What Makes Journal Club Effective?—A Survey of Orthopaedic Residents and Faculty

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BACKGROUND: Journal clubs play an important role in the education of orthopaedic surgery residents; however, there are sparse data available on the characteristics that make journal clubs effective.

OBJECTIVE: The primary goal of this study was to determine the characteristics of effective journal clubs as identified by orthopaedic residents and faculty. We sought to compare the opinions of residents and faculty in order to identify areas that may benefit from future research and discussion.

DESIGN: Orthopaedic surgery residents and faculty at residency programs around the country were surveyed anonymously. The survey was designed to determine the contribution of various journal club characteristics on the effectiveness of journal club. Nonparametric statistics were used to test for goodness-of-fit, and to compare responses between faculty and residents.

RESULTS: A total of 204 individuals participated. The most important goals of journal clubs were teaching the skillset of evaluating scientific papers (2.0 ± 1.2 [mean rank ± standard deviation, on a scale of 6, with 1 being most important]), encouraging participants to read current orthopaedic literature, (2.4 ± 1.1), and instilling career-long habits of reading the orthopaedic literature among residents (3.1 ± 1.3). Mandatory attendance (71.8%), monthly journal clubs (80.9%), resident presentation of articles (86.7%), and discussion of 3 to 5 papers (78.7%) were thought to lead to more effective clubs. The most clinically relevant articles published within the last year (63.8%), and classic articles that have influenced practice (68.1%) were preferred. Participation and attendance (2.4 ± 1.5) and paper selection (2.6 ± 1.5) were the most important characteristics overall.

CONCLUSIONS: In orthopaedics, journal clubs fulfill the role of encouraging reading of the literature, as well as educating residents and faculty. There are many possible club formats, but some are clearly felt to be more effective. Particular attention should be paid to attendance, participation, and paper selection. (J Surg Ed 75:722-729. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: structured review instrument, peer-reviewed literature, journal clubs, orthopaedic education, scientific literacy

COMPETENCIES: Practice-Based Learning and Improvement, Professionalism

INTRODUCTION

Journal clubs play an important role in the education of orthopaedic residents. Their origin is typically attributed to Sir William Osler in the late 1870s.[1,2] By the 1980s, they were commonplace, and have been used as a method for educating trainees and keeping physicians appraised of current peer reviewed research.[1-3]

There are a number of publications in the peer-reviewed literature that discuss the effect of journal clubs on medical education and techniques for creating effective clubs. Most of these have focused on journal clubs in subspecialties such as emergency, family, and internal medicine[4-6,3,7]; there have been only a few studies focusing on journal clubs in orthopaedic surgery.[2,8] In 2000, Greene[8] surveyed orthopaedic chairmen and found that 99% of orthopaedic residency programs held regular journal clubs, and that the primary goal of these clubs was to teach residents to evaluate scientific articles. The chairmen surveyed felt that they accomplished this successfully. In 2003, Dirschl et al.[2] published a review article discussing journal clubs in orthopaedics. These authors outlined strategies for implementing orthopaedic journal clubs, identified the importance of defining a journal club's goals, and discussed the

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TABLE 1. Table Demonstrating Mean Rank ± Standard Deviation for Answer Choices to the Question "Which of the Following Do You Believe Are Important Goals of an Academic Journal Club? Rank 1 to 6, With 1 Being Most Important"

Answer Choices	All Respondents (Mean Rank ± Standard Deviation)	Comparison		Statistical Analysis (Mann-Whitney *U*), p Value
		Residents	Faculty	
Teach the skillset of evaluating scientific papers	2.0 ± 1.2	2.1 ± 1.2	2.0 ± 1.2	0.722
Encourage participants to read current orthopaedic literature	2.4 ± 1.1	2.3 ± 1.1	2.5 ± 1.1	0.248
Instill career-long habits of reading the orthopaedic literature among residents	3.1 ± 1.3	3.3 ±1.3	2.8 ± 1.4	**0.023**
Develop rapport/sense of community between residents and attending staff	3.9 ± 1.3	3.8 ± 1.2	3.9 ± 1.4	0.410
Provide another outlet for residents to learn the fundamental principles of orthopaedic surgery	4.0 ± 1.5	3.8 ± 1.5	4.2 ± 1.3	0.100
Satisfy program, department, or ACGME requirements	5.7 ± 0.8	5.8 ± 0.9	5.6 ± 0.9	**0.002**

Bold indicates a statistically significant difference between resident and faculty rank, with significance set at $p < 0.05$.

need to address factors such as leadership, timing, attendance, duration, and setting to meet these goals effectively. However, this work was based on a review of the existing literature, and most of it was derived from other subspecialties. Although this previous work has helped to identify the goals of journal clubs in orthopaedics from the perspective of department chairmen and make suggestions about optimizing the effectiveness of journal club, there have been no studies identifying goals important to orthopaedic surgery residents or evaluating the most effective orthopaedic-specific journal club methodology.

The primary goal of this study was to identify the characteristics of an effective journal club as identified by orthopaedic residents and faculty. We also sought to compare the opinions of residents and faculty in order to identify areas of disagreement that may benefit from future research, discussion, and reconciliation. We also attempted to identify important goals of journal clubs in orthopaedics.

MATERIALS AND METHODS

One hundred and fifty-seven orthopaedic residency programs with a contact e-mail address for either the program coordinator or program director were identified. A 15 question anonymous survey was distributed to faculty and residents at each program via the contact address listed. The survey was designed to determine the contribution of various journal club characteristics on the perceived effectiveness of journal club based on characteristics and club designs previously reported in the literature.[2,8] Most of the questions were multiple choice, and asked participants to select a single answer choice. Two questions used a Likert scale, and asked participants to rank items on a scale of 6, with 1 being most important. One question allowed participants to select 3 answer choices from 6 possible answers. The survey remained open for a period of 2 months (May-June 2016), and responses were recorded electronically using Qualtrics survey software (Provo, UT). Responses from participants who only partially completed the survey were included in the analysis for questions that were completed.

For categorical data, a chi-square goodness-of-fit test was used to determine if responses differed significantly from an even distribution frequency. Resident and faculty responses were compared with a chi-square test of independence, and standardized residuals were calculated to determine the specific cells involved in differences that were identified. For ordinal data, a Mann-Whitney *U* test was used to compare resident and faculty responses. For all statistical analyses, a $p < 0.05$ and a standardized residual greater than 2 were considered significant.

This study held an approved exemption from our institution's institutional review board. No external funding was used to complete this study.

RESULTS

Two hundred and four (204) individuals responded to the survey. There were 106 resident/fellows and 98 faculty. The response rate per question decreased as the survey progressed as some participants ended the survey early. For question number 3, there were 193 responses. The final questions had 187 responses, which was the lowest of all questions.

When asked to rank the goals of orthopaedic journal clubs in order of importance, survey participants chose "teach the skillset of evaluating scientific papers" as the most important goal, with a ranking of 2.0 ± 1.2 (mean rank ±

standard deviation) (Table 1). This was followed closely by "encourage participants to read current orthopaedic literature," which was ranked 2.4 ± 1.1; "instill career-long habits of reading the orthopaedic literature among residents" was considered third-most important at 3.1 ± 1.3 (Table 1).

Participants felt that a leadership style with a faculty leader that rotated for each meeting was best ($n = 91$, 43.4% of respondents, $p < 0.001$). Monthly journal clubs were preferred ($n = 152$, 80.9%, $p < 0.001$), and participants felt that the most effective presentation style was each article presented by a different resident ($n = 163$, 86.7%, $p < 0.001$). Participants felt that journal clubs should take place in the evening after daily activities ($n = 152$, 80.9%, $p < 0.001$), and most felt that meetings should last 1 to 2 hours ($n = 135$, 71.8%, $p < 0.001$). The preference was to review 3 to 5 articles ($n = 148$, 78.7%, $p < 0.001$), include 8 to 15 participants ($n = 103$, 54.8%, $p < 0.001$), and discuss subspecialty topics rather than general orthopaedics ($n = 147$, 78.2%, $p < 0.001$). A mandatory attendance policy was preferred ($n = 147$, 78.2%, $p < 0.001$). There was no strong preference with regard to the setting of the journal club ($p = 0.67$) (Table 2).

Article types that were most supported for discussion in journal clubs were "'classic' articles that have influenced practice" ($n = 128$, 68.1%) and the "most clinically relevant articles published within the last year" ($n = 120$, 63.8%) (Table 2).

"Participation and attendance" was ranked as the most important factor contributing to overall journal club effectiveness (2.4 ± 1.5 on a scale 1-6, with 1 being most important). This was closely followed by "type and quality of articles reviewed" (2.6 ± 1.5) (Table 3).

There were some differences between resident and faculty responses. "Instill career-long habits of reading the orthopaedic literature among residents" was found to be significantly more important to faculty than residents (2.8 ± 1.4 vs 3.3 ± 1.3), as was "Satisfying program, department, or ACGME requirements" (5.6 ± 0.9 vs 5.8 ± 0.9) (Table 1). Residents preferred that a faculty member lead the journal club (57.8% vs 37.2%, $p = 0.048$) and present the articles (12.7% vs 0.0%, $p = 0.001$). Faculty believed journal club should be held in the hospital more frequently than residents (44.2% vs 23.5%, $p = 0.011$). Faculty preferred to include the "most recent articles published in the last 1 to 2 months" significantly more often than residents (52.3% vs 30.4%, $p = 0.002$) and were less likely prefer the "most clinically relevant articles published within the last 10 years" (29.1% vs 43.1%, $p = 0.046$) (Table 2).

Regarding the most important characteristic of journal club, faculty ranked "participation and attendance" significantly higher than residents (2.0 ± 1.3 vs 2.7 ± 1.6, $p = 0.003$). Residents ranked "type and quality of articles reviewed" highest overall (2.5 ± 1.5) (Table 3).

CONCLUSIONS

This study surveyed orthopaedic residents and faculty from departments around the United States to determine the goals of journal clubs at their institutions and to determine characteristics of clubs that effectively meet these goals. Important goals identified were teaching the critical evaluation of scientific literature, encouraging reading of current literature, and instilling career-long habits of reading the literature among residents. We found that (1) participation and attendance and (2) type and quality of articles were identified as the most important factors that contributed to effective journal clubs. A mandatory attendance policy and the inclusion of recent, clinically relevant papers, as well as classic articles that have influenced practice, were preferred. Compared with faculty, residents favored holding journal club meetings outside of the hospital setting and were less concerned with discussing the most recently published papers available.

In 2000, Greene[8] published a paper based on a survey of 149 chairmen of orthopaedic surgery residency programs. He found that the highest priority goals for journal clubs were to "teach residents how to evaluate scientific articles" and "instill the habit of reading scientific journals." The study also reported on characteristics of the journal clubs and found that most were led by a faculty member, held in the department offices, and met in the evening. Our findings are consistent with Greene's. In this study, "teach the skillset of evaluating scientific papers" also ranked as the most important journal club goal.

Dirschl et al.[2] reported on journal clubs in orthopaedics in 2003 and summarized the goals, characteristics, and considerations for journal clubs in orthopaedic surgery. A broad overview of the literature was given using data from multiple medical specialties. The authors report on multiple papers that discuss setting appropriate goals for journal clubs. In many instances, the most important goals were to teach residents critical evaluation skills or to keep up to date with the current literature. Dirschl et al.[2] also identified mandatory attendance policies at many programs and the importance of attendance and participation. Our results are largely in agreement, and we found that participation and attendance was the most important factor with regard to conducting effective journal clubs.

There have been multiple papers published in the literature regarding the use of standardized tools or structured review instruments for journal clubs.[2,9,10] These tools have been described as a standardized method for evaluating the papers to be discussed and as a method for evaluation of the journal club itself. The American Orthopaedic Association (AOA) has developed a tool specifically designed to evaluate the effectiveness of journal clubs.[11] It is meant for administration throughout the year and is essentially a self-assessment tool meant to track resident progress in 4 areas: (1) stimulate residents to read the current literature,

TABLE 2. Table Showing Various Survey Questions and Answer Choices. All Responses Column Lists Total Number of Participants Who Selected Each Answer Choice As Well As Percentage. Comparison Lists Breakdown of Faculty/Resident Responses

Survey Question	Answer Choices	All Responses	Chi-Square Goodness-of-Fit test	Comparison		Pearson Chi-Square Test
				Residents	Faculty	
Which leadership style is most effective?	Attending, same leader to each club meeting	28 14.90%	$\chi^2 = 101.5$ df = 4 **p < 0.001**	11 10.80%	17 19.80%	$\chi^2 = 9.60$ df = 4 **p = 0.048**
	Resident/fellow, same leader for each club meeting	20 10.60%		11 10.80%	9 10.50%	
	Attending, rotating for each meeting	91 48.40%		**59** **57.80%**	**32** **37.20%**	
	Resident/fellow, rotating for each meeting	35 18.60%		16 15.70%	19 22.10%	
	No specific leader	14 7.40%		5 4.90%	9 10.50%	
Which frequency for journal clubs is most effective?	Weekly	11 5.90%	$\chi^2 = 316.6$ df = 3 **p < 0.001**	6 5.90%	5 5.80%	$\chi^2 = 2.4$ df = 3 p = 0.486
	Monthly	152 80.90%		86 84.30%	66 76.70%	
	Once per resident rotation	22 11.70%		9 8.80%	13 15.10%	
	Less frequently than the above	3 1.60%		1 1.00%	2 2.30%	
Which presentation style is most effective?	One attending presents and initiates discussion on all articles	4 2.10%	$\chi^2 = 382.6$ df = 3 **p < 0.001**	4 3.90%	0 0.00%	$\chi^2 = 15.8$ df = 3 **p = 0.001**
	One resident presents and initiates discussion on all articles	8 4.30%		4 3.90%	4 4.70%	
	Each article is presented by a different attending who initiates discussion	13 6.90%		**13** **12.70%**	**0** **0.00%**	
	Each article is presented by a different resident who initiates discussion	163 86.70%		**81** **79.40%**	**82** **95.30%**	

TABLE 2 *(continued)*

Survey Question	Answer Choices	All Responses	Chi-Square Goodness-of-Fit test	Comparison		Pearson Chi-Square Test
				Residents	Faculty	
Which setting is most effective?	Department office or other location in the hospital	62 33.00%	$\chi^2 = 0.8$ df = 2 p = 0.67	**24** **23.50%**	**38** **44.20%**	$\chi^2 = 9.0$ df = 2 **p = 0.011**
	Faculty member home	58 30.90%		36 35.30%	22 25.60%	
	Restaurant	68 36.20%		42 41.20%	26 30.20%	
What time of day is best?	Early morning prior to cases/clinic	32 17.00%	$\chi^2 = 197.3$ df = 2 (0 response choice ignored) **p < 0.001**	13 12.70%	19 22.10%	$\chi^2 = 4.6$ df = 2 (0 response choice ignored) p = 0.101
	Mid-day at lunch or between cases	4 2.10%		1 1.00%	3 3.50%	
	Evening after daily activities	152 80.90%		88 86.30%	64 74.40%	
	Weekend	0 0.00%		0 0.00%	0 0.00%	
How long should journal club last?	<1 h	43 22.90%	$\chi^2 = 133.9$ df = 2 (0 response choice ignored) **p < 0.001**	19 18.60%	24 27.90%	$\chi^2 = 2.3$ df = 2 (0 response choice ignored) p = 0.315
	1 to 2 h	135 71.80%		77 75.50%	58 67.40%	
	2 to 3 h	10 5.30%		6 5.90%	4 4.70%	
	>3 h	0 0.00%		0 0.00%	0 0.00%	
How many articles should be reviewed?	1 to 2	12 6.40%	$\chi^2 = 295.6$ df = 3 **p < 0.001**	9 8.80%	3 3.50%	$\chi^2 = 8.9$ df = 3 **p = 0.031**

	3 to 5	148 78.70%		84 82.40%	64 74.40%	
	6 to 10	26 13.80%		**9** **8.80%**	**17** **19.80%**	
	>10	2 1.10%		0 0.00%	2 2.30%	
Which attendance policy is most effective?	Mandatory	147 78.20%	$\chi^2 = 59.8$ df = 1 **p < 0.001**	78 76.50%	69 80.20%	$\chi^2 = 0.4$ df = 1 p = 0.534
	Optional	41 21.80%		24 23.50%	17 19.80%	
What is the ideal group size?	Fewer than 8 participants	23 12.20%	$\chi^2 = 51.1$ df = 2 **p < 0.001**	**17** **16.70%**	**6** **7.00%**	$\chi^2 = 10.8$ df = 2 **p = 0.004**
	8 to 15 participants	103 54.80%		**45** **44.10%**	**58** **67.40%**	
	More than 15 participants	62 33.00%		40 39.20%	22 25.60%	
						Individual Pearson chi-square
Which types of papers should be included? Select up to 3.	Most recent articles, published in last 1to 2 mo	76 40.40%	$\chi^2 = 92.4$ df = 5 **p < 0.001**	**31** **30.40%**	**45** **52.30%**	$\chi^2 = 9.3$ **p = 0.002**
	Articles from most widely read journals	62 33.00%		31 30.40%	31 36.00%	$\chi^2 = 0.7$ p = 0.411
	Most clinically relevant articles, published within the last year	120 63.80%		65 63.70%	55 64.00%	$\chi^2 < 0.01$ p = 0.974
	Most clinically relevant articles, published within the last 10 y	69 36.70%		**44** **43.10%**	**25** **29.10%**	$\chi^2 = 4.0$ **p = 0.046**
	"Classic" articles that have influenced practice	128 68.10%		74 72.50%	54 62.80%	$\chi^2 = 2.0$ p = 0.153
	Review articles	25 13.30%		18 17.60%	7 8.10%	$\chi^2 = 3.6$p = 0.056

TABLE 2 *(continued)*

Survey Question	Answer Choices	All Responses	Chi-Square Goodness-of-Fit test	Comparison		Pearson Chi-Square Test
				Residents	Faculty	
Which format is most effective?	Subspecialty journal clubs focusing on literature relevant to a single specialty (i.e., sports, trauma, joint replacement, pediatrics, etc.)	147 78.20%	$\chi^2 = 59.8$ df = 1 **p < 0.001**	84 82.40%	63 73.30%	$\chi^2 = 2.3$ df = 1 p = 0.132
	General journal clubs focusing on literature relevant to all orthopaedists	41 21.80%		18 17.60%	23 26.70%	

Bold indicates a statistically significant difference, with significance set at $p < 0.05$.

TABLE 3. Table Demonstrating Mean Rank ± Standard Deviation for Answer Choices to the Question "Please Rank the Following in Terms of Contributing to Overall Journal Club Effectiveness. Rank 1 to 6, With 1 Being Most Important"

Survey Question	Answer Choices	All Respondents (Mean Rank ± Standard Deviation)	Comparison		Statistical Analysis (Mann-Whitney *U*), p Value
			Residents	Faculty	
Please rank the following in terms of contributing to overall journal club effectiveness. Ranked 1 to 6, with 1 being most important.	Participation and attendance	2.4 ± 1.5	2.7 ± 1.6	2.0 ± 1.3	**0.003**
	Type and quality of articles reviewed	2.6 ± 1.5	2.5 ± 1.5	2.7 ± 1.6	0.317
	Leadership style	3.2 ± 1.5	3.0 ± 1.6	3.3 ± 1.5	0.217
	Timing and frequency of the journal club	3.7 ± 1.3	3.7 ± 1.4	3.6 ± 1.3	0.829
	Number of articles reviewed	4.3 ± 1.4	4.0 ± 1.5	4.6 ± 1.3	**0.016**
	Setting of journal club	4.9 ± 1.5	5.0 ± 1.4	4.8 ± 1.6	0.472

Bold indicates a statistically significant difference, with significance set at $p < 0.05$.

(2) increase resident knowledge of study design and statistics, (3) ensure residents understand the hierarchy of evidence, and (4) encourage residents to incorporate new knowledge and evidence into practice. When compared to the current study, these 4 areas selected by the AOA are similar to the most important goals demonstrated in this study (teaching the evaluation of scientific papers, encourage reading of the current literature, and instilling career-long reading of the literature). Although the current study relied on survey participation and participant preferences to determine journal club effectiveness, well-designed tools such as those developed by the AOA can be used in future work to provide an objective measurement of journal clubs effectively meeting their goals.

This study has a number of limitations. Data collection was achieved via an anonymous, voluntary survey. The demographics of the participants are unknown, and it is possible that this population could be biased toward certain answer choices. For example, it is possible that our own institution is over-represented in this study, since the residents and faculty we e-mailed might be more likely to complete the survey. It is also possible that some potential participants were not invited to complete the survey, since the method of distribution was through contacting a single point person at each department, and we relied on that individual for forwarding the survey. However, to our knowledge this work represents the largest survey study published regarding journal clubs in the field of orthopaedics.

In conclusion, we found that teaching the critical evaluation of scientific literature and instilling the habit of reading the literature were the most important goals of journal clubs. Attendance and participation, as well as appropriate selection of articles, were found to be the most important characteristics of clubs that effectively met these goals.

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