Techniques in medical education

The journal club

Rudolph P Valentini, Stephen R Daniels

Summary

As the body of medical literature continues to expand, physicians must develop the necessary skills to keep up with the vast amount of information available. The journal club provides a forum to allow residents to remain current with the literature while also teaching them the methods to evaluate it critically. Those readers wishing to start a journal club or revive an existing one should begin by designating a leader and defining the conference goals. Emphasizing the importance of this conference in the educational process while allowing it to be structured to optimise resident interest and attendance will help to ensure its success. Periodic evaluation of this conference will allow the organisers to assess the concordance of the resident's goals with those of the faculty. Formal evaluation will also provide an objective assessment of the knowledge gained by the house-staff through participation in journal club.

Keywords: journal club, education, paediatrics

Common journal club goals

- providing participants with an update of the medical literature
- improving the clinical practice of its members
- teaching techniques in the critical appraisal of the medical literature

Box 1

Division of Nephrology, Department of Pediatrics, University of Michigan Medical Center, 1521 Simpson Road East, Ann Arbor, Michigan 48109-0297, USA
RP Valentini

Division of Cardiology, University of Cincinnati College of Medicine, 3333 Burnet Avenue, Cincinnati, Ohio 45229-3039, USA
SR Daniels

Accepted 29 March 1996

Journal clubs have been used as a teaching format in academic medicine for over a hundred years. While their origin is believed by some to have occurred in Europe in the mid 1880s, Sir William Osler is most often recognised as their founder.¹ He began this tradition in North America at McGill University in 1875 for the purchase and distribution of periodicals to which he could not afford to subscribe as an individual.² Fourteen years later at Johns Hopkins University, Osler established The Book and Journal Club which was designed to review the latest medical research in addition to providing a forum for members to recommend new works for the hospital library.³

The journal club has evolved a great deal since its inception. This conference is now present in medical schools and residency training programmes in nearly every field of medicine. Providing its members with up-to-date medical literature was a major focus of journal clubs in the 1960s and 1970s. More recently, in postgraduate medical education, journal clubs have become a forum to teach its members critical appraisal techniques thereby enriching their understanding of the medical literature. They also have emerged as a method to promote the practice of evidence-based medicine. While this conference has been a mainstay in postgraduate medical education for many years, designing a format to make it both stimulating and educational for its members has proven to be a great challenge and has only recently been addressed in the medical literature.

The purpose of this paper is to provide an approach to the development of an effective journal club as part of a postgraduate education programme. The recommendations are based on the published literature and a survey we conducted of journal clubs in paediatric residency programmes. In this survey of paediatric chief residents, a 65% response rate from the 228 accredited paediatric residency programmes in North America was achieved. This allowed for comparisons to be made between large and small programmes. This questionnaire asked the respondents to define the goals of their journal club, indicate how successful they were at meeting them, and allowed for evaluation of factors that might be associated with success.

Starting a journal club

SELECT A DIRECTOR

Perhaps the most important step in establishing a journal club is to have an interested person or small group who is committed to its organisation. A designated leader correlated significantly with effectiveness in one study.⁴ This director can be either a faculty member or a chief resident. More importantly, this person must be someone with both a strong interest in resident education and a belief that the journal club plays an important role in it.

DEFINE THE GOALS

Outlining the goals is another important early step in the structuring of this conference (box 1). While one goal of nearly every resident journal club is to keep the residents up-to-date with the literature, the importance of this goal varies between programmes. Influencing the clinical practice of residents is another frequent aim. Finally, other centres use this conference primarily to teach techniques in critical evaluation of the literature. In family practice residency programmes, keeping residents abreast with the current literature was the most important goal.⁴ For internal medicine programmes, on the other hand, teaching critical appraisal was the most common goal, followed by changing clinical practice and, finally, keeping participants up to date with the literature.⁵ Our survey of paediatric programmes found that 77% of chief residents believed that educating residents on critical appraisal and keeping them abreast with the literature were equally important. Of those selecting one goal or the other, there was a slight preference for teaching critical appraisal (14.5% *vs* 8.1).

The content of articles chosen for analysis during the conference session will be influenced by the goals outlined. In programmes aiming to keep residents up

to date with the literature, discussing several articles per session or discussing review articles are common strategies. Those programmes wishing to teach critical appraisal techniques, are more likely to select fewer articles per session – with those chosen illustrating important issues regarding methods and study design. These articles are usually discussed in greater detail, while sometimes de-emphasizing the clinical topic at hand.⁶

AIM TO OPTIMISE ATTENDANCE

Recent surveys indicate that consistent resident attendance is an important factor for journal club success.^{4,7} Resident attendance was one of only four factors that was positively associated with a successful conference in our survey of paediatric programmes. Scheduling journal club at a time convenient to the busy schedule of the residents and faculty is often difficult but very important. Most centres offer grand rounds which meet on a specified day and time, allowing faculty and residents to plan their calendar around it. This same routine should be developed for the journal club if it is to succeed in maintaining consistent attendance. Variable scheduling makes it more difficult for participants to attend regularly, thereby diminishing its teaching potential. Journal clubs reported in the literature typically meet during work hours (usually lunch time) for a one-hour period on a monthly basis. This is highly variable, however, as some conferences meet after work hours for as little as 15 minutes or up to four hours and at a frequency that varies from weekly to quarterly.^{5,7,8}

Another approach to increasing resident attendance is to make it a requirement for house-staff members. This tactic is utilised in many programmes in different fields of medicine. Resident attendance was mandatory in 58% of the internal medicine programmes participating in a recent survey.⁷ Similarly, family practice programmes required attendance in 43 to 57% of programmes surveyed.^{4,8} Paediatric journal clubs also required attendance in 49.6% of programmes surveyed. Closer analysis of these attendance requirements revealed that the smaller programmes (fewer than 30 total residents) were more likely to mandate resident attendance than larger programmes (63% *vs* 32%, respectively; $p=0.001$).

Other features common to journal clubs that have succeeded in achieving high resident attendance included: fewer house staff in the residency programme, a freestanding resident journal club independent of a faculty journal club, and the presence of formal teaching of biostatistics and clinical epidemiology.⁷ These data are consistent with our paediatric data in that smaller programmes may succeed in achieving higher attendance rates. It also suggests that resident interest may be stimulated by a journal club designed to educate its participants through a formal teaching programme. However, there was an inverse association between high attendance and the review of only original research articles in internal medicine programmes.⁷ This latter finding may merely indicate that the goals of the residents participating in this conference differ from those of its organisers. This emphasizes the need to reassess periodically the goals of this conference from the perspective of both the residents and faculty to determine if they are in concert with one another.

The type of moderator present also had a significant effect on resident attendance in one survey, with the highest attendance occurring with a faculty moderator.⁸ Another study, however, found that attendance was improved with a resident moderator.⁵ While it appears that the moderator can be important, the skill of the director in leading these sessions is probably more important than whether this person is a resident or faculty member.

GENERATE RESIDENT INTEREST

After defining the goals, a decision must be made regarding the level of importance that will be placed on this conference relative to other resident teaching sessions (eg, grand rounds, morning report, or noon conference). If deemed important, the director must generate an enthusiastic atmosphere about the role of journal club in resident education. Indeed, in our survey, the perceived importance of this conference in the education of paediatric residents was significantly associated with successful achievement of its defined goals. This points out that active participation and support by department chairmen, residency programme directors, chief residents, and other key department members may improve the success of this conference.

Unlike grand rounds and other medical teaching conferences, the journal club requires audience participation to best educate its participants. It is the constant exchange of ideas and interactions amongst members that helps optimise its teaching potential. A 'round table' discussion to maximise eye contact between members can be effective. Groups should ideally consist of 10

to 12 members; it may be necessary to form several groups of eight to 12 in a large, well attended, resident journal club.⁹

Residency programme directors in family practice found the factors most critical to the success of journal club were residents' interest, followed by the selection of relevant/interesting articles and the discussion of complex/controversial issues.⁴ We found that paediatric programmes that succeeded in meeting their goals were more likely to have had a high percentage of residents who read the articles prior to attending the session. One strategy to achieve this is for the house staff to choose the article to be reviewed.

CONSIDER THE CURRICULUM

Programmes aiming to teach critical appraisal techniques may include some type of formal teaching of these techniques, either as a supplemental lecture series or by devoting some journal club sessions to the analysis of articles illustrating fundamental principles of biostatistics and epidemiology. It has been found that 23–40% of residency programmes have a formal curriculum or lecture series in place.^{5,7} Similarly, 40% of paediatric programmes in our survey had an associated curriculum or lecture series.

Designing a curriculum to teach the fundamental techniques of critical appraisal has been tried by several authors. A controlled trial of such a curriculum for medical students demonstrated objective improvement in their critical appraisal techniques during an eight-week clerkship.¹⁰ In another study, two approaches to resident journal clubs were compared in a randomised trial.¹¹ In a self assessment, residents whose conference emphasised clinical epidemiology and biostatistics believed they read more completely with more attention to methodology than their counterparts whose conference did not emphasize such principles. The former group read fewer articles per month but, overall, were more pleased with the education provided by their journal club than were the latter residents. Despite their perception, objective testing of skills in epidemiology, biostatistics and critical evaluation revealed no significant difference between groups.

A study of Langkamp *et al* compared the acquisition of knowledge in clinical epidemiology and biostatistics between two paediatric programmes featuring monthly journal clubs – the only difference being that one featured two introductory didactic sessions on epidemiologic principles in exchange for the routine format during the first two journal club sessions.¹² Objective testing using pre-test and post-test assessment of epidemiologic principles revealed no significant differences between study groups, leading the author to conclude that a monthly journal club may not provide adequate reinforcement of the language and concepts of epidemiology. A weekly conference with a more intense and thorough introduction to techniques of critical appraisal was therefore recommended.

A controlled trial was conducted in ambulatory medicine comparing a weekly curriculum in clinical epidemiology to a weekly conference.¹³ As part of the curriculum, a clinical article was accompanied by one teaching appraisal of the literature. Also, questions emphasizing important epidemiologic principles were given to residents and faculty instructors one week before the upcoming conference to enhance discussion. Pre- and post-test assessment of the critical appraisal group showed an improvement in their knowledge of clinical epidemiology by 5% compared to a 1% fall in the score of residents in the control group. An uncontrolled study utilised a curriculum emphasizing learner participation through written assignments and active feedback. It was found that residents who were involved in the curriculum objectively improved their knowledge of critical appraisal.¹⁴

These studies illustrate that a curriculum to teach critical appraisal of the medical literature may be an effective adjunct to the journal club and that a formal evaluation of knowledge may be a useful way to determine the impact of changes in a programme. One approach to begin teaching critical appraisal can be found in a five-part series of articles from McMaster University.¹⁵ These articles can be used to accompany a clinical article to help illustrate whether or not the study suffers from potential flaws in design or analysis.

A journal club curriculum should be guided by the subject matter and types of studies frequently addressed. Analysis of the 52 articles reviewed over the past four years at the Children's Hospital Medical Center in Cincinnati, Ohio, reveals that the vast majority of the articles addressed new therapies for a variety of paediatric diseases. Secondary focuses of interest were on diagnostic tests, disease processes, and risk factors for diseases. The clinical trial was the most commonly used study design in the studies reviewed. This illustrates that a curriculum aimed at teaching basic epidemiologic and biostatistical principles may be quite useful. The appropriate use of the clinical trial to evaluate new

Six steps to starting a journal club

- select a director
- define the goals
- optimise attendance
- emphasize the importance of journal club
- generate resident interest and enthusiasm in an interactive setting
- consider creating a curriculum to teach techniques in the critical appraisal of the medical literature

Box 2

Journal club preparation

- structure journal club to conveniently fit into residency schedule
- pre-select one or two residents to lead the discussion
- article selection should occur at least three weeks before scheduled presentation
- assigned resident(s) should meet with faculty advisor before presentation to plan areas of emphasis and approach to moderating the discussion
- distribute articles to participants two weeks before meeting
- encourage participants to read the article in preparation for the discussion

Box 3

Journal club presentation formats

- selecting articles emphasizing different aspects of experimental design
- creating a controversy-utilising debate format
- selecting classic articles
- meticulous analysis of a single article
- problem-based learning method

Box 4

therapy as well as enforcement of the concepts of sensitivity, specificity, and predictive value in the evaluation of diagnostic tests are important for a postgraduate journal club. Proper understanding and application of these terms are critical to physicians who are often interpreting the utility of new therapies or diagnostic tests. The principal aspects of starting a journal club are listed in box 2.

Proposed journal club format

PREPARATION

Our approach to the journal club at the Children's Hospital Medical Center in Cincinnati has undergone an evolution which has resulted in an effective programme. The articles for review are chosen two to three weeks prior to the meeting by a group of three second year residents who will lead the discussion with a chief resident. Several days before the session, the presenting residents meet with a faculty member to discuss and critically evaluate the article. Issues of study design and data analysis, as well as the validity and clinical utility of the research findings, are discussed. These residents often do additional reading on the pertinent epidemiologic principles to enhance the presentation and discussion of the article. Additional faculty members who have expertise and interest in either the content area or in critical evaluation are invited to attend the discussion. Experimentation with different formats may be required to determine the optimal approach to journal club for each residency programme.

JOURNAL CLUB SESSION

Within the confines of the journal club session, different techniques can be used to optimise audience participation and interest. Seat members in a circle to promote eye contact and interactions. Residents leading the discussion should outline areas of emphasis and initiate discussion. The moderator should solicit comments from the audience to stimulate discussion if they are not forthcoming. Consider prompting residents with questions distributed prior to the discussion as a means to encourage the participants to consider the areas of emphasis and formulate opinions for discussion (box 3). Tailor the conference format to meet goals and maintain interest¹⁶ (box 4). The following aspects may be considered.

Experimental design

Select articles in the first one or two sessions that use different methods (eg, prospective or retrospective) to study the same subject matter. This will familiarise the newest members with the strengths and weaknesses of these different approaches while teaching them some basic fundamentals of literature analysis to be used later in the year.

Creating a controversy

A debate format has been reported by some centres as a means by which to stimulate resident discussion and interest. Selecting articles with opposing hypotheses, results, or conclusions on the same subject matter, will force participants to choose which article is more likely to affect their clinical decisions. One programme uses two teams of two residents each to lead the debate on their viewpoints. A neutral faculty member facilitates the discussion of critical appraisal and makes final recommendations regarding how clinical practice should be affected.¹⁷ This format may be useful as the participants must often synthesize information from a variety of studies of differing quality and design in order to formulate an opinion.

Selecting classic articles

Residents often rely on textbooks for established facts, and analysis of the actual articles on which these presumed facts are based may be a worthwhile approach, allowing participants to determine for themselves whether or not they agree with the accepted dogma. This format can enrich the background of the residents by adding a historical perspective.

Meticulous analysis of a single article

Devoting a full session to a single article allows a study to be examined in detail. This discussion should focus on the design of the study, the methods used and the appropriateness of the data analysis. This format may improve critical analysis skills and thus aid participants when writing their own manuscripts.

Problem-based learning method

One centre has reported the use of this method of teaching to involve every participant.¹⁸ This approach forces even the most bashful of members to

Evaluation of a journal club

- use periodic written surveys to assess the goals and overall satisfaction of participants
- survey residents if attendance is suboptimal to decide whether a change in meeting time and/or duration may improve attendance
- evaluate knowledge gained by participants using either self-evaluation surveys or by more objective measurements using a pre-test/post-test format

Box 5

become involved in the discussion. Distribution of excerpts from the paper to be reviewed, with accompanying open-ended questions, occurs at the beginning of each session. Each member must record their responses without outside consultation. Groups of four or five members are then formed to discuss and unify the responses. A representative provides an oral summary for each group, following which a general discussion ensues.

In one approach using this format, three articles each emphasizing a different aspect of a research paper are discussed. For instance, the first paper may have been chosen to emphasize study design. Participants are given the paper's title and are asked to design a study to investigate its hypothesis. An example provided was to measure effects of passive cigarette smoke on children; participants were then asked to design a study to evaluate this relationship. This involved defining passive smoking, subject selection, assessment of smoking effects, and controlling for confounding variables. This technique demands independent thought by each participant. A second article may look at methods. Simply providing participants with the title of the article and the methods utilised, residents are asked to predict pitfalls that the investigators came across using these methods. Finally, a third article is used in which data are provided which the participants are asked to interpret.¹⁸

In order to cover a variety of areas and maintain a high level of interest, it may be useful to consider using all of these approaches in the journal club setting.

Evaluation of the journal club

In order to keep the journal club stimulating to its audience it will probably have to undergo periodic refinements (box 5). The best way to decide whether any adjustments are necessary is to ask the participants whether they are satisfied with the conference. Asking residents to self-evaluate their clinical reading behaviour is a way of assessing success. If improving critical appraisal skills were a journal club goal, then resident responses to questions regarding their understanding of methodology and statistical evaluation of results would be important. For a more objective assessment several programmes have used a pre-test/post-test format to measure understanding of the epidemiologic principles which underpin so much of the medical literature. For instance, at the beginning of each year, the initial conference can begin by distributing a pre-test of 15–20 questions on study design, evaluation of diagnostic tests and descriptive statistics (percentages, means, standard deviations and standard errors), as well as *t*-tests, and contingency tables (Chi-square and Fisher's exact tests) as these have been found to be the statistical methods contained in nearly 75% of a series of clinical articles reviewed.¹⁹ This pre-test not only serves as a baseline against which to compare knowledge gained but also sets some expectations for participants. The post-test, covering similar material, can be administered at a later date (six months to one year) to assess achievement of conference goals. This type of objective testing has been utilised in a number of journal club studies.^{9–13} It may also be useful in developing and refining this conference in a particular programme.

- 1 Linzer M. The journal club and medical education: over one hundred years of unrecorded history. *Postgrad Med J* 1987; **63**: 475–8.
- 2 Cushing H. *The life of Sir William Osler*, vol. 1. New York: Oxford University Press, 1926; pp 132–3.
- 3 Sleeman W. Dr Osler and the book and journal club of the medical and surgical faculty of Maryland. *Md Med J* 1990; **39**: 1111–3.
- 4 Heiligman PM, Wollitzer OW. A survey of journal clubs in US family practice residencies. *J Med Educ* 1987; **62**: 928–31.
- 5 Linzer M, Mercado A, Hupart KH. Role of a medical journal club in residency training. *J Med Educ* 1986; **61**: 471–3.
- 6 Markert RJ. A research methods and statistics journal club for residents. *Acad Med* 1989; **64**: 223–4.
- 7 Sidorov J. How are internal medicine residency journal clubs organized, and what makes them successful? *Arch Intern Med* 1995; **155**: 1193–7.
- 8 Van Derwood JG, Tietze PE, Nagy MC. Journal clubs in family practice residency programs in the southeast. *South Med J* 1991; **84**: 483–7.
- 9 Mattingly D. Journal clubs. *Postgrad Med J* 1966; **42**: 120–2.
- 10 Bennett KJ, Sackett DL, Haynes RB, Neufeld VR, Tugwell P, Roberts R. A controlled trial of teaching critical appraisal of the clinical literature to medical students. *JAMA* 1987; **257**: 2451–4.
- 11 Linzer M, DeLong DR, Hupart KH. A comparison of two formats for teaching critical reading skills in a medical journal club. *J Med Educ* 1987; **62**: 690–2.
- 12 Langkamp DL, Pascoe JM, Nelson DB. The effect of a medical journal club on residents' knowledge of clinical epidemiology and biostatistics. *Fam Med* 1992; **24**: 528–30.
- 13 Kitchens JM, Pfeifer MP. Teaching residents to read the medical literature: a controlled trial of a curriculum in critical appraisal/clinical epidemiology. *J Gen Intern Med* 1989; **4**: 384–7.
- 14 Seelig CB. Affecting residents' literature reading attitudes, behaviors, and knowledge through a journal club intervention. *J Gen Intern Med* 1991; **6**: 330–4.
- 15 Department of Clinical Epidemiology and Biostatistics, McMaster University Health Science Center, How to read the clinical journals. *Can Med Assoc J* 1981; **124**: 555–8 (I), 703–10 (II), 869–72 (III), 985–90 (IV), 1156–62 (V).
- 16 Woods JR Jr, Winkel CE. Journal club format emphasizing techniques of critical reading. *J Med Educ* 1982; **57**: 799–801.
- 17 Douglas M. Use of the debate format journal club to teach critical appraisal. *Fam Med* 1994; **26**: 414.
- 18 Joorabchi B. A problem-based journal club. *J Med Educ* 1984; **59**: 755–7.
- 19 Emerson JD, Colditz GA. Use of statistical analysis in *The New England Journal of Medicine*. *N Engl J Med* 1983; **309**: 709–13.