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JOURNAL CLUBS IN UNDERGRADUATE MEDICAL EDUCATION: CRITICAL APPRAISAL, LEARNING OUTCOMES, AND CLINICAL TRANSFER

Abstract

Introduction: Journal clubs are widely used to introduce research appraisal, but the outcomes measured in undergraduate medical education range from satisfaction to tested skills. These outcomes should not be treated as interchangeable.

Objective: To critically discuss evidence on undergraduate journal clubs, distinguish direct from indirect evidence, and propose a patient-linked teaching and evaluation approach.

Materials and methods: This targeted narrative synthesis draws on PubMed-indexed undergraduate journal-club studies, reviews, comparisons of evidence-based medicine (EBM) teaching methods, and validation studies of assessment instruments. It is not a systematic review, and studies in other learner populations are identified as indirect evidence.

Results: An undergraduate-focused review included 15 studies and described improvements in selected educational outcomes, but no demonstrated translation to EBM practice or patient outcomes. A five-session pre-clerkship programme involving 29 students improved reported confidence without a detectable change on an objective EBM knowledge-and-skills test. A randomized comparison of simulation with a checklist-supported journal club found higher immediate Fresno scores in the simulation group. A meta-analysis of five randomized trials in health professionals found no statistically significant overall knowledge advantage for journal clubs over other educational formats.

Conclusion: Journal clubs offer a setting for structured discussion of research, but the available literature does not establish that participation alone produces sustained, patient-level benefits. Future undergraduate evaluations should use clearly defined outcomes, appropriate comparison groups, and delayed assessment of unfamiliar clinical cases.

Keywords: *journal club; undergraduate medical education; evidence-based medicine; critical appraisal; clinical reasoning; educational assessment.*

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МЕДИЦИНАЛЫҚ ЖОҒАРЫ ОҚУ ОРНЫ СТУДЕНТТЕРІНЕ АРНАЛҒАН ҒЫЛЫМИ МАҚАЛАЛАРДЫ ТАЛҚЫЛАУ КЛУБТАРЫ: СЫНИ БАҒАЛАУ, ОҚУ НӘТИЖЕЛЕРІ ЖӘНЕ КЛИНИКАЛЫҚ ПРАКТИКАДА ҚОЛДАНУ

Аңдатпа

Кіріспе: *Ғылыми мақалаларды талқылау клубтары студенттерді ғылыми зерттеулерді сыни бағалауға үйрету үшін кеңінен қолданылады. Алайда жоғары медициналық білімнің дипломға дейінгі кезеңінде олардың нәтижелілігі студенттердің қанағаттануынан бастап объективті бағаланатын дағдыларына дейін әртүрлі көрсеткіштермен өлшенеді. Бұл көрсеткіштерді бір-біріне теңестіруге болмайды.*

Мақсаты: *Медицина студенттеріне арналған ғылыми мақалаларды талқылау клубтары туралы дәлелдерді сыни тұрғыдан талдау, тікелей және жанама дәлелдерді ажырату, сондай-ақ клиникалық жағдайларға негізделген оқыту мен бағалау тәсілін ұсыну.*

Материалдар мен әдістер: *Бұл мақсатты нарративтік шолу PubMed базасында индекстелген медицина студенттеріне арналған ғылыми мақалаларды талқылау клубтары жөніндегі зерттеулерге, шолуларға, дәлелді медицина (ДМ) әдістерін оқытуды салыстырған еңбектерге және бағалау құралдарын валидациялау зерттеулеріне негізделген. Жұмыс жүйелі шолу болып табылмайды; білім алушылардың өзге топтарында жүргізілген зерттеулер жанама дәлел ретінде бөлек қарастырылды.*

Нәтижелері: *Медицина студенттеріне арналған 15 зерттеуді қамтыған шолуда жекелеген білім беру нәтижелерінің жақсарғаны сипатталғанымен, бұл жетістіктердің ДМ қағидаттарын клиникалық практикада қолдануға немесе пациенттердің ем нәтижелеріне ықпал ететіні дәлелденбеген. Клиникалық пәндерді оқуға дейінгі кезеңдегі 29 студент қатысқан бес сессиялық бағдарлама өзіне деген сенімділікті арттырған, алайда ДМ бойынша білім мен дағдыларды объективті тестілеуде анықталатын өзгеріс болмаған. Рандомизацияланған зерттеуде симуляциялық оқытудан кейінгі Fresno тестінің бастапқы бағалаудан кейінгі ұпайлары құрылымдалған тексеру парағымен өткізілген ғылыми мақалаларды талқылау клубындағы көрсеткіштерден жоғары болды. Денсаулық сақтау мамандары қатысқан бес рандомизацияланған зерттеудің метаталдауында клубтардың басқа оқыту форматтарымен салыстырғанда білім деңгейі бойынша статистикалық мәнді жалпы артықшылығы анықталмаған.*

Қорытынды: *Ғылыми мақалаларды талқылау клубтары зерттеу нәтижелерін құрылымдалған түрде талқылауға мүмкіндік береді, бірақ қолда бар әдебиет оларға қатысудың өзі ұзақ мерзімді, пациент деңгейінде байқалатын оң нәтижелерге әкелетінін дәлелдемейді. Болашақ зерттеулерде нәтижелерді нақты анықтап, сәйкес салыстыру топтарын пайдалану және таныс емес клиникалық жағдайлар бойынша білім мен дағдыларды белгілі бір уақыт өткеннен кейін бағалау қажет.*

Түйін сөздер: *ғылыми мақалаларды талқылау клубы; дипломға дейінгі медициналық білім; дәлелді медицина; сыни бағалау; клиникалық ойлау; білім беру нәтижелерін бағалау.*

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ЖУРНАЛЬНЫЕ КЛУБЫ В ДОДИПЛОМНОМ МЕДИЦИНСКОМ ОБРАЗОВАНИИ: КРИТИЧЕСКАЯ ОЦЕНКА, РЕЗУЛЬТАТЫ ОБУЧЕНИЯ И ПРИМЕНЕНИЕ В КЛИНИЧЕСКОЙ ПРАКТИКЕ

Аннотация

Введение: *Журнальные клубы широко используются для обучения критической оценке научных исследований, однако в додипломном медицинском образовании их результаты оценивают по различным показателям – от удовлетворённости студентов до объективно проверяемых навыков. Эти показатели не следует считать взаимозаменяемыми.*

Цель: *Критически рассмотреть данные о журнальных клубах для студентов-медиков, разграничить прямые и косвенные доказательства и предложить подход к обучению и оценке результатов, основанный на клинических ситуациях.*

Материалы и методы: *Настоящий нарративный обзор основан на индексируемых в PubMed исследованиях журнальных клубов для студентов-медиков, обзорах, сравнительных исследованиях методов преподавания доказательной медицины (ДМ) и работах по валидации оценочных инструментов. Работа не является систематическим обзором; исследования с участием других категорий обучающихся рассматриваются отдельно как косвенные доказательства.*

Результаты: *Обзор, включивший 15 исследований с участием студентов-медиков, описал улучшение отдельных образовательных результатов, однако не выявил доказательств переноса этих достижений в клиническую практику ДМ или их влияния на исходы лечения пациентов. Программа из пяти занятий с участием 29 студентов доклинического этапа повысила субъективную уверенность, но не привела к выявляемым изменениям при объективном тестировании знаний и навыков ДМ. В рандомизированном сравнении симуляционного обучения с журнальным клубом, использовавшим структурированный контрольный список, непосредственные результаты теста Fresno были выше в группе симуляции. Мета-анализ пяти рандомизированных исследований с участием медицинских работников не выявил статистически значимого общего преимущества журнальных клубов перед другими образовательными форматами по уровню знаний.*

Заключение: *Журнальные клубы создают условия для структурированного обсуждения научных исследований, однако имеющиеся данные не подтверждают, что само по себе участие в них обеспечивает устойчивое улучшение результатов на уровне пациентов. В будущих исследованиях необходимо чётко определять оцениваемые исходы, использовать адекватные группы сравнения и проводить отсроченную оценку на материале незнакомых клинических случаев.*

Ключевые слова: *журнальный клуб; додипломное медицинское образование; доказательная медицина; критическая оценка; клиническое мышление; оценка образовательных результатов.*

Introduction

A journal club places the interpretation of published research at the centre of a group learning activity. In undergraduate medicine, the educational question is not merely whether students enjoy discussing a paper, but whether they learn to judge its methods and use its findings responsibly. These are distinct constructs: an increase in self-reported confidence does not necessarily indicate an improvement in independently tested skills [1,2]. The distinction matters because the ability to explain a paper in a familiar group discussion is not the same as being able to evaluate an unfamiliar study independently. Students may become more comfortable with the language of research while continuing to struggle with the selection of an appropriate study design, interpretation of uncertainty, or application of findings to a clinical question. Educational evaluations therefore need to establish which of these abilities was assessed, how it was measured, and whether the observed change persisted beyond the teaching session.

The most directly relevant synthesis, by Bello and Grant, identified 15 undergraduate studies. It reported improvements in selected educational outcomes in some studies but found no evidence that participation improved clinical EBM practice or patient outcomes [1]. This distinction is particularly important when educational activities are proposed as a route from classroom appraisal to bedside reasoning. Taken together, these observations suggest that the question is not simply whether a journal club works, but what a particular format enables students to practise and what evidence is available for the intended outcome. A programme designed to stimulate reading may reasonably assess engagement, whereas a programme claiming to develop critical appraisal requires a measure of appraisal performance. Clinical transfer is a further step, for which evidence from classroom-based assessments alone is insufficient.

Search strategy

This targeted narrative review used PubMed-indexed publications relevant to undergraduate medical journal clubs, critical-appraisal education, evidence-based medicine teaching, and the validation of assessment instruments. Studies of undergraduate medical students were prioritized; systematic reviews, comparative educational studies and postgraduate research were included to provide contextual or indirect evidence. References were selected for relevance to the educational questions discussed and were not obtained through a documented systematic screening process. No comprehensive database search, prespecified search dates, duplicate independent screening or formal

risk-of-bias assessment is claimed. The scope was deliberately broader than undergraduate journal-club trials alone because decisions about teaching and assessment also depend on research into other educational formats and on the properties of the instruments used to evaluate learning. This breadth, however, introduces differences in learner experience, clinical responsibility and intervention design. Accordingly, evidence from postgraduate settings is discussed for its relevance to curriculum development without treating its effect estimates as directly applicable to undergraduate students.

The literature was organized into four evidence groups: undergraduate journal-club evaluations; comparative undergraduate EBM teaching studies; broader reviews and postgraduate journal-club research; and studies of assessment instruments. The main conclusions rely preferentially on the first group. Evidence from other populations is used to inform programme design, not as a direct estimate of undergraduate effectiveness. Numerical findings were extracted from the reported results of the cited publications. Where only abstracts were available, the synthesis was restricted to information explicitly reported there. Two recent undergraduate reports were also considered: a 2026 pilot of a blended, mentored format [3] and a 2025 before-and-after cardiovascular teaching study [4]. This distinction guided the interpretation of each cited report. Where a study combined several teaching activities, the outcome was attributed to the programme as evaluated rather than to the journal-club discussion in isolation. Similarly, findings from uncontrolled or before-and-after evaluations were treated as observations associated with participation, not as proof of a causal effect. These safeguards are particularly important in a field where interventions and outcome measures vary substantially.

Direct evidence from undergraduate journal clubs

Gokani and colleagues evaluated a national educational session that combined a journal club, a critical-appraisal lecture, discussion and support for correspondence with journal editors [5]. Its self-reported confidence outcome describes the combined programme rather than an isolated journal-club effect. This design illustrates a recurring difficulty: an attractive teaching package may have several active elements, making it difficult to attribute a subsequent change to discussion of the paper alone. A separate cardiovascular teaching programme enrolled 30 fourth- and fifth-year medical students in five journal-club activities. Its before-and-after ratings from students, peers and teachers indicated improvement in several competencies; voluntary recruitment and the absence of a concurrent control group mean that these changes cannot be attributed specifically to the journal club [4]. These two programmes also demonstrate why apparently similar journal clubs should not automatically be grouped together. A session that culminates in correspondence with an editor asks students to articulate and defend a critique for an external audience. A sequence of cardiovascular cases, by contrast, connects reading with a defined clinical subject and uses repeated activities to develop familiarity with the process. Both may be educationally useful, but differences in content, duration, accompanying instruction and assessment make a simple comparison of reported gains misleading.

Cahill and colleagues evaluated five faculty-facilitated, student-led sessions with 29 pre-clerkship students. Participants worked from clinical cases to searchable questions, located and appraised research, and considered its application to the case. Confidence improved, particularly among first-year students, but the EBM knowledge-and-skills test did not show a corresponding change [2]. The finding

supports feasibility and perceived benefit, not a claim of demonstrated objective skill gain. This divergence between confidence and test performance deserves particular attention. Confidence may reflect increased familiarity with searching, discussion or the terminology of EBM, all of which can make students more willing to participate. An objective test poses a different demand: students must demonstrate knowledge and reasoning under assessment conditions. Neither measure should be dismissed, but each answers a different educational question. Reporting both is more informative than presenting improved confidence as a substitute for demonstrated competence.

An earlier intervention combined journal-club activity with letter writing [6], and a student-led surgical journal club was evaluated through participant responses [7]. These reports illustrate different educational objectives and evaluation strategies. An editorial advocating critical review in medical education [8] offers a perspective, not controlled evidence of educational effectiveness. A more recent pilot by Lemmer and colleagues integrated patient-linked article presentation with e-learning and mentorship; it assessed 25 students and five mentors, with evaluation completed by 20 students and four mentors. Improvements in self-assessed learning outcomes cannot be attributed to the journal-club component alone [3]. The range of these reports is valuable for understanding how journal clubs have been adapted to different stages of training. It also reveals a persistent methodological problem: teaching formats frequently include mentorship, written assignments or online resources, while evaluations measure several outcomes at once. When these elements are introduced together, the available evidence can describe the experience of the whole programme but cannot isolate the contribution of any one component. Future comparisons would be easier to interpret if the intervention, accompanying activities and primary outcome were specified in advance.

Comparison with other undergraduate teaching methods

The randomized SiRCA study assigned 118 medical students either to an immersive simulated randomized trial or to a traditional checklist-supported journal club. Mean post-intervention Fresno scores were 68.12 and 50.2, respectively, favouring simulation on this immediate assessment [9]. The result is specific to the compared formats and the measured short-term outcome; it does not show that simulation improves later patient care or that all journal-club formats are inferior. The comparison is nevertheless informative because it challenges the assumption that discussing a published trial is the only way to teach appraisal. By taking part in a simulated trial, students may encounter design and methodological decisions from a different perspective than they would when reviewing a completed paper. The reported Fresno scores establish a difference on the assessment used in that study; they do not establish which component of simulation produced the difference or whether the same pattern would be observed with a differently structured journal club.

A separate randomized trial compared team-based learning with group discussion for teaching appraisal to 107 first-year medical students [10]. Neither arm was a journal club, so its findings belong to the wider question of how appraisal can be taught, not to estimates of journal-club effectiveness. The same distinction applies to a randomized undergraduate critical-appraisal workshop [11], a prospective evaluation of an integrated early-years EBM curriculum [12], and an online course combined with third-year clinical clerkships [13]. Reviews of undergraduate and trainee EBM education [14,15]

provide curricular context but cannot substitute for journal-club-specific evidence. The relevance of these studies is therefore conceptual rather than direct. They indicate that critical appraisal can be embedded in workshops, team activities, longitudinal curricula or clinical placements. For a journal-club curriculum, this raises a practical design question: which parts of appraisal require preparatory instruction, and which can be learned through discussion and repeated application? The answer may differ between students encountering EBM for the first time and those who already have experience interpreting clinical research.

What broader reviews add – and what they do not

In a systematic review and meta-analysis, Ilic and colleagues identified five randomized trials involving 378 health professionals. Compared with alternative educational methods, journal clubs showed no statistically significant overall difference in knowledge scores (standardized mean difference 0.15; 95% confidence interval −0.09 to 0.39); the review also found no significant overall differences in attitudes or implementation [16]. Because the included learners were health professionals rather than exclusively undergraduate medical students, these estimates should not be transferred uncritically to pre-clerkship teaching. An absence of a statistically significant pooled difference should not be interpreted as evidence that all journal clubs are ineffective. The pooled estimate summarizes the particular studies and outcomes included in that review. Variation in programme structure, learner background and assessment may obscure differences between individual approaches. At the same time, the finding cautions against assuming that journal clubs are superior to other methods merely because they are familiar or widely used.

Harris and colleagues synthesized research on journal clubs and evidence-based decision-making across educational and practice settings. Differences in study design and measured outcomes limit conclusions about clinical transfer; findings from mixed populations should not be presented as direct evidence of undergraduate effectiveness [17]. Deenadayalan and colleagues identified organizational features repeatedly described in journal-club reports: regular meetings, explicit aims, advance circulation of papers, trained leadership and structured appraisal [18]. These are practical design considerations, not proven mechanisms for improved clinical outcomes. A further systematic review, published in a nursing-education journal, discusses journal clubs as a possible way to address the theory-to-practice gap; it does not demonstrate that undergraduate medical journal clubs improve patient outcomes [19]. These reviews are most useful when their conclusions are matched to the questions they actually investigated. Reports of regular meetings or structured worksheets can inform how a programme is organized, but they do not independently establish that a particular feature improves appraisal skills. Likewise, a review that draws on nursing or postgraduate education can identify recurring educational challenges without resolving whether the same intervention produces equivalent outcomes in undergraduate medicine. Maintaining these distinctions prevents practical recommendations from being presented as stronger causal evidence than the literature provides.

Postgraduate studies offer examples of controlled evaluation and structured curricula, but their participants have different clinical responsibilities. A randomized house-staff trial [20], a multicentre comparison of moderated and internet journal clubs in surgical residency [21], a journal-club-based

emergency-medicine residency curriculum [22], and a surgical-residency systematic review [23] therefore provide indirect rather than direct undergraduate evidence. In the multicentre trial, participation differed markedly between the two formats, which complicates attribution of test-score differences to delivery mode alone [21]. This evidence remains relevant to undergraduate programme design because it demonstrates the importance of participation, facilitation and clear educational objectives. Its limitations are equally important. Residents can often draw on direct responsibility for patient care when interpreting a study, whereas pre-clerkship students may still be learning how to formulate clinical questions. An undergraduate adaptation should therefore provide enough clinical context for meaningful discussion without assuming the same baseline experience or the same opportunities to apply findings in practice.

Measuring what students actually learn

Assessment should begin with the intended outcome. If the aim is to increase willingness to read research, a confidence or behaviour questionnaire may be appropriate. If the aim is independent appraisal, performance should be tested with an instrument suited to the students and task. A cross-sectional study of medical students using the Fresno test [24] is a description of measured knowledge, not evidence that journal clubs caused it. In a study of 72 final-year students, adapted Fresno and Berlin scores correlated poorly ($r = 0.2$), cautioning against treating the instruments as interchangeable [25]. The choice of instrument should follow the learning objective rather than the convenience of an available questionnaire. A student who can identify the components of a study may still have difficulty judging whether its findings apply to a particular patient. Conversely, a test designed to assess several EBM competencies may not be sensitive to a short intervention targeting only one skill. These considerations make it essential to describe the assessment task and avoid treating a single numerical score as a complete account of clinical reasoning.

The original Fresno test was developed and validated using open-ended responses and standardized scoring; the validation involved residents, teachers and self-identified EBM experts rather than an undergraduate-only sample [26]. The Berlin questionnaire was validated to discriminate between differing levels of EBM expertise [27]. Adaptation of the Fresno test for pharmacy students [28] illustrates why an instrument validated in one group cannot automatically be assumed valid in another. Best-practice guidance for residency journal clubs [29] can inform planning, but undergraduate evaluation must still specify its own learner population, aims and assessment strategy. Instrument validity is not an inherent property that transfers unchanged between populations and purposes. The experience of the learners, language of administration, scoring process and expected level of performance all affect how a result should be interpreted. For undergraduate journal-club research, investigators should explain why an instrument fits the stated objective and, when possible, supplement it with a clearly scored task involving an unfamiliar paper or clinical scenario. This would help distinguish recall of taught material from the ability to apply appraisal principles in a new context.

A patient-linked teaching and evaluation framework

We propose, as an educational framework rather than a validated intervention, that each undergraduate session begin with a short clinical scenario. Students should formulate an answerable question, document a reproducible search, critically appraise one relevant study and explain the implications and limitations for the patient. A facilitator should make uncertainty visible rather than steer discussion towards a predetermined answer. Structured appraisal sheets, advance access to papers and mentorship are described in the journal-club literature as possible design elements, but their independent effects in undergraduate medical students have not been established [1,17,18]. The sequence is intended to make each stage of reasoning observable. Beginning with a patient problem provides a reason to search; the search makes study selection explicit; appraisal identifies the strengths and limitations of the evidence; and the final discussion requires students to connect those limitations to a clinical decision. A student should also be able to explain when the available evidence is insufficient. This framework is a proposal for future testing, not an intervention whose effectiveness has already been established by the studies reviewed here.

The evaluation should distinguish participation, satisfaction, self-efficacy, appraisal performance and transfer to new problems. An appropriate primary educational endpoint would be blinded scoring, with a prespecified rubric, of an unfamiliar paper and patient case after a delay. Baseline EBM experience, student year, attendance, session frequency, mentor involvement and comparison-group teaching should be reported. Such a design could test whether students retain and transfer what they have practised; it should not be described as already proven effective. A comparison group receiving another clearly described form of appraisal teaching would help determine whether any observed difference is specific to the journal-club format. A delayed assessment would address a different issue: whether students can retain and use the skill once the original article and facilitator are no longer available. Qualitative feedback could explain how students experienced the process, but it should be reported separately from independently assessed performance. These complementary measures would provide a fuller account of educational value without confusing engagement with clinical transfer.

Limitations

This targeted synthesis does not claim exhaustive retrieval, duplicate screening, formal risk-of-bias appraisal or pooled analysis. It deliberately includes studies of other EBM teaching formats and postgraduate populations to explain educational choices, while keeping those findings separate from direct undergraduate journal-club evidence. The synthesis was limited by uneven reporting across studies and reliance on indexed abstracts where complete articles were not accessible; conclusions were therefore restricted to outcomes explicitly reported in the cited sources. The review also brings together studies whose interventions and outcome measures are not directly comparable. Consequently, the discussion identifies patterns, distinctions and research questions rather than estimating a single effect of undergraduate journal clubs. The proposed framework should be regarded as a reasoned educational design arising from these observations; its feasibility, acceptability and effectiveness require prospective evaluation.

Conclusion

The educational promise of undergraduate journal clubs lies in making the reasoning behind research interpretation explicit. Existing studies support selected improvements in confidence and learning under particular conditions, but the strength of evidence depends heavily on what was measured. Claims of improved clinical decision-making or patient outcomes require direct evaluation rather than inference from attendance or satisfaction. Patient-linked tasks and delayed, independently scored assessments offer a testable direction for future research. A stronger evidence base will depend on transparent descriptions of the teaching format and on assessments aligned with the skills a programme intends to develop. In particular, distinguishing perceived confidence from demonstrated appraisal, and immediate performance from later application, would make future studies more interpretable. Until such evidence is available, journal clubs can be discussed as a flexible educational approach without assuming that any single format reliably changes clinical practice.

Conflicts of Interest

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Data availability

The data that support the finding of this study are available on a reasonable request from the corresponding author.

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