Journal clubs in Australian medical schools: prevalence, application and educator opinion

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Abstract

Purpose: Medically-focused journal clubs have been used as an educational tool for over 100 years with research indicating that they improve knowledge, reading behaviour, and critical appraisal skills. However, it is not known how widespread their use is among Australian medical schools, nor the opinions of medical education leaders as to their value.

Methods: A nationwide cross-sectional study was performed on academic leaders from every Australian medical school. Individuals were asked to complete a survey detailing their attitudes towards journal clubs using single or multiple answer questions, Likert scales, and ranked data. They were asked whether students at their institutions were able to partake in journal clubs, and if so, details of their implementation.

Results: At least one response was collected from 18 of 19 Australian medical schools. This represented 60 responses of a possible 147 (40.8%), the vast majority of whom were heads of clinical schools, 36 (60.0%). The prevalence of journal clubs among medical institutions was high, with 15 of 18 (83.3%) stating that they had a journal club. Of these 23 (65.7%) were metropolitan and 12 (34.3%) were rural institutions. Most were clinician-led, 18 (51.4%), run through specific hospital departments, 13 (37.1%), and most frequently occurred during clinical years, 23 (65.7%). The vast majority stated that the primary aim of the journal club was to develop critical appraisal skills, 20 (57.1%).

Conclusion: Journal clubs are a highly regarded educational tool in the armoury of medical school educators, with significant heterogeneity in their structure, geographic prevalence and intended purpose. Further studies into their efficacy in teaching evidence-based medicine is warranted in the medical student cohort.

Word count: 250

Keywords: Australia, Continuing medical education, Curriculum, Evidence-based medicine, Journal club
Introduction

In Australia, the last two decades have seen a profound shift in the curriculum and pedagogy of medical education, with less emphasis on traditional lecture-based learning and more emphasis on teachings that can be applied and practiced, such as problem-based learning, simulation, and inter-professional teamwork [1]. The move from a didactic to a collaborative education model has been driven by the rise in graduate medical programs, which necessitated the incorporation of adult learning principles [2]. Another profound change, affecting healthcare worldwide, is that evidence-based medicine has become the gold standard in clinical practice. Medical practitioners have mostly embraced this trend, expanding on their roles as healers and teachers to include researchers. The strong focus on research within Australian medicine has meant job security and admission to specialty colleges effectively rely on its production. This trend has not gone unnoticed amongst medical-teaching institutions, with many courses now including a research component in their already overloaded curriculum. Partially related to these changes is the fact that more research is now being produced than ever before [3]. The impossible task of keeping up to date with all relevant, newly published articles is made more so by articles whose content is often incomplete, incorrect or misleading, which may explain, at least in part, why a large proportion of medical research cannot be reproduced [4]. Thus the ability to effectively critically appraise has never been more important. It is this evolution of medicine that makes journal clubs, like bedside tutorials and human dissection, one of the few medical education tools to withstand the test of time. Despite this, our knowledge of journal clubs in an Australian medical school setting is lacking. Specifically, we do not know the prevalence of journal clubs, how they are implemented or the opinions of academics towards their use as an educational tool. Our study aims to address these questions.

Methods

Ethics statement: Approval for this study was obtained from the University of Melbourne Department of Medical Education Human Ethics Advisory Group (Ethics ID: 1648448.1).

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964 and its later amendments. Informed consent was obtained from all survey respondents included in the study and a plain language statement was provided. This was a study designed to improve quality in medical education through expert opinion in the form of a survey. Participants were made aware of the study and no staff – excluding the authors listed – had access to the data. Confidentiality has been maintained at all times. There is no identifying data that could breach privacy.
Respondents completed the survey on a voluntary basis after which results were pooled and analyzed.

**Study design:** A cross-sectional survey research design was used.

**Materials and/or Subjects:** We conducted a survey of key medical school academics from all Australian universities to identify if, 1) their school had a journal club, 2) how the journal club was implemented if there was one, and 3) what they personally thought of journal clubs as an education tool. The survey was administered online using the survey tool provided by Survey Monkey (www.surveymonkey.com/). The complete survey is available as Supplemental 1.

Australian medical schools were identified by visiting the websites of Medical Deans Australia and New Zealand, and the Australian Medical Students Association which both produce a list of current institutions. We then manually searched the websites of these universities for the names and contact details of medical and clinical school heads and deputy’s heads. For universities who employed multiple deputy heads of school, each focused on a different department, we selected the role most likely to be involved with a journal club, for example deputy head of research. Where the information could not be gleaned from online searches, the university was contacted directly.

Included in our survey were all Australian medical schools, which consisted of a cohort of students at every year level. This resulted in the exclusion of two newly established medical schools. All clinical schools based in Australia were included in the study, with the exception of schools consisting solely of a rural general practice clinic.

**Technical Information:** A 10-point survey was developed to gain information on the participants’ roles within the university, preferred journal club logistics, attitudes towards journal clubs, and whether or not opportunities were available for medical students to partake in them. If a participant indicated that they were aware of a journal club’s existence at their institution, we asked seven more questions pertaining to its implementation. For the purposes of our study we defined a journal club as “A group of people, including medical students, who meet periodically to discuss research articles in the scientific or medical field. Discussion may include, but is not limited to clinical application, biostatistics, epidemiology, and critical evaluation”.

The survey, along with a plain language statement, was initially delivered online, via email with two reminders. If no response was received electronically, the survey was delivered through standard mail. Responses were collected and securely stored on an excel spreadsheet used for qualitative analysis.

Respondents emailed were dichotomised according to the Australian Standard Geographical Classification – Remoteness Area (ASGC-RA)[5]. The classification ranges from RA1 (Major Cities of Australia) to RA5 (Very
Remote Australia). All respondents residing in RA1 areas were considered ‘Metropolitan’ with the remainder considered as being ‘Rural’.

**Statistical analysis:** Responses were collected using single or multiple answer questions, 10-point Likert scales and ranked data.

A ranking average was used to determine the intended purpose of journal clubs in medical education. The ranking average was determined as follows: \( w = \text{weight of ranked position} \) and \( x = \text{response count for answer choice} \), \( \left( \frac{x_1w_1 + x_2w_2 + \ldots + x_nw_n}{\text{Total}} \right) \).

The primary intended purpose of journal clubs, which respondents ranked as the most important, had the largest weight. The lowest rated intended purpose (ranked in the last position) had a weight of one. The criteria with the highest average score were deemed the primary purpose of journal clubs.

**Results**

One or more responses were collected from 18 of the 19 Australian medical schools (94.7%). This corresponded to a total of 60 of 147 (40.8%) responses from individuals who were most commonly clinical school heads, 36 (60.0%). Deputy heads of medical schools and academic leaders each comprised 7 (11.7%) responses, while heads of medical schools accounted for 6 (10.0%), and deputy head of clinical schools made up 4 (6.7%). Of the 60 collected responses, 35 (58.3%) were educators based in metropolitan centers, with the remaining 25 (41.7%) based in rural centers.

**Opinions of educators:**

The ability for students to critically evaluate evidence was rated of great importance to these academics (9 [IQR: 8-10]), as was an appreciation of the research method (8 [IQR: 7-9]), and an understanding of biostatistics and epidemiology (7 [IQR: 6-8]).

Generally speaking, journal clubs were highly regarded for the education of medical students (7 [IQR:6-8]) and were thought to be effective at teaching research skills (7 [IQR:6-8]).

When asked to rank the purpose of a journal club on a scale from 1 to 6 (1 indicating highest importance) as demonstrated in Table 1, the development of critical appraisal skills was deemed the most important (1), followed by a forum for the discussion and debate of medical topics using evidence (2), a means of encouraging an appreciation of research (3), a way to disseminate information relating to good practice (4), a method of keeping students abreast of new research (5), and a method of teaching biostatistics and epidemiology (6).

It was felt journal clubs were of such importance that attendance should be made compulsory by 21 (35.0%)
responders. Twenty (33.3%) however, felt that it should not be mandatory, while 19 (31.7%) were unsure.

The majority of responders thought journal clubs should ‘only be run during the clinical years’, 25 (41.7%). This was followed closely by the opinion that it should be ‘run throughout medical school’, 23 (38.3%), and less popular options of ‘during a compulsory research term’, 5 (8.3%), and ‘during the final year only’, 5 (8.3%). Two responders (3.3%) felt that journal clubs should never be implemented during medical school.

Prevalence and implementation:

There was a high prevalence of journal clubs among medical schools, with 15 of 18 universities (83.3%) stating that they incorporated a journal club in their curriculum. Of the original 60 responders to the survey, 35 (58.3%) stated that their clinical school or institution had a journal club, and they were asked a further series of questions. Twenty-three (65.7%) of these responders were based at metropolitan sites while the remaining 12 (34.3%) were rurally based. Journal club prevalence, when expressed as a percentage based on location, demonstrated only 48.0% (12/25) of rurally based institutions had a journal club, compared to 65.7% (23/35) at metropolitan sites.

As seen in Table 2, journal clubs were most frequently described as clinician-led, 18 (51.4%), student-led, 11 (31.4%), or a combination of these, 5 (14.3%). One journal club (2.9%) was described as being led through hospital administration. The department or organization responsible for running the journal club was most frequently specific specialty departments, 13 (37.1%), followed by the clinical school, 10 (28.6%), and in fewer cases directly from the university, 9 (25.7%) or student associations, 2 (5.7%). One respondent (2.9%) reported a combination of these.

Journal clubs were most commonly conducted during the clinical school years, 23 (65.7%), with fewer being available throughout medical school, 4 (11.4%), pre-clinical years, 4 (11.4%) and final year, 4 (11.4%). Two (5.7%) stated during a compulsory research term and two (5.7%) were unsure when their journal club was run. As responders could select more than one-time point, our survey revealed multiple opportunities for students, at varying year levels, to gain exposure to a journal club.

Journal clubs most commonly met either weekly, 11 (31.4%), or monthly, 11 (31.4%). Fortnightly gatherings were less common, 6 (17.1%), and some responders reported “other” frequencies such as once every two months (n=1, 2.9%), variably (n=3, 8.6%), or unsure (n=3, 8.6%). Journal clubs were reported as ‘mandatory’ in 11 (31.4%) cases, while 21 (60.0%) were voluntary and 3 (8.6%) were unsure.

Aims for existing journal clubs were to develop critical appraisal skills, 20 (57.1%), to provide a forum to discuss and debate medical topics using evidence, 8 (22.9%), to provide a means of disseminating information relating to good practice, 3 (8.6%), to encourage an appreciation of research, 2 (5.7%), and to keep students abreast of new research,
One person (2.9%) felt that the aims of a journal club differed if they were faculty or student-led with the former being more focused on the teaching of critical appraisal, and the latter about formulating an appreciation of research.

Discussion

Our study demonstrated that journal clubs are popular among Australian medical schools with over 4 in 5 surveyed implementing one for the teaching of their students. While no study has previously investigated the prevalence of journal clubs in this specific medical student cohort, our rate was found to be similar to medical residency programs [6,7].

That the majority of journal clubs were found in metropolitan sites is hardly surprising, and the reasons for this discrepancy are likely multifactorial. Firstly, rurally-based clinical schools contain fewer students than their metropolitan counterparts [8]. Given that the establishment of a journal club and the facilitation of discussions could be thought to require a ‘critical mass’ of participants in order to be meaningful, a rural journal club may not have been as feasible as at metropolitan sites. However, as demonstrated by Sidorov et al, the one factor determinate in the success of journal clubs - as defined by having high attendance or long, continuous existence - is having smaller groups [6]. Other reviews have demonstrated that the number of participants does not positively or negatively impact the overall success of a journal club [9], indicating that while they are less popular rurally they will not be less efficacious if implemented.

Furthermore, universities with a research focus – especially those affiliated with dedicated research institutions – are largely metropolitan, and therefore may place greater importance on journal clubs when compared with less research-affiliated regional centres. Metropolitan sites are also more likely to offer specialty based journal clubs given the greater number of specialty departments (e.g. Cardiology). Whatever the reason for the disparity it is unlikely to have a significant effect on the academic performance of Australian rural students, given that they have demonstrated at least equivalence to their metropolitan counterparts [10].

Our study found that the critical appraisal of evidence was the principal goal and the primary purpose of existing journal clubs. This is in keeping with the research including Linzer’s seminal study [11] and other journal clubs studies and reviews [12], where the primary goal was the teaching of critical appraisal skills. Given the recent focus on evidence-based medicine both abroad [13,14] and locally [15], the importance of critical appraisal skills is
well-founded and demonstrates the evolution of journal clubs from a convenient way to share medical discoveries, to one that is arguably essential in the preparation of medical students for practice.

With regards to implementation, it was not surprising that journal clubs were predominantly clinician-led, as most medical students will require external input to decipher the content within journal articles. However, the popularity of student or peer-led teaching activities has been growing since the 1990s, particularly in the medical field, as has the body of research exploring its benefits and limitations [16,17]. While no study has investigated this method in the setting of a medical student journal club, several studies have examined the efficacy of peer-teaching in clinical examination skills, problem-based learning and examination revision. In their systematic review, Yu et al found peer teaching appeared to be equivalent to conventional faculty-led teaching in a selective context, likely due to the cognitive and social congruence between the student-teacher and their peers [18].

Most journal clubs were held during the clinical years, which was also stipulated as being the ideal time during medical school by respondents. This was not a surprising finding given that students would require a baseline level of knowledge achieved in pre-clinical education years to understand the content of articles reviewed. Additionally, when delivered during the clinical years, students would be able to implement knowledge attained from journal articles to clinical interactions in the hospital and to patient care.

The finding of journal clubs usually meeting weekly and fortnightly confirms systematic review conclusions that weekly prevalence is the most common, followed by monthly and fortnightly [9].

While some journal clubs dictated student attendance as mandatory, the majority did not. This difference could be based both on institution culture and university requirements, with some clinical schools allowing students the ability to attend opportunistically for furthering personal learning, while others may have specified attendance recorded as a hurdle requirement to fulfill curriculum assessment. A systematic review by Deenadayalan in 2008 into the key factors of running an effective journal club found making them mandatory important to ongoing success [19]. It is therefore unsurprising that in Harris’s 2011 review on journal club structure that the majority of studies in which attendance was specified required it to be mandatory.

Limitations

Despite a seemingly low response rate from eligible respondents, the survey was designed in a manner to account for non-responders, with in-built redundancy for each site. The response rate was also slightly higher than the expected response rate of 35% for web surveys [20].
While under-sampling of academics was not an issue, it is possible that a small number of journal clubs, especially those that were student or allied-health led, may have been missed. Similarly, fewer respondents were sourced per site regionally than in metropolitan areas. This again may have resulted in underreporting. Finally, points emphasised in other reviews of journal clubs were not included in our survey. These included the number of participants per session, longevity of journal clubs, and presence of external sponsorship.

Conclusions

This nationwide study – the first of its kind – emphasizes the prevalence of journal clubs in Australian medical schools. Academics within these institutions believe that journal clubs are beneficial to the teaching of students, particularly with respect to critical appraisal skills. As research articles are being produced and disseminated at an exponential rate, teaching our future doctors the skills required to appropriately evaluate scientific articles is crucial to developing a generation of clinicians adept in providing evidence-based medicine. Our study provides a unique understanding of the perceptions that medical education leaders have regarding the utility of journal clubs, and provides a framework of expert insights for future journal clubs to be developed.

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Formal analysis: DI.
Funding acquisition: Not applicable
Methodology: DI, KA, SK
Project administration: RO
Visualization: DI, KA, SK, RO
Writing – original draft: DI, KA, SK
Writing – review & editing: DI, KA, SK, RO

Conflict of interest
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Data availability
Data files are available from Harvard Dataverse: https://doi.org/~~
Dataset 1. Raw data of the subjects’ response

Supplementary materials
Data files are available from Harvard Dataverse: https://doi.org/~~
Supplement 1. Questionnaire used
Supplement 2. Audio recording of the abstract

References
Table 1: Educator ranking of the intended purpose of journal clubs in medical education

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weighted scores</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical appraisal skills development</td>
<td>4.88</td>
<td>1</td>
</tr>
<tr>
<td>A forum to discuss and debate medical topics using evidence</td>
<td>3.93</td>
<td>2</td>
</tr>
<tr>
<td>Encourage an appreciation of research</td>
<td>3.42</td>
<td>3</td>
</tr>
<tr>
<td>A forum to disseminate information relating to good practice</td>
<td>3.25</td>
<td>4</td>
</tr>
<tr>
<td>Keeping students abreast of new research</td>
<td>2.82</td>
<td>5</td>
</tr>
<tr>
<td>Teach biostatistics and epidemiology</td>
<td>2.68</td>
<td>6</td>
</tr>
</tbody>
</table>

Responders asked ‘What do you think is the purpose of a Journal Club for medical school students?’ ranking criteria from most important (1) to least important (6), (n = 60).

a) Calculated Weighted Rank Scores
Table 2: Implementation and opinions of medical educators that utilise journal clubs

<table>
<thead>
<tr>
<th>Survey Question and Response</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who leads the journal club?</td>
<td></td>
</tr>
<tr>
<td>Clinician led</td>
<td>18 (51.4)</td>
</tr>
<tr>
<td>Student led</td>
<td>11 (31.4)</td>
</tr>
<tr>
<td>Both</td>
<td>5 (14.3)</td>
</tr>
<tr>
<td>Other (Hospital Administration)</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Who runs the journal club?</td>
<td></td>
</tr>
<tr>
<td>Specialty specific departments</td>
<td>13 (37.1)</td>
</tr>
<tr>
<td>Clinical school</td>
<td>10 (28.6)</td>
</tr>
<tr>
<td>University</td>
<td>9 (25.7)</td>
</tr>
<tr>
<td>Student associations</td>
<td>2 (5.7)</td>
</tr>
<tr>
<td>Other (combination of clinical school and university)</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>How often does journal club meet?</td>
<td></td>
</tr>
<tr>
<td>Weekly</td>
<td>11 (31.4)</td>
</tr>
<tr>
<td>Monthly</td>
<td>11 (31.4)</td>
</tr>
<tr>
<td>Fortnightly</td>
<td>6 (17.1)</td>
</tr>
<tr>
<td>Variably</td>
<td>3 (8.6)</td>
</tr>
<tr>
<td>Unsure</td>
<td>3 (8.6)</td>
</tr>
<tr>
<td>Bimonthly</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Location of Journal Club?</td>
<td></td>
</tr>
<tr>
<td>Metro</td>
<td>23 (65.7)</td>
</tr>
<tr>
<td>Rural</td>
<td>12 (34.3)</td>
</tr>
<tr>
<td>What is the primary aim of your Journal Club?</td>
<td></td>
</tr>
<tr>
<td>Critical appraisal skills development</td>
<td>20 (57.1)</td>
</tr>
<tr>
<td>A forum to discuss and debate medical topics using evidence</td>
<td>8 (22.9)</td>
</tr>
<tr>
<td>A forum to disseminate information relating to good practice</td>
<td>3 (8.6)</td>
</tr>
<tr>
<td>Encourage an appreciation of research</td>
<td>2 (5.7)</td>
</tr>
<tr>
<td>Keeping students abreast of new research</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (2.9)</td>
</tr>
<tr>
<td>Teach biostatistics and epidemiology</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Is Journal Club mandatory?</td>
<td></td>
</tr>
<tr>
<td>Mandatory</td>
<td>11 (31.4)</td>
</tr>
<tr>
<td>Unsure</td>
<td>3 (8.6)</td>
</tr>
<tr>
<td>Not mandatory</td>
<td>21 (60.0)</td>
</tr>
</tbody>
</table>

Results of the medical educator survey for educators with journal clubs (n = 35)
Results expressed as percentages and frequencies.
\textsuperscript{a)} Total of percentages is less than/greater than 100\% due to rounding.