinking, and the theoretical connection with practical ability in the image professional internship students, and the differences were significant ($P < 0.05$) see Table2.

Table 2. Comparison of questionnaire results between the two groups ($\bar{x} \pm s$,points)

project	Improve interest in learning	Improve reading ability	Cultivate clinical thinking	Improve the integration of theory with practice
Experimental group	3.1±0.6	3.1±0.7	3.1±0.9	3.1±0.5
Control group	2.6±0.9	2.7±0.8	2.6±0.7	2.7±0.8
t	2.321	2.151	2.965	2.356
P	0.024	0.036	0.004	0.022

4. Discussion

It is important for the imaging profession to enter clinical placements, and PACS serves as an important imaging delivery system for digital acquisition, storage, transmission, and reproducibility of medical images[3]. It has become a routine tool in radiology department and clinical practice teaching, in clinical work PACS is stored with advanced storage equipment for imaging material storage, and reproduction, and with the aid of computer for window wide bed adjustment of images, image density adjustment, three-dimensional reconstruction, and many other image processing functions, such as convenient and rapid Clearly improve the effect of image display, improve the accuracy rate of diagnosis of diseases according to images, and through PACS can be many examinations image retrieval contrast, as well as the same disease image retrieval, different patients the same disease imaging performance observation, through PACS imaging teaching of interns is an important tool[5], which is also common practice in most internship teaching, PACS in teaching can facilitate students to quickly find similar case imaging material and examination reports learned in the classroom, and observe the gray scale value, sharp edges, how many, shape, size and other imaging manifestations of this similar case, students through PACS, compared with the previous only through the typical level of a few diseases on a slide in the classroom, can more increase the understanding of the whole process of the disease, deepen students' understanding of the disease [4].

Integrating PACS with micro assistant could easily solve these problems, both enhancing students' learning of imaging knowledge, imaging examination analysis, examination report writing code understanding, and differential diagnosis between diseases, and at the same time facilitate teachers' targeted solving of student questions, so as to achieve a more careful understanding of students' learning. After applying micro teaching combined with PACS based virtual imaging system, the trial group deepened the learning of imaging knowledge and enhanced the awareness of the writing norms of the reports, and its performance was significantly higher than that of the control group, which may be helpful to improve the students' learning ability of imaging professional through this new teaching method.

5. Summary

In summary, the integrated PACS teaching method of micro assistant improved students' awareness of the typical presentation of imaging in diseases, enhanced their awareness of the writing norms of imaging reports, and reinforced students' thinking of imaging physicians to think about the characteristics of imaging diseases, enabled students to learn imaging knowledge from any time and anywhere, enabled better use of fragmented time to deepen the understanding of the imaging presentation of various diseases, Increased ability to write examination reports.

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Reference

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