Advances in Medical Education and Practice

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ORIGINAL RESEARCH

The Effectiveness of Student-Led Ward Round Training on Knowledge Acquisition, Critical Thinking Ability, and Self-Confidence of Acute Upper Gastrointestinal Bleeding for Nursing Students

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Introduction: Nursing knowledge, critical thinking ability, and self-perceived confidence are imperative to nursing skills in professional nursing practice. Therefore, nurse educators are required to use teaching strategies that will help promote their knowledge, critical thinking, and self-confidence in complex contents such as the nursing of acute upper gastrointestinal bleeding (AUGIB).

Purpose: This study compares the effect of student-led and instructor-led ward-round training methods on knowledge acquisition, critical thinking ability, and self-perceived confidence during AUGIB sessions.

Methods: Forty nursing students in the first year of the Emergency Nursing Residency Program were randomly divided into a student-led ward round training group (SG) and an instructor-led ward round training group (IG) with a ratio of 1:1. A knowledge quiz, critical thinking ability test, and self-perceived confidence questionnaire were performed before and after the ward round training to assess both groups of students for their knowledge acquisition, critical thinking ability, and self-perceived confidence improvement. Feedback questionnaires were conducted after the training to evaluate students' perspectives and interests concerning the teaching module.

Results: The scores of the post-training quiz were significantly higher than that of the pre-training quiz in both the SG (44.10±2.92 vs 31.10±4.27, $p<0.001$) and IG (32.35±2.21 vs 30.55±2.24, $p=0.01$). In the post-training quiz, scores achieved by the students from the SG (44.10±2.92) were significantly higher than those achieved by the students from the IG (32.35±2.21, $p< 0.001$). The level of self-perceived confidence improved significantly after ward round training in the SG ($p< 0.001$). However, there was no statistically significant difference in the IG with respect to the change from pre- to post-training ($p=0.43$).The students' critical thinking ability improved significantly in the SG (14.95±2.58 vs 7.10±1.79, $p<0.001$), while no significant improvement was found in the IG (7.91 ±2.28 vs 6.52±2.21, $p=0.07$) after ward round training.

Conclusion: The teaching method of SWRT improves nursing students' knowledge acquisition, critical thinking ability, and self-perceived confidence in AUGIB.

Keywords: student-led ward round training, knowledge acquisition, critical thinking ability, self-perceived confidence, nursing education

Introduction

Patients' outcomes were determined not only by medical staff's professional knowledge, by also related to their critical nontechnical skills, such as critical thinking ability (CTA), self-perceived confidence (SC), communication skills and teamwork ability.[1] Conducting a ward round is a complex and multifactorial process requiring both medical expertise and

Received: 11 July 2022
Accepted: 28 December 2022
Published: 7 January 2023

nontechnical skills.[2,3] Therefore, ward-round teaching has been used to improve students' quality of patient assessment, management, and nontechnical skills in medical education.[2,4–6] However, there are limited studies on nursing education through ward-round training.[7–10]

Acute upper gastrointestinal bleeding (AUGIB) is one of the most common emergency visits in China. The incidence of AUGIB is 37–172/10,000 adults, with a crude overall in-hospital mortality of 10%.[11,12] Therefore, AUGIB is a core component of the medical curriculum from the Emergency Nursing Residency Program (ENRP) designed by the Teaching and Research Office of Emergency Department (TRO-ED), First Affiliated Hospital (FAH), Sun Yat-sen University (SYSU). In recent years, the teaching of AUGIB was conducted with the method of instructor-led ward round training (IWRT). However, according to a previous survey conducted by the TRO-ED, notable shortcomings of this teaching method in students' SC improvement, independence in learning, understanding, and acquisition of knowledge were reported by students and instructors. Therefore, an urgent call for teaching reform was sent out by the TRO-ED.

Student-, or peer-led learning, is one of the instructional activities that encourage greater autonomy and collaboration between students. In nursing education, the student-led educational module has shown promising effects for promoting self-directed learning and preparing nurses with the required medical knowledge and skills to support effective patient care and outcomes.[13–15]

Therefore, in this study, we adopted the student-led ward round training (SWRT) method in the teaching of AUGIB in a simulated ward setting. We aimed to evaluate whether an SWRT can improve students' knowledge acquisition, CTA, and SC, as compared to the IWRT method.

Methods

Student Recruitment and Study Design

This study was structured as a randomized single-blinded trial, conducted in November 2020. Ethics approval was gained from the Institutional Review Board of the FAH, SYSU, China. Guidelines outlined in the Declaration of Helsinki were followed in this study. All 43 nursing students who were in the first year of the Emergency Nursing Residency Program (ENRP) were recruited. The ENRP was a two-year project which was designed by the Nursing Department of FAH to improve the nursing skills of graduated nursing students before entering into independent clinical work. These students had passed the entrance exam of the ENRP. Out of these 43 students, there were 3 who refused to participate in the study and written informed consent was obtained from the other 40 students. These students were randomly divided into a student-led ward round training group (SG) and an instructor-led ward round training group (IG) using a computer-generated sequence with a ratio of 1:1. Both groups' teaching was carried out by the same instructor from the ED, FAH, and SYSU. This instructor had passed the teaching ability tests conducted by the Continuing Medical Education Session of FAH, SYSU, and had a teaching qualification in Emergency Nursing Education (ENE). A graphical overview of the study design is presented in Figure 1.

Pre-Training Assignments

All of the students from both the SG and IG had the same pre-training assignments. One week prior to the ward round training, six lecture videos, which were professionally recorded and edited by the instructor, were distributed to all the students for self-learning. Each video was produced in less than 10 minutes and consisted of a combination of PowerPoint presentation and audio voiceover. The videos created were as follows: etiology, clinical manifestations, diagnosis points, therapeutic principles, and nursing measures in AUGIB management. The instructor also presented relevant questions to the students. Representative questions included: (1) How to assess the patient's blood volume status? (2) What should you do to keep the airway open during hematemesis? (3) What indicators suggest re-bleeding? According to the learning tasks, students were required to watch the video lectures, answer the questions and read the course textbook by themselves ahead of the ward round training. Moreover, students from both the SG and IG were randomly divided into small teams of four by a completely random method performed by SPSS software (SPSS, version

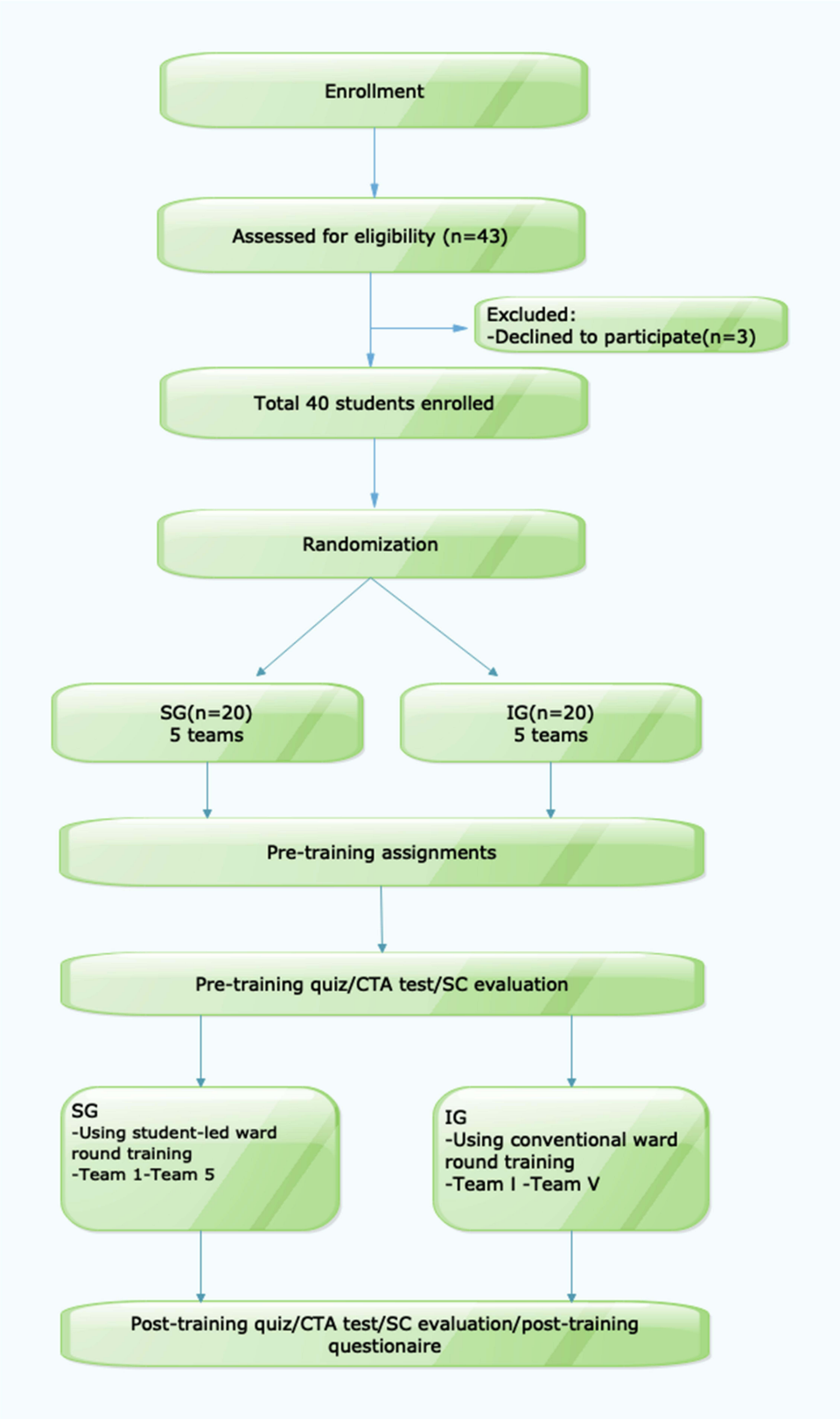

Figure 1 Study flow diagram.
Abbreviations: CTA, critical thinking ability; SC, self-perceived confidence; SG, student-led ward round training group; IG, instructor-led ward round training group.

22.0, Chicago). Each team was encouraged to review the main points of the learning content together, discussed any questions they encountered during self-learning, and made a patient's care plan for the upcoming ward round training.

Simulation Scenario

Both groups of students used the same simulation scenario based on a standardized patient (SP) during ward round training. The SP, who had experience in managing AUGIB patients, was a physician from the Gastroenterology Department of FAH, SYSU. The SP had been trained to master the art of imitating an AUGIB patient including medical history, type of transfer to hospital, signs, and symptoms, information on physical examination, and verbal feedback to the students. The scenario simulated a middle-aged man who was emergently admitted after throwing up a large amount of bright red blood. On admission, the patient was diagnosed with AUGIB with hypovolemic shock. He was immediately subjected to continuous ECG monitoring, blood transfusion, and fluid resuscitation. Upper endoscopy showed a peptic ulcer with active bleeding, and hemostasis was performed. Now the patient was worried about rebleeding. He also wanted to be discharged as soon as possible because he had a lot of work to do. A panel of two experts in ENE from the ED, FAH, and SYSU, reviewed the scenario to ensure content validity and course content fidelity.

Procedures of Student-Led and Instructor-Led Ward Round Training

All of the students from the SG and IG were taught respectively using the SWRT and IWRT method. The training was carried out separately on two consecutive days for each group. Training for each team consisted of a clinical encounter and a debriefing period, with a time of 30 minutes and 15 minutes, respectively.

Student-Led Ward Round Training

Before the beginning of the training, the instructor set the role of senior nurse among students for each team. First, the student as the senior nurse was required to make medical interviews, do physical examinations on the patient, and obtain diagnosis and treatment processes. Second, the senior nurse had to make a presentation on the patient's condition to his/her peer students. Each peer student then review the student's performance and asked some questions about the patient if needed. Then, all the students share their opinions on the patients' current condition and nursing measures, including airway maintenance, vital signs monitoring, venous access, blood transfusion, rebleeding evaluation, etc. Students also provided psychological care to the patient. During this phase of training, the role of the instructor was to guide students to explore knowledge by themselves through a scenario that the students would be likely to face in practice. After completing the clinical encounter, the instructor gave formative and summative feedback to the students on their performance and answered questions posed by the students regarding the scenario. Then the simulated scenario was repeated, and each student has the opportunity to practice as the senior nurse individually.

Instructor-Led Ward Round Training

The instructor runs through the scenario instead of the students, as compared to the SWRT. The IWRT started with an instructor-led brief introduction of the patient's medical history and therapeutic course to the students. Then according to the patient's condition, the instructor thoroughly analyzed all the relevant knowledge and nursing measures related to AUGIB for the students. During the debriefing period, the instructor summarized the scenario and answered questions from the students if needed.

Data Collection and Evaluation of the Training

Knowledge Acquisition and Critical Thinking Ability

After the pre-training assignments, a pre-training quiz and CTA test were conducted to evaluate the students' baseline knowledge and CTA regarding AUGIB. A post-training quiz and CTA test were also administered after the training. Each quiz and test consisted of 50 and 20 multiple-choice questions, respectively. These quizzes and tests were different from each other, and all were derived from the validated item bank developed by the TRO-ED, FAH, and SYSU. A panel of two experts in ENE from the ED, FAH, and SYSU, reviewed the quizzes and tests for content validity.

Self-Perceived Confidence

An anonymous questionnaire reflecting students' SC with regard to AUGIB management was performed before and after the training. The response options provided were "yes" and "no", regarding whether they have self-perceived confidence in the nursing of AUGIB or not. The content validity of the questionnaire was reviewed and evaluated by experts from the ED, FAH, and SYSU.

Questionnaire

Students answered an anonymous questionnaire about their perspectives and interest concerning the teaching module after the training. They answered using a five-point Likert-type scale, with scores ranging from 1 (strongly disagree) to 5 (strongly agree).

Statistical Analysis

GraphPad Software (GraphPad Software, Inc, La Jolla, CA) was used for statistical analyses and graphs generation. Independent *t*-tests were used to compare age, scores of entrance exam, and score changes of knowledge and CTA between the SG and IG from the pretest to the post-test. To compare students' perspectives and interests, Wilcoxon rank sum tests were performed. $\chi 2$ tests were used to compare the proportion of sex and academic degree between the two groups. Students' self-perceived confidence before and after the training were compared by using $\chi 2$ tests and Yates's correction for continuity. A *p-value* of less than 0.05 was considered statistically significant.

Results

Demographic Information

A total of 40 students were enrolled in this study, with 20 students assigned to the SG and 20 students assigned to the IG. The demographic information of the participants is presented in Table 1. There was no significant difference between both groups with respect to age, gender, academic degree, and scores on the entrance exam ($p>0.05$).

Knowledge Acquisition

Figure 2 compares the scores of the pre-training and post-training quizzes between students from the SG and IG. There was no significant difference between the SG and IG with regard to their pre-training quiz scores (31.10±4.27 vs 30.55 ±2.24, $p=0.61$; Figure 2A). However, in the post-training quiz, scores achieved by the students from the SG (44.10±2.92) were significantly higher than those achieved by the students from the IG (32.35±2.21, $p< 0.001$; Figure 2B). The scores of the post-training quiz were significantly higher than that of the pre-training quiz in both the SG (44.10±2.92 vs 31.10 ±4.27, $p< 0.001$; Figure 2C) and IG (32.35±2.21 vs 30.55±2.24, $p=0.01$; Figure 2D).

Table 1 Demographic Information of Nursing Students Who Participated in the Study

	SG* (n=20)	IG* (n=20)	*P* value
Age (years)	23.65±1.18	23.45±1.23	0.60
Gender			0.66
Female	18 (90.0)	16 (80.0)	
Male	2 (10.0)	4 (20.0)	
Degree			0.61
Bachelor	17 (85.0)	19 (95.0)	
Master	3 (15.0)	1 (5.0)	
Scores of entrance exam	80.90±5.94	80.40±7.03	0.81

Note: *Data are presented as means and standard deviations or as the number of nurses (%).
Abbreviations: SG, Student-led Ward Round Training Group; IG, Instructor-led Ward Round Training Group.

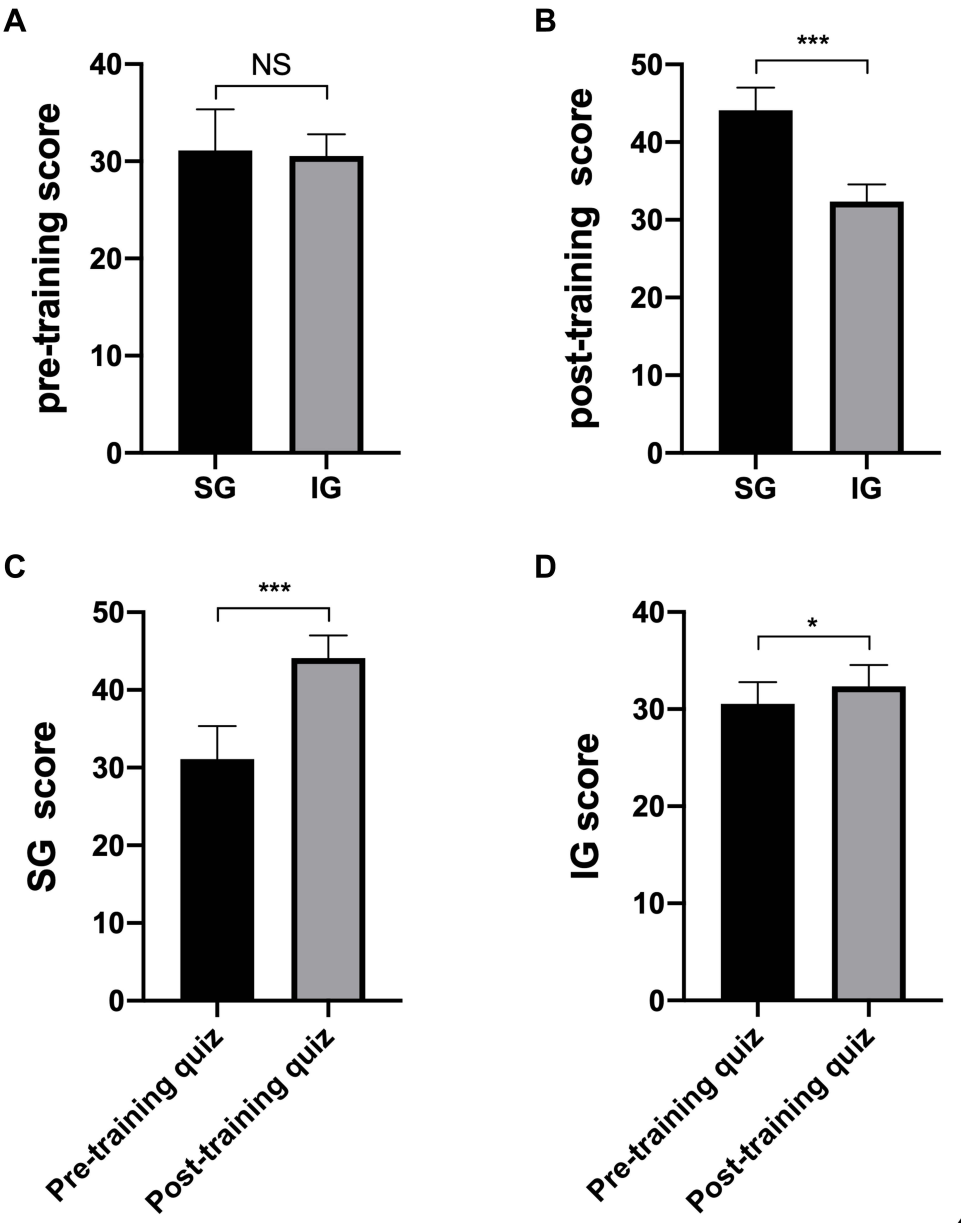

Figure 2 Pre-training and post-training quiz scores of AUGIB knowledge from the SG and IG students. (**A**) Comparison of pre-training quiz scores between the SG and IG. (**B**) Comparison of post-training quiz scores between the SG and IG. (**C**) Comparison of pre-training quiz and post-training quiz scores in the SG. (**D**) Comparison of pre-training quiz and post-training quiz scores in the IG. *P=0.01; ***P< 0.001.

Abbreviations: AUGIB, acute upper gastrointestinal bleeding; SG, student-led ward round training group; IG, instructor-led ward round training group; NS, not significant.

Self-Perceived Confidence

Table 2 compares the level of SC in the management of AUGIB between students from the SG and IG. The results showed that the level of SC improved significantly after training in the SG ($p< 0.001$). However, there was no statistically significant difference in the IG with respect to the change of SC from pre- to post-training ($p=0.43$).

No significant difference was found between both groups in gains in SC before training ($p=0.23$); however, the level of students' SC in the SG was significantly higher than that in the IG ($p< 0.001$) after training.

Table 2 Comparison of Students' Self-Perceived Confidence in Acute Upper Gastrointestinal Bleeding Management Between the Student-Led and Instructor-Led Ward Round Training Group

Variables	Pre-Training*		Post-Training*		*P* value
	Yes#	No#	Yes#	No#	
SG	2 (10.0)	18 (90.0)	16 (80.0)	4 (20.0)	< 0.001
IG	3 (15.0)	17 (85.0)	5 (25.0)	15 (75.0)	0.43
P value	0.23		<0.001		

Notes: *Data are presented as the number of patients (%). #Yes, have self-perceived confidence in the nursing of acute upper gastrointestinal bleeding; No, have no self-perceived confidence in the nursing of acute upper gastrointestinal bleeding.

Abbreviations: SG, Student-led Ward Round Training Group; IG, Instructor-led Ward Round Training Group.

Critical Thinking Ability

Figure 3 compares CTA between students from the SG and IG. The results indicated that the students' CTA improved significantly in the SG (14.95±2.58 vs 7.10±1.79, $p< 0.001$; Figure 3C), while no significant improvement was found in the IG (7.91±2.28 vs 6.52±2.21, $p=0.07$, Figure 3D) after training.

On comparing the scores of the pre- and post-training between students from the SG and IG, no significant difference was found between the 2 groups (7.10±1.79 vs 6.52±2.21, $p=0.36$; Figure 3A) before training; however, the scores achieved by the SG were significantly higher than those achieved by the IG (14.95±2.58 vs 7.91±2.28, $p< 0.001$; Figure 3B) after training.

Questionnaire

Table 3 compares students' perspectives and interests in terms of the teaching module between the SG and IG. There was no significant difference when comparing responses from the 2 groups of students with regard to self-learning ability improvement ($p=0.60$) and spare time occupation ($p=0.83$). More students in the SG agreed that the training was helpful for understanding the course ($p=0.02$) and knowledge acquisition ($p<0.001$), and could help improve their teamwork ability ($p<0.001$), communication ability ($p<0.001$) and clinical thinking ability ($p=0.04$). Although students in the SG felt much more pressure ($p=0.01$), they still showed greater interest in the teaching modality ($p=0.04$) and would like it to be applied in other courses ($p=0.01$).

Discussion

To the best of our knowledge, this is the first study to compare the effects of student-led and instructor-led ward-round training methods on the knowledge acquisition, SC, and CTA of nursing students with regard to AUGIB. There are two main findings. First, improvement in knowledge acquisition was observed in the SG and IG from pre-training to post-training quizzes. Moreover, the scores achieved by the SG from the post-training quiz were significantly higher than the IG. Second, the SWRT method also promoted students' CTA and SC in terms of AUGIB.

Bedside teaching is an important educational activity in ward rounds, where medical knowledge, as well as diagnostic, problem-based, and administrative skills are taught based on real or simulated patients.[5,16,17] Bedside teaching in ward rounds provides students with a true contextual learning experience and could improve medical students' clinical competence and professionalism.[2,4,18] Heckmann et.al[19] found that a blended teaching method, which consisted of problem-based learning, gathering experience with neurooncological and neurophysiological principles, and ward-round bedside teaching, could improve students' neurological knowledge and skills. However, we are not aware of previous studies evaluating the effectiveness of ward-round training as a single instructional tool for clinical competency in nursing education.

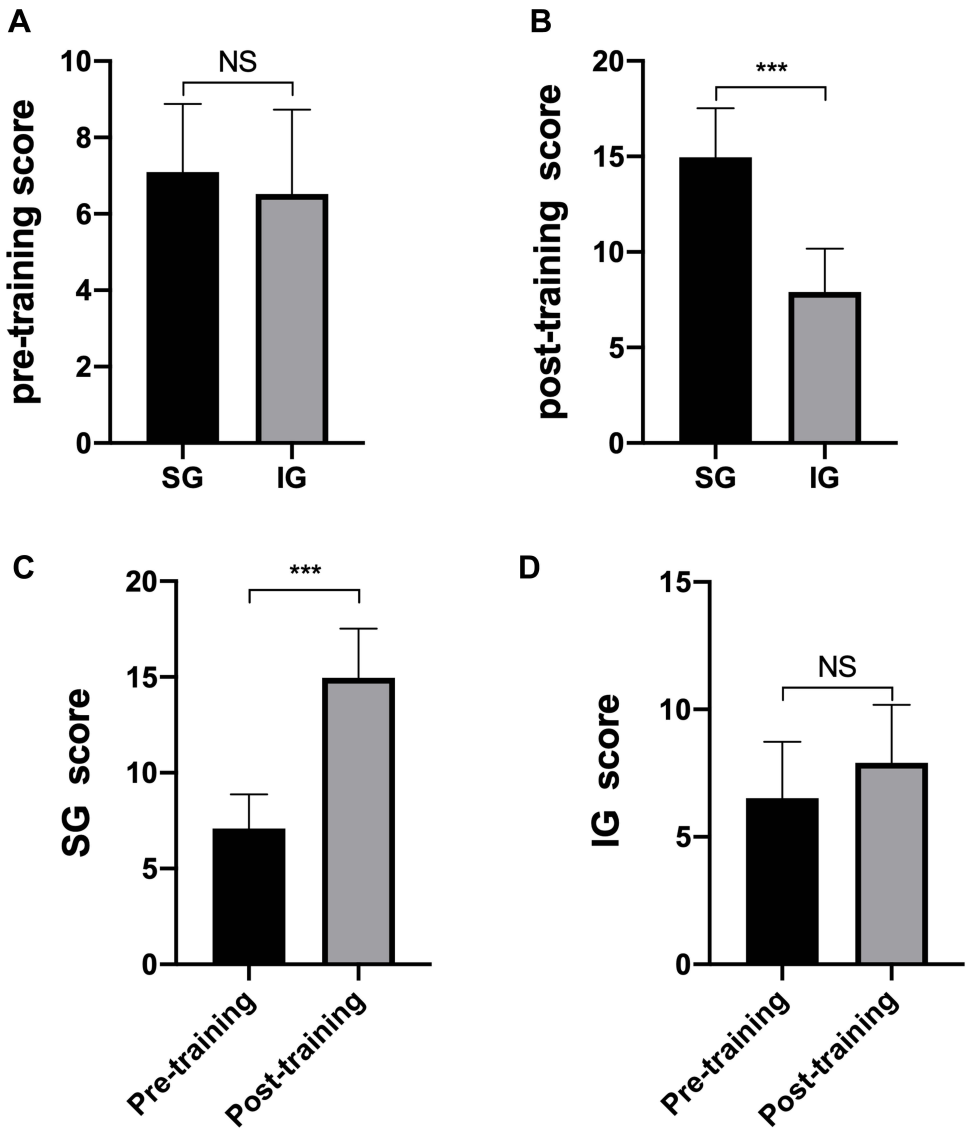

Figure 3 Pre-training and post-training scores of critical thinking ability from the SG and IG students. (**A**) Comparison of pre-training scores between the SG and IG. (**B**) Comparison of post-training scores between the SG and IG. (**C**) Comparison of pre-training and post-training scores in the SG. (**D**) Comparison of pre-training and post-training scores in the IG. ***$P< 0.001$.

Abbreviations: SG, student-led ward round training group; IG, instructor-led ward round training group; NS, not significant.

In this study, both groups of ward round training were conducted based on an SP. We found that improvement in medical knowledge was observed in SG and IG from pre- to post-training quizzes. However, students from the SG gained significantly higher scores from the post-training quiz. Higher satisfaction with course content understanding and knowledge acquisition was also reflected among students from the SG. These promising effects should be particularly encouraging to educators to consider using the SWRT method in nursing education. Under the guidance of the instructor, SWRT is the process of active learning, which could deepen students' understanding and memorization of medical knowledge.[20] Moreover, the SWRT method technically builds on peer learning. During ward round training, students from the SG actively collaborated with their peers and drew on knowledge from each other.[19]

CTA and SC play crucial roles in professional nursing practice. CTA has been identified as a core competency for nursing healthcare professionals, as it helps make sound clinical and managerial judgments in complex healthcare environments.[21,22] SC in nursing is an important factor in allowing nurses to build mutual trust and respect between nurses and their patients in patient care.[22,23] Our present study demonstrated that the SWRT helped foster CTA and SC

Table 3 Comparison of Students' Perspectives and Interest in the Module Between the Student-Led and Instructor-Led Ward Round Training Group

No.		SG*	IG*	*P*-value
1	This module improves my self-learning ability.	4.14±1.03	4.25±0.97	0.60
2	This module is helpful for better understanding the course.	4.37±.0.83	3.31±1.02	0.02
3	This module is helpful for knowledge acquisition.	4.69±1.14	2.95±1.05	< 0.001
4	This module improves my teamwork ability.	4.83±0.35	3.01±0.88	< 0.001
5	This module improves my communication ability.	4.72±0.65	2.87±0.54	< 0.001
6	This module improves my clinical thinking ability.	4.85±0.58	3.62±0.42	0.04
7	I like this teaching modality.	4.53±0.67	3.11±0.73	0.04
8	I would like this teaching modality to be applied in other courses.	4.43±0.39	3.13±0.29	0.01
9	This module gives me much pressure.	4.18±1.02	3.12±0.53	0.01
10	This course takes up too much of my spare time.	4.17±0.93	4.05±1.03	0.83

Note: *Data are presented as means and standard deviations.
Abbreviations: SG, Student-led Ward Round Training Group; IG, Instructor-led Ward Round Training Group.

for the SG, while students from the IG had no improvement after IWRT. The SWRT method was an active learning method, which was able to engage the students' participation in ward rounds through knowledge application and problem-solving. Students from the SG had the opportunity to interact and examine the SP, analyzed the patient's condition, and solved encountered clinical questions. However, students from the IG mainly absorbed knowledge through listening and watching during IWRT.

According to the post-training questionnaire, students from the SG demonstrated higher satisfaction with teamwork, communication, and clinical thinking ability improvement. Students also showed a preference for the SWRT method. However, much more study pressure was reflected from on SG students. The reason for this result was that the SWRT method emphasized student-oriented, active participation in the ward round. Students should completely involve themselves in ward round practice by interacting with the patient and peers. This could be challenging to students who have been trained through the IWRT method in a previous clinical study.

The present study has several limitations. First, we evaluated the students' CTA by using a multiple-choice test. Previous studies that assessed CTA utilized the California Critical Thinking Dispositions Inventory (CCTDI) and the California Critical Thinking Skills Test (CCTST).[21] However, we wanted to focus on the CTA regarding AUGIB management. Second, we did not evaluate other core competencies, such as leadership skills and nursing skills. Therefore, future studies should be conducted to further assess the effectiveness of the SWRT method. Third, we only recruited first-year nursing students in the ENRP hence our sample size is small to generalize our findings. Therefore, a larger sample should be employed in our future study to confirm our findings.

Conclusions

The teaching method of SWRT may improve nursing students' knowledge acquisition, CTA, and SC in AUGIB. However, the IWRT method has no beneficial effect on CTA and SC promotion for nursing students.

Disclosure

The authors report no conflicts of interest in this work.

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