Original Article
Video feedback approach to improve clinical teaching of gastroenterology for nursing students

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Abstract: Aims: To investigate effect of a video feedback approach in clinical teaching of gastroenterology for nursing students. Methods: In this study, we selected 100 eligible student interns who meet the enrollment criteria from The First Affiliated Hospital of Ningbo University from March 2021 to March 2023. According to their personal choices, 50 interns were assigned to a control group (traditional teaching methods), while the other 50 interns were assigned to an observation group (video feedback methods). We compared theoretical knowledge, practical skills, and comprehensive ward-round abilities between the two groups, as well as doing an evaluation of teaching behaviors of the supervising teachers at the end of the clinical internship. Results: The observation group significantly outperformed the control group in theoretical and practical assessments (P<0.05). The observation group also scored higher in nursing inquiry, examination, diagnosis, interventions, health consultation, humanistic care, organizational effectiveness, and overall evaluation (P<0.05). In addition, the total score of critical thinking (267.24±16.87 points) and scores of the individual dimensions in the observation group were higher than those of the control group (257.64±13.84 points), (P<0.001). Conclusion: The video feedback method can effectively improve the theoretical knowledge, practical skills, and overall ward-round performance of students in clinical nursing interns in the field of gastroenterology. Additionally, this approach can standardize teaching behaviors and enhance student satisfaction.

Keywords: Video feedback method, clinical teaching, gastroenterology, nursing students

Introduction

Clinical nursing education in gastroenterology is essential for students to apply theoretical knowledge from classes and improve their professional capability. Clinical internships serve as a crucial bridge between theoretical learning and practical application [1]. Traditional teaching methods, including case-based teaching [2, 3], are predominantly teacher-centered, relying heavily on student imitation. This approach can restrict active learning, leading to passive and superficial engagement. Furthermore, assessments are often based solely on academic performance, without adequate educational management and supervision [4, 5]. Consequently, there is a pressing need to shift the educational paradigm to better foster students' comprehensive clinical competencies, a key development in the evolution of nursing education.

The behavioral replay teaching method, also known as video feedback or self-observation, uses multimedia technology to allow students to repeatedly review video recordings of their own performance. This method facilitates interactive teaching and effective correction of behaviors, positioning students at the center of the learning process [6, 7]. It encourages students to analyze and reflect on their knowledge, promotes active thinking and problem-solving, transforms passive learning into active engagement, and enhances theoretical, practical, and operational skills [8]. Video recordings offer students a multi-sensory learning experience, seeing and hearing the nuances of clinical actions. By observing their own operational details from a different perspective, students can identify and rectify deficiencies, thereby enhancing their clinical performance [9]. Research by Yang et al. [10] demonstrated that the behavioral replay method can significantly improve opera-

tional skills of second-year nursing students, such as bed preparation, aseptic operations, vital sign measurements, and oxygen therapy. Similarly, Oseni et al. found that a behavioral replay teaching method enhanced clinical knowledge, confidence, and team collaboration in emergency care contexts within low-resource settings. Applying the behavioral replay teaching method to dermatology medical education improved medical students' operational skills and self-directed learning abilities [11]. However, there is currently no relevant research on the application of video feedback teaching methods in gastroenterology.

Therefore, this study applied video feedback method to clinical nursing education in gastroenterology, and compared it with traditional teaching methods. The study aimed to determine whether the feedback could improve the quality of education by observing the theoretical knowledge, practical skills, and overall student performance. Additionally, the study also assessed whether video feedback could enhance the instructional competence and awareness of educators, as reflected by student feedback on their teaching.

Materials and methods

Study design

This study selected 100 eligible nursing student interns who met the enrollment criteria from The First Affiliated Hospital of Ningbo University between March 2021 and March 2023. Based on personal preference, 50 interns were assigned to a control group (traditional teaching method), while the other 50 interns were assigned to an observation group (video feedback method).

Inclusion and exclusion criteria

Inclusion criteria: Student interns from vocational colleges or higher education nursing schools with an internship period equal to or greater than 4 weeks.

Exclusion criteria: Those participating in other teaching and research.

Methods

The control group received the traditional teaching methods. (1) Theoretical lectures:

Interns received theoretical lectures on digestive internal medicine nursing through PowerPoint presentations delivered by the instructor. After each lecture, homework assignments were given to reinforce the acquired knowledge. (2) Skills training: Following on-site demonstrations by training teachers, interns practiced nursing procedures independently using standard patient models. The training focused on adhering to standard operation processes. Two weeks later, theoretical and operational assessments were conducted. Only upon passing these assessments were interns allowed to proceed to clinical practice. (3) Clinical practice: Clinical practice followed the traditional teaching approach. Interns initially observed the instructor's operational techniques in the clinical setting. Once proficient in these procedures, they engaged in digestive internal medicine nursing work through the "one-to-many" mode.

The observation group underwent training using video feedback methods, which consisted of the following steps.

(1) Theoretical training: Before the training sessions, a WeChat group was established to provide participants with an overview of the training objectives and content. The process of implementing the behavior replay teaching method was explained, and participants were assigned specific tasks. Teachers recorded teaching videos, dividing each class session (45 minutes) into three segments (15 minutes each), creating micro-classrooms. After each class, these video segments were shared with participants for comparison and learning purposes. This teaching approach prioritized student-centered learning, with the teacher serving as a facilitator. The specific teaching method comprised the following steps: 1) Group preparation: Participants were organized into groups of 3, with a total of 16 groups (the 16th group with 2 participants). Topics for explanation were randomly assigned. The teacher provided an outline of the content, and group members collaborated to create presentation slides. 2) Recording the teaching video: Participants took on the role of the teacher and deliver an 8-10 minute lecture, incorporating scenarios and case studies. The entire teaching process was recorded for review. 3) Feedback and evaluation: After the lecture, the

teacher and participants collectively reviewed and analyzed the videos. Participants conducted self-evaluations, while others provided feedback on the content, methods, and techniques used in the lecture. The teacher summarized the discussion, identified any issues or considerations, and assigned homework. 4) Reflective learning: The participants compared and analyzed their own teaching videos with those of the teacher. They completed the homework and wrote reflective journals to document their teaching experiences and gains.

(2) Skill training: 1) Operation demonstration: The training instructor played a pre-recorded standard operation video and conducted a step-by-step on-site demonstration. Following the demonstration, the instructor shared the standard operation video with trainee nurses for further review and learning. 2) Group practice and video recording: Trainees engaged in group practice according to the complete operation process. During practice sessions, members within and between groups were asked to help each other. Once proficient, nurses were tasked with recording and submitting a satisfactory complete operation video. 3) Feedback and evaluation: First, the trainees conducted self-evaluation, along with sharing insights, experiences, analyzing shortcomings, and proposing improvement measures. Peer evaluation followed, encompassing assessments within and between groups. During the processes, trainees could learn from each other, identify mistakes, correct omissions, and foster critical thinking skills. The instructor corrected errors in trainee evaluations, and asked further questions to encourage deeper understanding. Unresolved issues were assigned as homework to build their problem-solving ability through literature research, consulting relevant experts, or other methods. The instructor summarized the overall performance of the trainees in practice and discussion, highlighting outstanding operations. For unstandardized techniques or missed steps, targeted questions were posed for correction. 4) Repeat practice: After class, students were asked to compare and analyze their operation videos with standard ones. Through self-review, group discussion, and instructor guidance, they could identify deficiencies and practice steps to enhance accuracy and standardization. 5) Operation assessment: Two weeks later, a theoretical exam and an operation assessment using standard patients as models were conducted. Only those

meeting the assessment criteria (a theoretical score of ≥70 points and an operation score of ≥80 points) could proceed to the next learning stage.

(3) Clinical practice: Nursing interns applied the theoretical knowledge and operational skills they learned to clinical practice. This process was guided by specialized nurses in the Department of Digestive Medicine through one-on-one teaching. The teaching steps were as follows: 1) Recording operation videos: Nursing interns, with the help of members within the group, filmed their actual performance videos without affecting normal performance. Prior consent from patients was obtained before filming, and during the filming process. Privacy was safeguarded, and videos were strictly for self-learning purposes. 2) Feedback: Students were asked to watch their own operation video, write reflective diaries, and record gains, shortcomings, and improvement measures during the operation process. At the same time, teachers provided one-on-one guidance or observed any deficiencies in theoretical knowledge, operational skills, humanistic care, or communication skills.

Observation indicators

The general information of students was collected using our hospital's case query system, including: age, gender, education level, and whether they had received clinical case teaching. Additionally, we assessed their theoretical and practical performance, ward-round comprehension, and satisfaction with teaching behaviors (a self-made teacher behavior evaluation scale distributed through the platform Questionnaire Star). The teacher behavior evaluation scale includes 10 items, such as the instructor's emphasis on teaching work and teaching awareness, evaluated on a scale of 1 to 10, with higher scores indicating better performance. Using SPSS software, we computed the Cronbach's α coefficient for the scale based on data from 60 samples within the control group, yielding a value of 0.801, signifying robust reliability and validity.

Statistical analysis

SPSS 24.0 statistical software was employed for statistical analysis. The normality of all metric data was tested using the Kolmogorov-Smirnov test, and normally distributed data

Table 1. Comparison of clinical data between the two groups

	Observation group (n=50)	Control group (n=50)	t/x²	P
Age (years)	20.75±1.99	21.25±1.58	1.35	0.39
Sex			4.21	0.14
Male (n%)	23 (46%)	17 (34%)		
Female (n%)	27 (54%)	33 (66%)		
BMI	19.7±1.14	20.1±0.77	3.39	0.35
Highest degree of nursing students			5.52	0.47
Junior high school	13 (26%)	11 (22%)		
High school/technical secondary school	20 (40%)	19 (38%)		
Junior college	10 (20%)	16 (32%)		
University and higher	7 (14%)	14 (28%)		

Table 2. Comparison of assessment results

Group	Theoretical score	Operation score
Observation group (n=50)	94.34±2.87	91.85±2.87
Control group (n=50)	98.74±1.67	65.71±1.62
t	9.357	10.541
p	0.003	0.001

were represented by mean ± standard deviation. Independent sample t-test was used for between-group comparisons. Non-normally distributed data were represented by the median (P25, P75) and processed by Mann-Whitney U test. Categorical variable data were represented by counts (%) and compared using a chi-square test. Analysis was performed using Pearson's correlation for normally distributed data, Spearman's for non-normally distributed continuous variables, and Kendall's tau-b for non-normally distributed continuous variables with categorical variables. $P<0.05$ indicated statistical significance for all the above tests.

Results

Comparison of clinical data between the two groups

Table 1 presents the characteristics of nursing students. Our study included a total of 100 nursing students, with 50 in the observation group and a mean age of (20.75±1.99) years, and 50 in the control group with a mean age of (21.25±1.58) years. The BMI in the observation group was (19.7±1.14) kg/m², and in the control group was (20.1±0.77) kg/m² (P=0.35). Demographics and clinical characteristics were similar between the two groups (all P>0.05).

Comparison of assessment results

The theoretical and practical scores of the observation group were significantly higher than those of the control group ($P<0.05$) (**Table 2**), indicating significant differences between the two groups in theoretical and practical performance.

Comparison of mini clinical practice rating scales

According to the scale, the two groups of students were assessed in eight aspects: nursing inquiry, nursing examination, nursing diagnosis, nursing interventions, health consultation, humanistic care, organizational effectiveness, and overall evaluation. The results showed that the observation group scored higher than the control group in all eight aspects ($P<0.05$) (**Table 3**).

Comparison of critical thinking ability between groups

The total score of critical thinking ability in the observation group (267.24±16.87 points) and the scores of each dimension were higher than those in the control group (257.64±13.84 points, $P<0.001$) (**Table 4**).

Before training, the total score and scores in each dimension of critical thinking were at the same level for both groups of nurses (P>0.05). After the training, there was no significant difference of the score change in the dimensions of seeking truth, open-mindedness, or self-confidence between the observation group and the control group before and after the training (P>0.05) (**Table 5**).

Table 3. Comparison of mini clinical practice rating scales for nursing

Index	Control group (n=50)	Observation group (n=50)	t	p
Nursing consultation	3.24±1.35	7.56±0.94	5.974	0.001
Nursing physical examination	5.97±1.34	7.46±1.07	7.041	0.001
Nursing diagnosis	5.97±1.31	7.46±1.03	7.267	0.002
Nursing measures	5.71±1.32	7.64±0.84	9.974	0.000
Health consultation	7.34±1.05	7.62±0.97	1.621	0.120
Humanistic concerns	6.94±1.42	7.43±0.87	2.287	0.027
Organizational effectiveness	6.45±1.29	7.74±0.94	6.187	0.004
Overall evaluation	6.34±1.47	7.78±0.89	6.574	0.002

Table 4. Comparison of critical thinking scores between two groups

Group	Project	Before Intervention	After Intervention	t	p
Observation group (n=50)	Total score of critical thinking ability	229.78±16.24	267.24±16.87	-35.654	0.001
	Searching for the truth	29.74±4.87	35.67±4.84	-18.014	0.003
	Open mindedness	29.68±4.38	36.54±4.12	-21.654	0.001
	Analytical ability	33.64±3.87	39.67±3.24	-20.178	0.001
	Systematic capability	33.47±3.08	38.97±3.57	-25.674	0.001
	Self-confidence	34.67±3.41	40.17±3.67	-22.143	0.001
	Thirst for knowledge	34.14±4.67	40.27±2.87	-21.348	0.001
	Cognitive maturity	28.64±4.36	36.47±4.36	-22.312	0.001
Control group (n=50)	Total score of critical thinking ability	223.48±14.68	257.64±13.84	-59.674	0.001
	Searching for the truth	29.64±2.97	36.13±2.97	-23.547	0.001
	Open mindedness	30.24±3.46	36.12±3.61	-24.324	0.001
	Analytical ability	33.54±3.24	39.54±2.79	-31.278	0.001
	Systematic capability	30.97±3.87	36.67±3.89	-27.541	0.001
	Self-confidence	33.64±2.89	39.67±2.10	-28.697	0.001
	Thirst for knowledge	33.64±2.97	39.10±2.87	-48.674	0.001
	Cognitive maturity	28.97±3.65	34.65±3.67	-36.357	0.001

Table 5. Comparison of the differences in critical thinking scores before and after training

Index	Observation group (n=50)	Control group (n=50)	t	p
Total difference score	44.12±9.01	38.54±4.36	4.674	0.001
Searching for the truth	6.74±3.24	5.64±1.32	1.574	0.001
Open-mindedness	6.23±2.07	5.98±1.58	1.362	0.002
Analytical ability	6.34±2.36	5.57±1.34	2.354	0.000
Systematic capability	6.57±1.87	4.98±1.21	4.894	0.120
Self-confidence	6.37±2.31	5.99±1.42	1.121	0.027
Thirst for knowledge	6.23±1.87	4.63±0.65	5.324	0.004
Cognitive maturity	5.97±1.64	5.36±0.96	2.781	0.002

Comparison of clinical communication skills

After training, the total score of clinical communication ability in the observation group (264.12±8.95 points) and the scores of each dimension were higher than those in the control group (254.81±8.97 points, P<0.001) (**Table 6**).

Table 6. Comparison of clinical communication skills

Group	Project	Before Intervention	After Intervention	t	p
Observation group (n=50)	Total score of clinical communication ability	204.78±9.54	264.12±8.95	-36.554	0.001
	Difficult situation communication skills	68.98±6.68	84.65±4.89	-21.041	0.001
	Emotional perception ability	29.65±2.31	39.58±2.63	-21.064	0.001
	Emotional support ability	20.94±1.98	28.35±1.65	-22.141	0.001
	Basic language communication skills	41.20±2.56	51.24±1.98	-23.478	0.001
	Basic non-verbal communication skills	23.62±2.18	32.36±2.31	-23.658	0.001
	Team communication skills	22.03±2.56	27.64±1.38	-18.741	0.001
Control group (n=50)	Total score of clinical communication ability	206.85±10.65	254.81±8.97	-40.782	0.001
	Difficult situation communication skills	69.34±4.68	82.94±3.81	-20.149	0.001
	Emotional perception ability	30.84±2.64	39.54±2.35	-21.014	0.001
	Emotional support ability	20.41±2.31	27.36±1.51	-28.904	0.001
	Basic language communication skills	41.68±2.98	49.36±2.54	-18.945	0.001
	Basic non-verbal communication skills	23.94±2.65	29.68±1.87	-28.364	0.001
	Team communication skills	22.35±2.67	28.32±1.89	-18.104	0.001

Comparison of behavior evaluation scale for teacher

The scores of the observation group were higher than those of the control group (P<0.001) (**Table 7**).

Discussion

In this study, the observation group, which participated in video feedback methods, demonstrated significantly higher theoretical scores than the control group. This suggests that video feedback method is more beneficial for students' mastery and improvement of clinical theoretical knowledge compared to traditional teaching.

Video feedback offers several advantages that contribute to its effectiveness. First, video feedback allows students to visually observe their performance and receive direct, real-time feedback on their clinical skills. This immediate feedback enables students to identify areas for improvement, gain a clearer understanding of concepts, and make necessary adjustments to their technique [12]. Additionally, video feedback can be replayed multiple times, enabling students to review and analyze their performance in detail [13]. This repetition aids in reinforcing learning and retention of clinical theoretical knowledge. Furthermore, video feedback can facilitate a collaborative learning environment by allowing students to share their videos with instructors or peers for additional input and insight. This fosters a sense of teamwork and encourages peer-to-peer learning [14]. Overall, video feedback methods offer a more interactive and engaging approach to learning, enhancing students' clinical theoretical knowledge. By incorporating video feedback into their learning process, students can receive personalized guidance and support, ultimately improving their performance in clinical practice.

One of the most innovative aspects of video feedback methods is the establishment of a practical educational ward for students. This educational ward admits patients with typical diseases, providing students with a targeted learning environment. By focusing on typical cases, unnecessary clinical tasks are minimized, allowing students to concentrate on integrating theoretical knowledge with practical exercises. This approach enhances students' sense of belonging within the nursing team and fosters a deeper connection to patient care, ultimately improving their professional knowledge [15, 16]. The results of our study revealed that the observation group, which utilized video feedback methods, achieved significantly higher operation scores compared to the control group. This finding suggests that the video feedback method is more effective in enhancing nursing students' operational skills compared to traditional teaching models. The success of this approach may be attributed to the unique educational ward, that is, clinical learning environment.

Table 7. Comparison of teaching evaluation scores

Index	Control group (n=50)	Experimental group (n=50)	t	p
The teachers attach great importance to teaching work and have a strong teaching awareness	8.89±0.87	9.36±0.87	2.874	0.000
The teachers pay attention to words and deeds, which helps students learn	8.79±1.05	9.56±0.67	4.474	0.002
The teacher cares about the learning and life of students and is willing to actively communicate with them	8.87±1.04	9.87±0.74	4.226	0.001
The teacher has strict requirements for students and pays attention to the cultivation of comprehensive abilities	8.01±1.38	9.64±0.54	7.987	0.000
The teacher actively creates internship opportunities for students and strives to let go without looking down	8.65±1.31	9.07±0.87	2.035	0.046
The teacher can provide timely explanations and patiently answer questions during the teaching process	9.02±0.87	9.32±0.68	1.087	0.274
The explanation is clear and easy to understand, and the teacher is diligent and meticulous in teaching	9.23±0.78	9.16±0.87	0.284	0.807
The teacher use civilized language, have a friendly attitude, are patient and responsible treatment of patients	9.25±0.89	9.65±0.78	1.187	0.234
The leading teacher has solid professional knowledge	8.13±1.65	9.67±0.67	7.587	0.001
Department Teaching Management	8.23±1.39	9.68±0.69	7.654	0.001

In the observation group, mentoring teachers underwent pre-job and long-term training, which significantly enhanced their teaching abilities. The student clinical internship process cultivated teamwork, fostered a collective atmosphere, and instilled a positive overall attitude among both students and teachers. This process also facilitated the correction of mentoring teachers' attitudes and behaviors, ensuring quality education and enhancing student satisfaction. Notably, students in the observation group scored significantly higher on the teacher's teaching behavior rating scale compared to the control group. This improvement can be attributed to the standardized mentoring process and clear teaching objectives within the department [17-19]. One of the highest-scoring items on the teaching behavior rating scale was "mentoring teachers have strict requirements for students and pay attention to the development of comprehensive abilities". This could be attributed to the weekly assessments and evaluations conducted during the four-week internship process [20]. These sessions, during which nursing students engaged in discussions with mentoring teachers for at least 30 minutes each week, covered a range of topics including medical history, physical examinations, diagnoses, measures, health education, and humane care, reflecting a focus on comprehensive ability. Additionally, participation in ward rounds allowed for mutual exchange of opinions, greatly enhancing critical thinking skills among students [21-23]. The use of an independent education ward, exposure to real cases, and collaborative teamwork positioned students as integral members of the nursing team. Under the guidance of the head nurse, departmental teaching management was systematically executed, facilitating applied learning for all nursing students. Another contributing factor to the observed improvements was the emphasis placed by mentoring teachers on leading by example, which positively influenced student learning outcomes [24]. Furthermore, the designation of a ward as an education ward provided a clear definition of its function and significance. This clarity led mentoring teachers to regulate their behavior and assist students in standardizing their operations [25-27]. Evaluation results from this study indicate that the implementation of video feedback methods can enhance the teaching behavior of mentoring teachers, improve their professional quality, increase teaching awareness, and ultimately enhance teaching satisfaction.

The study on the application of the video feedback method in teaching digestive internal medicine nursing has yielded promising results in improving the learning outcomes of nursing students. However, several limitations and shortcomings need to be acknowledged and addressed to strengthen the validity of these findings. First, the sample size of the study may have been too small to draw generalizable conclusions. A larger sample size would provide more robust evidence of the effectiveness of the video feedback method in nursing education. Second, the study may have focused solely on short-term outcomes and may not have assessed the long-term retention of knowledge and skills acquired through the behavior replay teaching method. Longitudinal studies are necessary to determine the lasting impact of this teaching method on nursing students' performance. Furthermore, the study may have only examined the application of the behavior replay teaching method in one specific area of nursing education (digestive internal medicine). Future research should explore its effectiveness in other nursing specialties to determine its generalizability across different clinical contexts. While the study on the application of the video feedback method in digestive internal medicine nursing education has shown promising results, addressing these limitations in future research is essential to further validate its effectiveness in nursing education.

In summary, the implementation of the video feedback method contributed to standardized clinical teaching methods, independent teaching ward, unique teaching plans, unified teaching materials, formal teaching training, efficient teaching methods, and advanced teaching concepts. This provides a basis for teaching implementation and quality improvement. Theoretically, this model is suitable for gastroenterology and can improve teachers' teaching quality and teaching awareness, increase students' learning motivation and sense of belonging, reduce anxiety, enhance teaching effectiveness, and gradually shift the focus of education to culti-

vating students' knowledge, skills, and professional values.

Disclosure of conflict of interest

None.

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