

Orthopaedic Journal Clubs are More Effective with Variety and Debates

Michael M. Polmear, MD; John P. Scanaliato, MD; Matthew E. Wells, DO; Marc A. Nicholes, DO; Alexis B. Sandler, MD; Richard L. Purcell, MD; Ahmed M. Thabet, MD, PhD

Texas Tech University Health Sciences Center El Paso

Objectives: To analyze the opinions of orthopaedic surgery faculty and residents on the characteristics that improve journal club effectiveness, engagement, and value.

Design and Setting: Survey assessment after completion of a journal club series with 10 monthly meetings at a single ACGME orthopaedic surgery residency program during the 2022-2023 academic year with variable formats based on leadership style, themes, types, number of articles, and debates.

Participants: 16 faculty surgeons and 25 residents participated in the journal club series. There were 37 survey respondents including 14 faculty surgeons and 23 residents.

Results: Faculty ranked a hybrid format (71%) with resident presentations and debates (86%) first. Residents were relatively more divided and overall ranked a hybrid format (52%) with attending presentations and debates (56%) first. Both faculty and residents ranked a debate or hybrid format among the top three formats (69 vs. 77%). Within the program, a debate or hybrid format was ranked first by 65% of respondents and among the top three formats by 74%.

Conclusion: Faculty preferred that residents lead and present articles or debate topics while approximately half of residents preferred that faculty debate. The optimal journal club series combines multiple components and can be improved with variety, debates, and continued opportunities for residents to demonstrate critical appraisal of how articles influence practice.

Keywords: journal club, debate, ACGME, residency

Level of Evidence: Level III, cohort

INTRODUCTION

Journal clubs among faculty and residents have played an active role in medical education for over 100 years¹. Critical appraisal of the literature is integral to evidence-based medicine (EBM) and is considered a core activity among common program requirements established by the Accreditation Council for Graduate Medical Education

(ACGME).² Although there is consensus on the value of practicing EBM, there is conflicting evidence on the attributes of journal clubs that improve the efficacy of teaching the associated skills.^{3,4} Purpose, format, expertise of participants and presenters, timing, and nature of chosen articles contribute to the variety of journal club characteristics and may detract from efficacy if not optimized.

Previous work in orthopaedic surgery education sought to define the purpose and effective formats for holding journal clubs. Greene in 2000 surveyed orthopaedic surgery chairs and reported on the widespread participation in regular journal clubs (99%) with the primary goal of teaching residents to evaluate scientific articles.⁵ Dirschl et al. in 2003 reviewed journal club formats from the medical education literature and proposed a structured article review checklist to increase resident satisfaction and perceived educational value of the meeting. Campbell et al. in 2017 surveyed orthopaedic surgery residents and faculty and reported on specific

journal club attributes that improve effectiveness, including mandatory attendance, discussion of 3 to 5 papers, and resident presentation of articles.⁶

Other surgical specialties have debuted debate-style journal club formats to improve participant engagement;⁷ however, there is a paucity of data on the efficacy of these formats within orthopaedic surgery training. The primary goal of this study was to analyze the opinions of faculty and residents on the characteristics that improve journal club effectiveness following a 12-month trial of 10 journal clubs with a variety of formats and content, primarily the inclusion of debates and corroboration with previous debates. Hypotheses were that debate formats are preferable and priorities and attributes would align with previous studies.

METHODS

A series of 10 monthly journal clubs at a single ACGME orthopaedic surgery residency program was attended during the 2022-2023 academic year with a variety of formats based on leadership style, themes, types and number of articles, and debate styles among residents and faculty. Meetings were planned 2-3 months in advance to assist with scheduling. Article selection was performed by senior residents in consultation

with attending surgeons on a rotating basis to include all sub-specialties within the annual curriculum. Meetings were led by a faculty surgeon or senior resident with papers presented by an individual, faculty and resident team, or debated by faculty surgeons or residents using the American Orthopaedic Association Competency Self-Assessment Tool as a structure⁸. The debate structure followed the format described by Luc et al⁷ modeling the Lincoln-Douglas style with affirmative and negative positions followed by discussion, rebuttals, voting, and feedback. Senior residents or faculty surgeons moderated debates. Teams were provided with a primary study and position and found supporting literature to defend their position or refute the opposition. Hybrid formats were also used where single article presentations and a debate occurred during the same meeting. Themes were a general review of orthopaedic literature from widely read journals and subspecialty meetings (supplemental material for journal club curriculum).

At the conclusion of the 2022-2023 academic year, an anonymous 12-question survey with a free text comment section was sent to the 16 faculty surgeons and 25 residents at a single ACGME orthopaedic residency program. The survey was

designed to determine the contributions of various attributes and characteristics on the effectiveness of journal club and was derived from articles from surgical specialty resident programs^{5-7,9}. Questions were a combination of single selection multiple choice, selection of multiple choices, and ranking on a Likert scale (supplemental material for survey format).

For categorical data, a chi-square goodness-of-fit test was used to determine if overall program responses differed from an even distribution frequency. A cohort analysis was performed to compare the responses from faculty and residents using Fisher's exact test. For ordinal data, a Mann-Whitney U test was used to compare resident and faculty responses. For all analyses, $p < 0.05$ was considered significant.

RESULTS

There were 37 respondents to the survey (90% invited) with a 100% response rate of survey questions, consisting of 14 attending surgeons (88% invited participation, 38% of all respondents) and 23 residents (92% invited participation, 62% of all respondents).

Faculty and residents agreed (80% each) that the three most important intents of journal clubs

were to “teach the skillset of evaluating and presenting scientific papers” (mean rank \pm SD; 2.0 ± 0.8), “instill career-long habits of reading the orthopaedic literature among residents” (2.5 ± 1.0), and “encourage participants to read current orthopaedic literature” (2.5 ± 1.0 , Table 1). Faculty ranked “teaching the skillset of evaluating and presenting scientific papers” significantly more important than residents (1.3 vs. 2.4, $p=0.00364$; Table 1). Residents ranked “providing another outlet for residents to learn the fundamental principles of orthopaedic surgery” significantly more important than faculty (3.8 vs. 5.0, $p=0.0126$; Table 1).

There were significant differences in responses regarding effective leadership styles between faculty and residents. A majority of faculty preferred that a resident lead (93%). In comparison, residents were divided with a majority favoring faculty leadership (52%, relative risk for preference of resident leadership among faculty vs. residents was 7.0, 95% CI 1.03-48.0, $p=0.0462$; Table 2). Among multiple leadership formats, faculty favored that the residents either rotate leadership (57%) or that the same resident lead (36%) each journal club

Table 1: Which of the following do you believe are important goals of an academic journal club? (Rank 1 to 6, with 1 being most important)

Survey Question	All Mean Rank (SD)	Comparison		
		Faculty	Residents	p-value*
Teach the skillset of evaluating and presenting scientific papers	2.0 (0.8)	1.3 (0.5)	2.4 (1.0)	0.00364
Encourage participants to read current orthopaedic literature	2.5 (1.0)	2.4 (1.0)	2.6 (1.0)	0.841
Instill career-long habits of reading the orthopaedic literature among residents	2.5 (1.0)	2.5 (1.0)	2.6 (1.0)	0.769
Develop rapport/sense of community between residents and faculty surgeons	3.8 (1.5)	3.9 (1.6)	3.8 (1.5)	0.793
Provide another outlet for residents to learn the fundamental principles of orthopaedic surgery	4.3 (1.7)	5.0 (2.0)	3.8 (1.5)	0.0126
Satisfy program, department, or ACGME requirements	5.9 (2.3)	5.9 (2.3)	5.9 (2.3)	0.654

*Mann-Whitney U

meeting while residents preferred that a faculty surgeon lead each meeting on a rotating basis (52%) or that the same resident lead each meeting (44%). The specific preferred leadership style for faculty was a resident rotating for each meeting (57%) while the highest proportion of residents preferred that the same resident lead each meeting (41%, $p < 0.001$; Table 2).

There were no significant differences between faculty and residents regarding the frequency of journal clubs with the majority in each group preferring monthly (60 vs. 61%) followed by once per rotation block (every 10 weeks, 35 vs. 30%, $p = 0.180$; Table 2).

A debate or hybrid format was ranked first by 65% of respondents and among the top three

formats by 74% ($p < 0.001$; Table 3). Majorities of both faculty and residents ranked a debate or hybrid format among the top three formats (69 vs. 77%, $p = 0.549$; Table 3). A majority of faculty ranked a hybrid format (71%) with resident presentations and debates (86%) first. Faculty ranked a hybrid format with individual article presentations and debates by residents within the same meeting significantly more effective than residents (mean rank \pm SD; 1.6 ± 0.7 vs. 3.5 ± 1.4 , $p < 0.001$; Table 3). Residents ranked debate style among attending surgeons significantly higher than faculty (2.7 ± 1.1 vs. 4.6 ± 1.9 , $p < 0.001$; Table 3). Residents were relatively more divided and overall ranked a hybrid format (52%) with attending presentations and debates (56%) first.

Table 2: Various survey questions with all respondents and comparisons between faculty and resident responses.

Survey Question	Answer Choices	All (%)	Chi-Square Goodness-of-Fit Test	Comparison		Fisher's Exact Test p-value
				Faculty (%)	Residents (%)	
Which leadership style is most effective?	Resident, same leader for each club meeting	40.5	$\chi^2 = 73.5$ df = 4 p < 0.001	35.7	40.5	< 0.001
	Faculty, rotating for each meeting	35.1		7.1	35.1	
	Resident, rotating for each meeting	24.3		57.1	24.3	
	Faculty, same leader for each club meeting	0		0	0	
	No specific leader	0		0	0	
Which frequency for journal clubs is most effective?	Monthly	59.5	$\chi^2 = 92.0$ df = 3 p < 0.001	57.1	60.9	0.180
	Once per rotation block, ~10 weeks	35.1		42.9	30.4	
	Less frequently than above	5.4		0	8.7	
	Weekly	0		0	0	
Which setting is most effective?	Restaurant or hotel	97.3	$\chi^2 = 89.5$ df = 1 p < 0.001	100	95.7	0.121
	Department office or other location in a hospital	2.7		0	4.3	
What time of day is best?	Evening after clinical activities	97.3	$\chi^2 = 185.4$ df = 2 p < 0.001	100	95.7	0.121
	Early morning prior to rounding, cases, and clinic?	2.7		0	4.3	
	Weekend	0		0	0	
How long should journal club last?	1 to 2 hours	89.2	$\chi^2 = 226.0$ df = 3 p < 0.001	92.9	87.0	0.542
	< 1 hours	5.4		0	8.7	
	2 to 3 hours	5.4		7.1	4.3	
	> 3 hours	0		0	0	
How many articles should be reviewed?	4 to 5	56.8	$\chi^2 = 54.5$ df = 2 p < 0.001	64.3	52.2	0.151
	1 to 3	43.2		35.7	47.8	
	> 6	0		0	0	
Which types of papers should be included? Select up to 4.	Most clinically relevant articles published within the last 5 years	89.2	$\chi^2 = 19.4$ df = 5 p = 0.00160	85.7	91.3	< 0.001
	"Classic" articles that have influenced practice	81.1		64.3	91.3	
	Most recent articles, published in last 6 months	73.0		92.9	60.9	
	Articles from the most widely read journals	67.6		92.9	52.2	
	Review articles	16.2		14.3	17.4	
Which format is most effective?	Technique articles	29.7	$\chi^2 = 88.4$ df = 1 p < 0.001	28.6	30.4	0.121
	General journal club from major journals relevant to all orthopaedic surgeons	97.3		100.0	91.3	
	Subspecialty journal club focusing on relevant literature in a theme, e.g. navigation in total joint arthroplasty	2.7		0.0	8.7	

The program agreed significantly that a restaurant or hotel was the optimal setting (97%) in the evening after clinical activities (97%) for 1-2 hours (90%) with a subspecialty theme, rather than a general review from major journals covering multiple topics (95%, p < 0.001; Table 2). Faculty and residents favored presentations or debates of 4-5 articles (64 vs. 52%) relative to 1-3 articles (46 vs. 48%) without a significant difference (Table 2).

There were significant proportional differences between faculty and residents for preferred presented article types (p<0.001, Table 2). A majority of faculty favored articles published within the last 6 months (93 vs. 61% for residents), from the most widely read orthopaedic and medical journals (93 vs. 52%), and clinically relevant articles from the last 5 years (86 vs. 91%). Residents favored clinically relevant articles from the last 5 years (91

Table 3: Which presentation style is most effective? (Rank 1 to 5, with 1 being most effective)

Survey Question	All Mean Rank (SD)	Comparison		
		Faculty	Residents	p-value*
Hybrid with individual article presentations and debates by faculty surgeons within the same meeting	2.1 (0.8)	2.4 (1.0)	1.9 (0.8)	0.107
Each article is presented by a different resident who initiates discussion	2.3 (0.9)	2.1 (0.8)	2.5 (1.0)	0.722
Hybrid with individual article presentations and debates by residents within the same meeting	2.8 (1.1)	1.6 (0.7)	3.5 (1.4)	< 0.001
Debate style among faculty surgeons	3.4 (1.4)	4.6 (1.9)	2.7 (1.1)	< 0.001
Debate style among residents	4.3 (1.7)	4.2 (1.7)	4.4 (1.8)	0.328

*Mann-Whitney U

Table 4: Please rank the following in terms of contributing to overall journal club efficacy. (Rank 1 to 6, with 1 being the most important.)

Survey Question	All Mean Rank (SD)	Comparison		
		Faculty	Residents	p-value*
Type and quality of articles reviewed	1.8 (0.7)	1.9 (0.7)	1.8 (0.7)	0.546
Participation and attendance	2.0 (0.8)	1.4 (0.6)	2.3 (0.9)	0.0533
Leadership style of meeting	3.5 (1.4)	3.9 (1.6)	3.3 (1.3)	0.0458
Timing and frequency of journal club	3.8 (1.5)	3.6 (1.5)	3.9 (1.5)	0.393
Number of articles reviewed	4.8 (1.9)	4.6 (1.9)	4.9 (2.0)	0.257
Setting of journal club	5.1 (2.0)	5.5 (2.2)	4.8 (1.9)	0.122

*Mann-Whitney U

vs. 86% for faculty), “classic” articles (91 vs. 64%), and articles published within the last 6 months (61 vs. 91%; Table 2).

There were minor differences between faculty and residents regarding the three most important contributors to journal club effectiveness. Faculty surgeons responded that participation and attendance (93% of respondents, mean rank \pm SD 1.4 \pm 0.6), type and quality of articles (100%, 1.9 \pm 0.7), and timing and frequency (57%, 3.6 \pm 1.5) were the most important factors (Table 4). Residents agreed on the type and quality of articles (96% of respondents, mean rank \pm SD 1.8 \pm 0.7) and participation and attendance (78%, 2.3 \pm 0.9) but also

noted leadership style (70%, 3.3 \pm 1.3 vs. faculty 29%, 3.9 \pm 1.6, p 0.0458) as the three most important factors.

Free text comments provided additional rationale, value, and purpose of journal clubs from faculty and resident perspectives. Free text comments from faculty referenced the importance of selecting articles from orthopaedic subspecialty journals that align with or augment the journal clubs of subspecialty organizations provided on their websites and social media platforms. Additionally, faculty comments mentioned the value of including at least one article from a general orthopaedic journal and a review of the American Academy of

Orthopaedic Surgeons (AAOS) AAOS Clinical Practice Guidelines (CPG) and Appropriate Use Criteria (AUC)¹⁰ to prepare for board examinations and clinical practice. Faculty comments favored the inclusion of subject matter experts, which occurred in five of the meetings. (Supplemental material) Further comments suggested referencing “classic” articles as supplements to provide exposure to residents for self-directed studying for discussion during the journal without investing additional time in presenting the article. Finally, other faculty comments expressed interest in further developing a debate-style curriculum with teams composed of resident and faculty members by current rotation to discuss practice patterns and connections to recent cases.

Resident comments expressed interest in articles presented by faculty surgeons, specifically from the American Board of Orthopaedic Surgery (ABOS) Web-Based Longitudinal Assessment (WLA) Pathway¹¹ or articles that influence their practice patterns. Additionally, residents wrote about the value of a tiered presentation structure where junior residents present foundational and “classic” articles from the general orthopaedic literature while senior residents present articles from subspecialty

journals and techniques. Finally, residents expressed interest in reviewing the highest level of evidence articles, particularly multi-institutional trials published in general medical journals where the results shape institutional policies, such as PREVENT CLOT published in the New England Journal of Medicine demonstrating the non-inferiority of aspirin relative to low-molecular-weight heparin in preventing death following extremity and pelvic girdle fracture as thromboprophylaxis¹².

DISCUSSION

This study surveyed faculty and residents in an orthopaedic surgery residency program on the attributes and formats of journal clubs that improve effectiveness after a trial of 10 monthly meetings of various formats. The primary objective significantly supported the inclusion of debate styles with these formats ranked first by 65% of respondents and among the top three formats by 74%. Majorities of both faculty and residents ranked a debate or hybrid format among the top three formats (69 vs. 77%). Secondly, preferred leadership differed significantly with faculty favoring resident leadership (86%) while residents were divided evenly on faculty (48%) or resident (44%) leadership

of each meeting. These significant majority opinions supported the inclusion of debate formats in journal club meetings, either as resident-led hybrid structures with individual article presentations and debates or faculty-led debates.

Luc et al. outlined a debate format for journal clubs in cardiothoracic surgery and demonstrated positive effects in participation, format preference, information retention, and achievement of education objectives.⁷ Their faculty and resident participants ranked favorably (4.6/5 on a Likert scale) for debate formats in encouraging participation, facilitating literature application to clinical scenarios, accountability for breadth and depth of literature, and encouraging critical evaluation of literature. Faculty surgeons reported that the use of strong supporting literature was the most convincing aspect of determining winners of the debates, which aligned with the overall intent to develop EBM approaches. Faculty respondents in the present study expressed similar opinions and ranked articles that were recent, from widely read journals, and were highly clinically relevant. In contrast, residents also preferred the inclusion of “classic” articles, reflecting a different stage in educational development than faculty surgeons who have already read “classic” articles

and are interested in more recent studies. Therefore, the optimal journal club has a variety of articles with the option to supplement article lists with “classic” articles for self-directed study, as suggested in the free comments.

The program’s goals of the journal club aligned with previous literature where “teaching the skillset of evaluating and presenting scientific papers”, “encouraging participants to read current orthopaedic literature”, and “instilling career-long habits of reading the orthopedic literature among residents” were deemed the three most important.^{5,6} Greene’s work in 2020 derived from a survey of 149 chairmen in orthopaedic surgery and reported that the priorities were to “teach residents how to evaluate scientific articles” and “instill the habit of reading scientific articles” and were most effectively led by a faculty. Most faculty surgeons in the present study preferred resident meeting leadership, whereas approximately half of residents preferred faculty leadership. Most faculty surgeons (79%) ranked “teaching the skillset of evaluating and presenting scientific papers” first and all faculty ranked the specific intent as 1.3 ± 0.5 , suggesting that resident leadership, article presentations, and debates reflect achieving the goal. The orthopaedic surgery

respondents reported by Cambell et al. reported the same hierarchy of journal club goals.⁶

Participation and attendance were the focus of multiple previous studies and were found to be consistently important. Dirschl et al⁹ reviewed multiple studies from medical specialties in 2003 and Campbell et al⁶ reported on orthopaedic surgery survey respondents in 2018 with a similar conclusion that participation was the most important factor in contributing to overall journal club effectiveness. In the present study, “type and quality of articles” was determined to be the most important factor (mean rank \pm SD; 1.8 ± 0.7) with 100% of faculty surgeons and 96% of residents ranking it among the top three contributors. Majorities of both faculty surgeons and residents agreed that “participation and attendance” were among the top three contributors (93% vs. 78%, overall mean rank 2.0 ± 0.8). Faculty surgeons also ranked “timing and frequency of journal club” among the top three (57%) while residents ranked “leadership style of meeting” significantly higher and among the top three (70%). This hierarchy from the present study reflects how faculty surgeons value attendance while also recognizing scheduling conflicts, thus underscoring the positive effect of scheduling meetings 2-3 months in advance.

Free text comments yielded thought-provoking ideas that centered on material sources and increasing the level of expertise within the journal club. Faculty comments supported discussions with subject matter experts during journal clubs, which occurred five times in the present series with epidemiologists, microbiologists, and engineers. Faculty surgeons also advocated for deriving material from subspecialty society journal clubs, which reflected combining self-study and residency program-wide learning. Similarly, faculty surgeons encouraged including AAOS CPG and AUC¹⁰ as refreshers with updates and essential to board preparation and practice.

Residents wrote about including ABOS WLA¹¹ pathway articles in the journal club, which were often referenced in morning conferences as faculty surgeons prepared for their assessments. Further, residents expressed the value of tiered article presentations and debates, including fundamental articles from junior residents, subspecialty technique articles from senior residents, and articles influencing practice from faculty surgeons.

This study had multiple limitations. The results derived from a single orthopaedic surgery residency program and findings may not apply to all

residency programs. However, the methodology of trialing a variety of formats and conducting a survey to determine effectiveness has been advocated by numerous studies and may be reproducible in other programs.^{5,9} The logistics of scheduling and hosting journal clubs are program-dependent with preferences based on academic calendar and other conferences. The results from the present study demonstrated agreement that a restaurant or hotel was the optimal setting (97%) in the evening after clinical activities (97%) for 1-2 hours (90%) with a subspecialty focus (95%). Obtaining the support of most participants increases the likelihood of participation and attendance and may be trialed and surveyed in another program. Finally, the survey was anonymous. Therefore, individual follow-up on suggestions for improvement was not possible; however, the free text comments were insightful and influenced the evolution of the program's journal club curriculum.

CONCLUSION

The optimal journal club series throughout an academic year combines multiple components and can be improved with variety, faculty participation in debates, and continued opportunities for residents to demonstrate critical appraisal of how articles influence practice.

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