

# A Journal Club Format That Combines Literature Reading and Clinical Cases Is More Conducive to Improving Senior Undergraduate Medical Students' Overall Competence

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**Background:** Journal clubs have proved to be very important in postgraduate education. This method is based on a problem-oriented teaching methodology. However, it is less commonly used in teaching undergraduate medical students. The aim of our study was to apply a journal club learning format in the teaching of cardiovascular medicine to senior undergraduate students and to assess the improvement of students' knowledge and skills in evidence-based medicine after participation in the journal club.

**Methods:** Participants were selected on a voluntary basis. A total of 30 undergraduate medical students were selected (15 students each from the fourth and fifth years). Each student was required to complete five journal club activities within 2 years. For each journal club activity, an instructor and two students were assigned to report separately. The content of the instructor's report was the analysis of a typical clinical case or the diagnosis and treatment standard and new development of the related disease. The literature reported by the students should be related to the case or new development reported by the teacher.

**Results:** Changes in students who participated in the journal club before and after the training were assessed using student self-assessments, student peer assessments, teacher assessments, and modified EPIC scale assessments. Statistical analysis showed that students' verbal expression, teamwork, intellectual curiosity, analytical skills, slide production, doctor-patient communication, clinical thinking, and research thinking improved significantly after participating in the journal club ( $p < 0.001$ ).

**Conclusion:** Participation in journal clubs by undergraduate medical students improved students' knowledge and skills in evidence-based medicine. A journal club format that combines literature reading and clinical cases is conducive to improving students' overall competence.

**Keywords:** journal club, cardiovascular medicine, medical education

## Introduction

The use of the journal club began in 1875, with Sir William Osler of McGill University.<sup>1</sup> Since then, journal clubs have been used to teach medical residents how to critically appraise research literature. Journal clubs are educational activities used in health sciences education to teach evidence-based decision-making, critical thinking, and assessment skills, and to build participants' understanding of important professional issues.<sup>2</sup> Students' ability to critically evaluate the literature is important not only for teaching and research institutions, but also for their future careers.

The journal club teaching method has achieved good results in postgraduate education.<sup>3,4</sup> At present, however, journal club activities are used less often in the teaching of medical undergraduates in China. Based on our previous research,<sup>5</sup> we hope to further improve students' abilities in reading, literature retrieval, inductive reasoning, language expression, and analysis, and to cultivate students' clinical thinking and scientific research thinking ability, by conducting journal club activities in the undergraduate stage of medical education.

## Teaching Design and Delivery

### Principles for Setting Learning Objectives and Selecting Learning Content

#### Learning Objectives

1. To master the skills of searching for literature.
2. To read extensively and intensively in English literature.
3. To standardize the production of journal club literature report slides.
4. To achieve fluency in language expression.
5. To improve analytical and reasoning skills.
6. To improve the clinical reasoning and scientific research skills of medical students.
7. To cultivate the teamwork skills of medical students.
8. To develop and maintain the habit of learning and thinking.
9. To encourage students to express different opinions and suggestions to cultivate their innovative and creative ability.
10. To help students to better understand and master evidence-based knowledge and skills in cardiovascular disease.

#### Principles of Content Selection

1. The content of literature reading is derived from the content of undergraduate medical textbooks, but the content is not limited to textbooks.
2. Content is based on cases of hospitalization in cardiovascular medicine.
3. Each student should report five articles related to a disease or group of diseases.
4. One teacher and two students will be assigned to report on each journal club activity.
5. The content reported by the teacher should be the analysis of typical clinical cases or the diagnosis and treatment guidelines of related diseases and new advances. The content of the students' report should include a document selected according to the cases or related diseases selected by the teacher, and the completed literature review.

### Process of the Journal Club Learning Format

Our journal club learning format was a research project, not a compulsory course. Participation in this study was voluntary. The project leader paid the participating students a stipend for their labor from the project funds. The supervisor also received some additional financial assistance. The journal club was organized in such a way that it did not interfere with the students' regular study time. A total of 30 students were selected from the Clinical College of Wannan Medical College, and 15 students each were selected from the fourth and fifth years. Students in the fourth and fifth grades have some basic theoretical knowledge of medicine and practical clinical skills, which may be conducive to the implementation of the journal club teaching program. Students take basic and clinical theoretical cardiovascular courses for about 6 months during their undergraduate years. Fourth year students completed the school's required courses on a regular basis as they participated in the activities of the journal club. Fifth year students completed their clinical practicum on a regular basis. We explained the form and content of the study to the candidates and evaluated the participants who might be able to complete the study. Each student completed five journal club activities under the guidance of the teacher, and completed the research in the form of before-and-after comparisons of the research objects themselves. The Ethics Committee of the Second Affiliated Hospital of Wannan Medical College approved the study. All participants signed an informed consent form.

Before the study started, the special advisor instructed all of the selected students on the method of literature retrieval from the database and provided guidance on the production of literature review slides. Teachers and students who participated in the journal club should thus be familiar with the process of running the journal club.

#### Journal Club Implementation Process

Before the study started, the teachers and students participating in the journal club set up a WeChat group.

We conducted a journal club activity with 30 students over a period of 2 years. Once a week, two students were assigned to complete the literature review and a teacher was assigned to complete the analysis and report of typical clinical cases. The journal club was scheduled to start on Wednesdays at 17:00.

Each student was required to complete five literature reviews. At least three pieces of foreign literature were included in the five literature reviews. Each student's journal club of five literature reviews should preferably focus on a relevant clinical issue or basic research. The student's choice of literature was made in consultation with the supervisor.

Once the topic of the literature had been decided, students should complete the reading independently and communicate with the teacher if they had any difficulties in reading or understanding. It was recommended that the debriefers post the selected literature in the journal club WeChat group a week in advance so that all members of the group could read it. Students were allowed to complete the first documentary presentation slide production under the guidance of the teacher, and completed the later slide production independently. The content of the slide should include at least the following: basic information on the literature, such as the title of the literature, the name of the journal in which it was published, the time of publication, research background, main research methods used, research results, conclusions and main discussion points, clinical problems and basic problems solved by the literature, and its innovative points and shortcomings. Each debriefer made a mind map after reading the literature and suggested possible ideas for further research.

After each student had completed the literature reading report, teachers participating in the journal club gave their opinions and suggestions on the appropriateness of the literature selection, the content of the research, the student's slide production, the language organization and expression, literature reading ability, depth of thinking, etc. The students who participated in the journal club could also express their opinions on the creativity of the literature, the scientific nature of the research questions, and the research ideas.

### Evaluation of Effectiveness

The system for evaluating the effectiveness of journal clubs included the following aspects:

1. Student self-assessments, including confidence, teamwork, communication skills, self-motivation, and literature searching.
2. Student peer assessments, including verbal expression, teamwork, intellectual curiosity, analytical skills, and clinical practice.
3. Faculty assessments, including literature reading, slide production, doctor–patient communication, clinical reasoning, and research reasoning.
4. Modified Evidence-based Practice Confidence (EPIC) scale assessments,<sup>6,7</sup> including identifying knowledge gaps; formulating a clinical question in patient, intervention, comparison, outcome (PICO); searching the literature; interpreting results; and applying to the patient.

### Statistical Analysis

We compared the pre-training and post-training scores using the Student's two-sample *t*-test. We entered all data into Microsoft Office Excel Professional Plus 2019 and used SPSS Statistics version 26.0.0.0 (IBM) to analyze the data. We considered  $p < 0.05$  as indicating statistical significance.

### Results

A total of 30 students (15 in their fourth year and 15 in their fifth year) participated in the study. Both fourth graders and fifth graders participated in the journal club learning format in their spare time. The fourth graders had completed the school's required basic medical theory courses and were in the process of taking clinical courses in medicine, including cardiovascular disease. Fifth graders had completed all school-mandated basic medical theory courses and medical clinical courses, and were in the clinical internship phase of their program. Each student completed five journal club sessions, involving literature selection, literature review, slide production, and debriefing, and all 30 students completed pre- and post-training evaluations.

**Table 1** Student Self-Evaluations

Groups	Self-Confidence	Teamwork	Communication Skills	Study Conscientiousness	Literature Search
Pre-training	71.37±9.73	71.87±7.86	72.60±7.82	72.83±7.76	73.33±8.26
Post-training	85.57±4.97	83.33±4.89	83.90±4.84	85.43±5.02	87.77±5.58
<i>t</i>	-7.114	-6.783	-6.728	-7.470	-7.993
<i>p</i>	<0.001	<0.001	<0.001	<0.001	<0.001

**Notes:** There were significant differences between pre- and post-training for self-confidence, teamwork, communication skills, self-motivation to learn, and literature searching.

## Students' Self-Evaluation

Self-evaluation before and after the training was carried out for all 30 students. The results are shown in Table 1, which shows that there were significant differences between pre- and post-training for self-confidence, teamwork, communication skills, self-motivation to learn, and literature searching ( $p < 0.001$ ).

## Students' Peer Evaluation

The results of the students' peer evaluations are shown in Figure 1. Statistical analysis showed significant differences between pre- and post-training in verbal expression, teamwork, intellectual curiosity, analytical skills, and clinical practice.

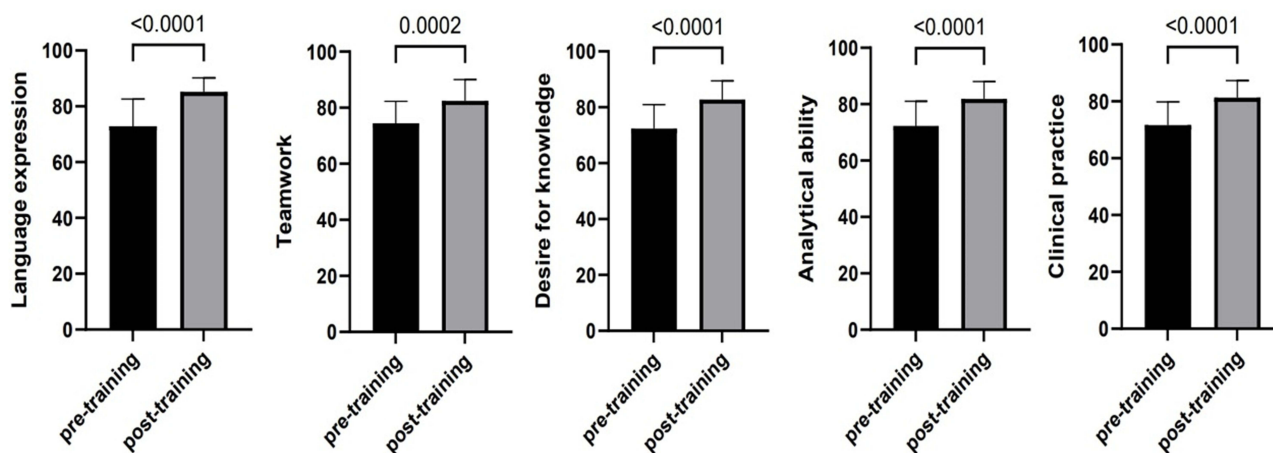
## Teachers' Evaluations

The results of the faculty evaluations are shown in Figure 2. The results show that there were significant differences between pre- and post-training in the areas of literature reading, slide making, doctor-patient communication, clinical thinking, and research thinking.

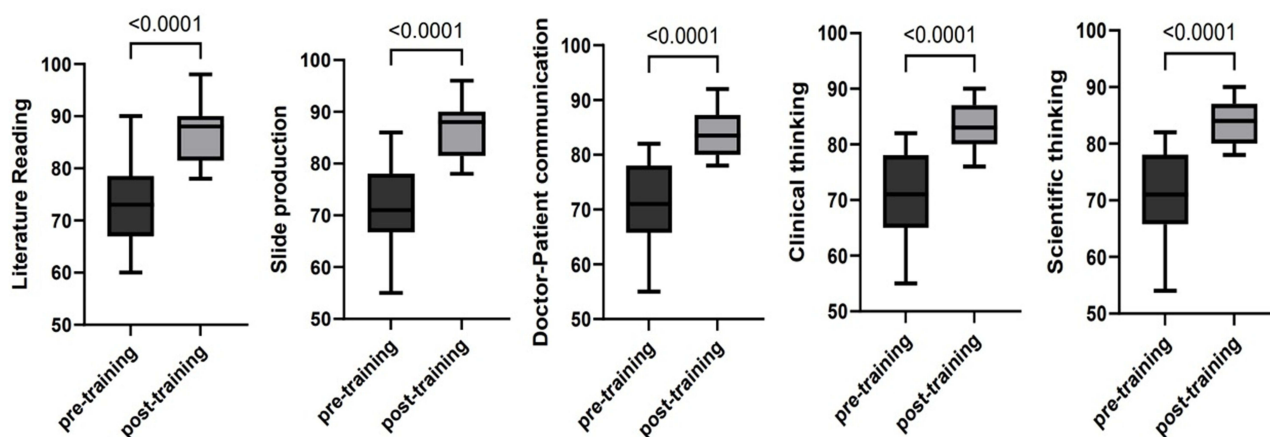
## Evaluation of a Modified Version of the EPIC Scale

The results of the evaluation of the modified EPIC scale (Figure 3) showed significant differences in identifying knowledge gaps, formulating PICO, searching literature, interpreting results, and applying to the patient.

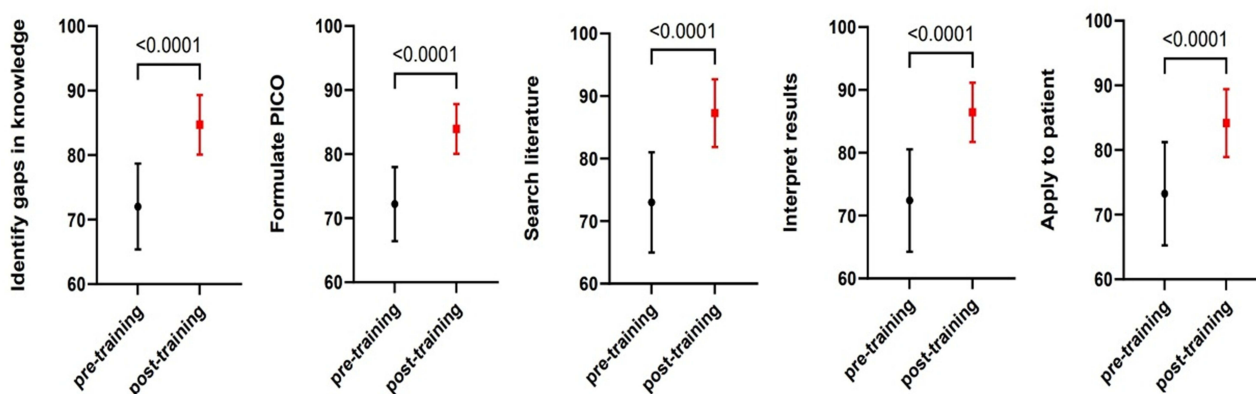
The results of these different evaluation methods demonstrate that the journal club training could improve medical students' skills in many ways.



**Figure 1** Student peer evaluations. There were significant differences between pre- and post-training in language expression, teamwork, desire for knowledge, analytical ability, and clinical practice.



**Figure 2** Teachers' evaluations. There were significant differences between pre- and post-training in the areas of literature reading, slide production, doctor-patient communication, clinical thinking, and scientific thinking.



**Figure 3** Evaluation of a modified version of the EPIC scale. There were significant differences between pre- and post-training in identifying gaps in knowledge, formulating PICO, searching literature, interpreting results, and applying to patient.

## Discussion

To improve students' clinical thinking, scientific research thinking, teamwork and other skills, the Department of Cardiovascular Medicine of the Second Affiliated Hospital of Wannan Medical College implemented a journal club learning format. The specific learning mode was that during one period of journal club activities, one teacher completed the analysis report of typical clinical cases or the interpretation of the latest guidelines for disease diagnosis and treatment, and two students completed the literature reading report. All 30 students completed the literature review report and a total of 75 journal club teaching activities were completed.

The effectiveness of the journal club was evaluated using four modes of evaluation: student self-evaluation, student peer evaluation, teacher evaluation, and modified EPIC scale evaluation. The results of the study showed that after learning through the journal club teaching format, students showed significant improvements in literature searching, slide production, language expression, self-confidence, doctor-patient communication, teamwork, patient handling, clinical thinking, and research thinking.

Postgraduate students' participation and performance in journal clubs in Chinese postgraduate education are similar to those in global studies.<sup>8,9</sup> However, the implementation of journal clubs at undergraduate level in Chinese medicine has not been reported in the literature. Journal clubs for first and second year medical students have been implemented worldwide and resulted in improvements in self-confidence, literature searching, comprehension, and writing skills, but no significant changes in evidence-based medicine knowledge and skills.<sup>10,11</sup> In our study, senior undergraduate medical students (fourth and fifth year students) were trained in a journal club, and the results in terms of confidence, literature searching, and

comprehension were similar to those in the studies by Ellen et al and Edwards et al.<sup>10,11</sup> Our study enrolled fourth and fifth year students, owing to their better basic theoretical knowledge of medicine and practical clinical skills, which may be more conducive to the implementation of the journal club teaching program. Unusually, our study found improvements in clinical skills and knowledge of evidence-based medicine, research thinking, and teamwork. The improvements in these skills could be attributed to the fact that we enrolled senior medical students who had already completed a clinical placement. In addition, each stage of the journal club training included not only student participation, but also the participation of the instructor, who led the interpretation of typical clinical cases and the latest guidelines, so that the training could enable students to improve their clinical knowledge and skills. Most medical schools in China focus on lecture-based, case-based, or problem-based learning in their universities.<sup>12,13</sup> In general, schools in China do a poor job of training students to critically evaluate articles, which leaves them underprepared for clinical placements. The early integration of journal clubs into medical education could help to build a foundation of communication, analytical skills, and confidence in presenting scientific information. There is no doubt that these skills will be used throughout a doctor's career. In a doctor's practice, the ability to communicate between doctor and patient could increase the patient's trust in the doctor and confidence in the treatment. Good verbal expression and self-confidence are the foundations of good patient communication skills. Our study showed that the journal club learning format could improve medical students' patient communication skills. This demonstrates the need for journal clubs in undergraduate medical education. Our study also showed that journal clubs could help to improve students' teamwork skills. Previous research suggested that teamwork improved student motivation and learning outcomes.<sup>14</sup> Journal clubs have been documented to be beneficial for medical students at the undergraduate, postgraduate, and residency levels.<sup>3,4,15-17</sup> Journal clubs can be organized as online exchanges, in addition to the usual face-to-face exchanges.<sup>18</sup>

The results of this study were evaluated in a way that differs from previous medical education studies, which used a single self-assessment, teacher assessment, or questionnaire. This study used subjective student self-assessment, student peer assessment, and teacher assessment, as well as an objective modified EPIC scale assessment for a comprehensive evaluation. A comprehensive evaluation may lead to more reliable conclusions.

Our study also had some limitations. First, the enrolled students had a strong willingness to participate, so they completed the journal club with a clear purpose and high levels of motivation and participation, which may have biased the evaluation of the journal club outcomes. Second, we did not compare the strengths, weaknesses, and differences between fourth and fifth graders in our study.

## Conclusions

Through participation in the journal club, students gained additional skills, including literature review, slide production, evidence-based medicine knowledge and skills, communication skills, clinical thinking, and research thinking.

The journal club learning activities could be carried out by both students and teachers, combining literature reading and clinical cases, which was conducive to improving students' evidence-based medicine knowledge and skills.

In future research, the journal club learning format could be integrated into the whole teaching stage of undergraduate medical education, and could be carried out after students' enrolment.

## Declarations

All authors consent to publication of this manuscript. Participants who consented to this project were informed that anonymized data would be utilized in a formal publication.

## Data Sharing Statement

Data and materials are available upon request to the corresponding author, Dasheng Lu, Email: wydsu@wnmc.edu.cn.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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