



The Value of Journal Clubs in Orthopaedic Resident Education

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The journal club is considered a standard of medical education across many institutions and fields of medicine. Our hypothesis is that the systematic evaluation and/or critical discussion of articles in journal club can change resident perception of the articles and topics examined. We performed a pilot study in which residents read and evaluated seven orthopaedic journal articles using a Structured Review Instrument (SRI) prior to journal club sessions for critical analysis of an article's content. A five question systematic evaluation form was then completed by each resident before and after journal club using a Likert Scale to rate quality, understanding, and importance of an article. The articles' influence on resident thinking and practice were rated with "yes" or "no" responses. The resident responses were compiled across all residents and all articles into "respondent cases" for statistical analysis of scores. In regards to an article's quality, 18 respondent cases decreased scores after journal club, 5 cases increased their ratings, and 26 remained the same (p -value = 0.004). In regards to residents' understanding of the article, 11 cases decreased scores, 5 cases increased, and 33 stayed the same (p -value = 0.087). It is concluded that the systematic evaluation and/or discussion of articles during journal club impacts orthopaedic residents' impressions of articles analyzed. We propose that larger future prospective studies be performed comparing residents who use an SRI to those who do not. Statistical analysis of systematic evaluation scores from both groups could then be compared to discern whether the influence of an SRI or journal club discussion alone affords orthopaedic residents the best critical understanding of journal articles.

The journal club has long been considered a standard of medical education across many institutions and fields of medicine. However, despite its importance in the education of medical students and residents, the convention of journal clubs is still relatively new. Sir William Osler is credited with the first journal club established at McGill University in 1875^{1,2}. Since its inception and vast expansion, the value of the journal club in medical education has constantly been analyzed and questioned. Many studies have focused on journal club members' ability to properly examine and analyze published data. Similarly, articles have been published on the proper means of designing, conducting, and evaluating the utility of journal clubs for resident education²⁸.

Major journals such as *Clinical Orthopaedics and Related Research*⁹⁻¹² and *Journal of Bone and Joint Surgery American*¹³⁻¹⁶ have both published special sections on the critical evaluation of published manuscripts. Several authors have proposed the use of evaluation sheets for the systematic reading of articles^{4,5}. However, the utility of such methods have not been examined in the context of the orthopaedic resident journal club.

Considering the increasing importance placed on evidence-based medicine, it is important for those in medical and surgical training to learn the skills necessary for critical analysis of published studies. In doing so, physicians should be able to systematically and critically choose what findings they consider applicable to their patient population and develop their practice accordingly. In order to better understand the influence of critical discussion during resident journal club, we performed a pilot study evaluating the change in resident perception of

journal articles after they are analyzed using a Structured Review Instrument (SRI). We present an outline of our journal club and evaluation method that could be used in future prospective studies to better quantify the value of journal club for orthopaedic residents.

Our hypothesis is that the systematic evaluation and/or critical discussion of articles as part journal club changes resident perception and understanding of the articles and topics examined.

Materials and Methods

Journal Club Method

Journal club sessions at the University of Pennsylvania Department of Orthopaedic Surgery were held in accordance with residency standards. Briefly, a master plan for the sessions was created at the beginning of the academic year. Several months prior to each session, a designated resident discussed potential topics, finalized three to four papers, and prepared a plan for the session. Each session (one per month) had a subspecialty topic of focus (adult arthroplasty, foot and ankle, hand and upper extremity, pediatric, rehabilitation, shoulder and elbow, spine, sports, trauma, tumor) and was supervised by one or more subspecialty attending. Prior to the first clinical topic, the residents had an introduction to manuscript analysis including use of the Structured Review Instrument (SRI) worksheet (see Addendum)^{4,5}. All residents were given the articles at least 2 weeks prior to the session and were requested to utilize the worksheet for analysis. A team of 4 residents were assigned to each paper and collectively prepared a short verbal presentation to be given to the entire group. All residents

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and attendings participated in the ensuing discussion. The assessment survey (Figure 1) was distributed for completion prior to and after discussion.

Data Collection

Data was collected during the 2006-2007 academic year. Residents read and evaluated seven different journal articles related to the field of orthopaedics during two journal club sessions (adult arthroplasty and orthopaedic trauma). Prior to and following these sessions, residents were given the assessment survey. The survey required the residents to rate five following characteristics of the journal articles they discussed: quality of the study, understanding of the study, importance of the study, impression of the article on the discussed topic, and impression of the article on practice. The residents rated the first three characteristics on a Likert Scale (1 = terrible; 5 = outstanding), while the last two characteristics were rated with "yes" or "no" responses.

Statistical Analysis

The scores from resident surveys were collected and tabulated for analysis. Descriptive statistics were derived from the collected data in the form of mean scores at pre- and post-journal club sessions as well as mean difference in scores from those time points. In addition, rates of change in resident responses following journal club were calculated. The data was then compiled into "respondent cases" in which all the responses for each of the five questions were combined across all seven journal articles analyzed. The Likert-scaled responses were analyzed using Wilcoxon signed-rank test, while the two "yes/no" questions data were analyzed using McNemar's test. All statistics were calculated with the SPSS processor, version 16.0 (SPSS Inc, Chicago, IL).

Results

The three scale-rated questions (addressing an article's quality, the residents' understanding of the topic, and the importance of the topic) varied in value from pre- to post-journal club sessions. In the first question regarding an article's quality (Figure 2), 18 respondent cases decreased scores after journal club, 5 cases increased their ratings, and 26 remained the same (*p*-value for decrease = 0.004). In the second question regarding the residents' understanding of the article (Figure 3),

Resident Journal Club Article Assessment						Date: _____	
Clinical year	1	2	3	4	5	Fellow	Attending
Paper 1	et al.						
1. How would you rate the overall quality of this manuscript	1 Terrible	2 Poor	3 Satisfactory	4 Good	5 Outstanding		
2. How would you rate your understanding of this manuscript	1 Terrible	2 Poor	3 Satisfactory	4 Good	5 Outstanding		
3. How would you rate the importance of the article topic	1 Not at all	2 Minimal	3 Neutral	4 Somewhat	5 Very		
4. Does this article change the way you think about the topic	Yes	No	No prior basis				
5. Will this article change the way you practice	Yes	No	No prior basis				

Figure 1. Survey Provided to Residents Before and After Journal Club.

Residents were requested to fill out this Assessment Survey before and after the discussion session. Prior to the session residents used an SRI to analyze the assigned articles.

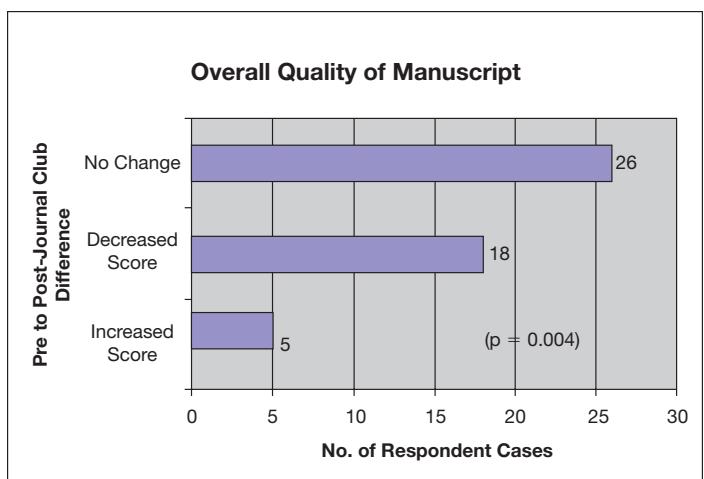


Figure 2. Pre to Post-Journal Club Ratings of Manuscript Quality.

Residents responses to question 1 of the survey is represented as change in rating between surveys completed prior to and after journal club discussion of the article.

11 cases decreased scores, 5 cases increased, and 33 stayed the same (*p*-value for decrease = 0.087). The third and final Likert-rated question regarding the importance of the article (Figure 4) showed 14 cases of decreased perception, 8 cases of increased perception, and 27 cases of unchanged perception (*p*-value for decrease = 0.129). The common trend was a decrease in the score following the journal club session. Four articles were given lower scores on all Likert-rated aspects following journal club, one article showed a decrease in only two aspects with an increase in the third, one article showed an increase in two aspects with no change in the third, and one article showed an increase in all three aspects of the article.

The other two aspects of the articles were based on a "yes" or "no" reply in regards to applicability of the article on (1) a resident's thought process and (2) a resident's practice in regards to the article topic. Four of the articles analyzed showed no difference in resident opinion for these two aspects before and after journal club at all. In all cases of

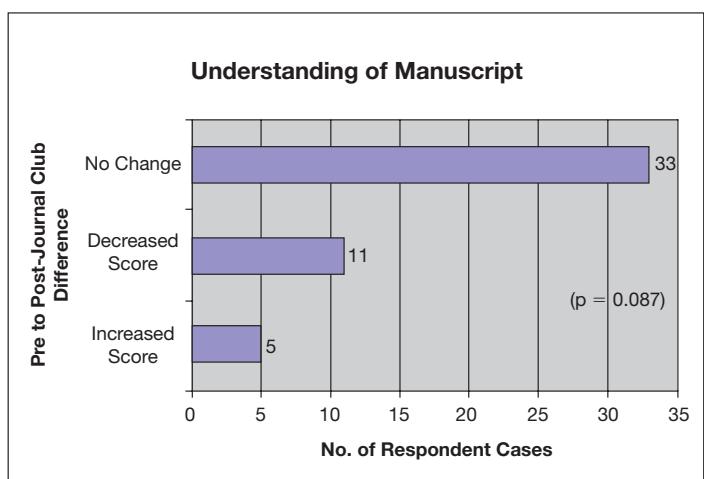


Figure 3. Pre to Post-Journal Club Ratings of Manuscript Understanding.

Residents responses to question 1 of the survey is represented as change in rating between surveys completed prior to and after journal club discussion of the article.

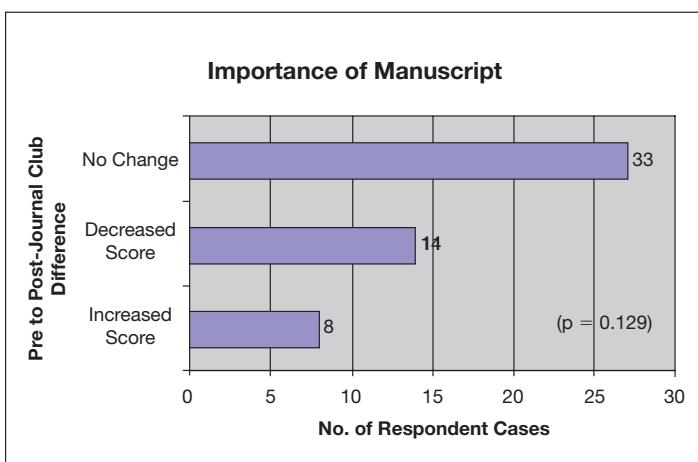


Figure 4. Pre to Post-Journal Club Ratings of Manuscript Importance.

Residents responses to question 1 of the survey is represented as change in rating between surveys completed prior to and after journal club discussion of the article.

residents' pre- and post-journal club response to an articles' ability to change their thought process of a topic, 12/31 respondent cases answered "yes" pre-journal club and 11/31 respondent cases answered "yes" post-journal club (p -value for change = 0.999). Looking more closely at this, only 3 out of 31 respondent cases (9.7%) changed from a "yes" to "no" answer following journal club, while only 2 out of 31 respondent cases (6.5%) changed from a "no" to "yes" answer. With the question regarding the influence of the article on residents' future practice, the change of resident opinion appeared even less influenced. 7/29 respondent cases answered "yes" pre-journal club and 7/29 respondent cases answered "yes" post-journal club (p -value for change = 0.999). Only one out of twenty-nine respondent cases (3.4%) went from a "no" to "yes" answer and only one out of twenty-nine respondent cases (3.4%) went from a "yes" to "no" answer.

Discussion

Journal club remains an important aspect of medical resident education. Since its inception by Osler in the late 1800s, the journal club has expanded into a practice shared across all specialties of medicine¹⁻³. In the field of orthopaedics alone, 99% of residency programs schedule regular journal club meeting with 78% of programs holding meetings once a month^{6,7}. However, unlike many aspects of resident training that are regulated by the Accreditation Council for Graduate Medical Education (ACGME), the format of journal clubs can vary much between institutions. The trend towards Evidence-based Medicine in modern healthcare has promoted the importance for reading, understanding, and analyzing newly published literature. Now, more than ever, the institution of journal clubs in residency training is highly necessary. In fields across medicine, journal clubs have been perceived as successful and highly valuable^{4,7,17,18}. The overall purpose of this study was to determine whether a journal club format that included systematic evaluation and discussion of articles offered the residents the most educational gain.

In a study from 1999, Greene found that 99 of 147 (67%) surveyed programs listed "teaching residents how to evaluate

scientific articles clearly" as the most important goal for journal club⁷. However, despite the shared opinion of journal club importance in achieving this goal, there are very few studies that have critically examined if orthopaedic journal clubs are effective in doing so. Dirschl et al published an article offering insight on the elements of a successful journal club. The article noted that structured review instruments (SRI) have been implemented in many aspects of orthopaedic residency training and that the use of such in journal club is a logical tool for teaching critical thinking^{4,5}. In fact, it has been shown that SRI use in journal clubs increased resident satisfaction and improved perceived educational value⁸.

Our survey study demonstrated that the systematic SRI-based evaluation and discussion of articles in journal club can influence orthopaedic resident impressions of topics presented. This was most noted in the residents' perception of the quality of the manuscript. In the respondent cases for this question, there was a significant decrease in the perception of the article quality as rated by the scale provided on the survey ($p = 0.004$). This was expected, as a discussion and structured analysis in journal club likely leads to more critical thinking about a paper presented and allows residents to carefully dissect the flaws of its content.

Although not significant, a similar trend was noted in the question regarding the residents' understanding of the article ($p = 0.087$). One may presume that a journal club would improve a resident's understanding of a manuscript. However, our data suggest that the residents realized after the journal club discussion that they did not understand the manuscript as well as they thought they had. Interestingly, our data shows that despite a change in opinion and lower rating of articles, residents seemed less influenced in their thought process and practice about a topic discussed. Additionally, this may be a result of the specific articles tested. In response to an articles' ability to change their thought process of a topic, respondent cases answering "yes" went from 12 out of 31 instances pre-journal club to 11 out of 31 instances post-journal club. Similarly, the question regarding the influence of the article on residents' future practice, respondent cases answered "yes" in 7 out of 29 cases both pre- and post-journal club. Therefore, systematic evaluation and/or critical discussion of articles during journal club was more likely to affect a resident's opinion of the article analyzed, but less likely to affect opinion on the topic in general.

There are a number of limitations to this study. The first stems from the low number of residents involved and articles evaluated. A maximum number of eight residents engaged in analysis for only two of the seven articles reviewed. The other five articles analyzed were done so by only six or seven residents. With such low numbers, it is hard to determine if the trend towards more critical thinking on behalf of the residents is a product of better understanding during journal club or the residents themselves. A larger study involving a greater number of respondent cases will be required to better delineate the relationship between SRIs, critical discussion and educational effect. A study performed across multiple residency programs may offer the best insight to this by increasing the power

of the study and eliminating any confounding variables of looking at a single training program.

In addition, the pilot study presented was not designed to discern whether the change in resident perception is a product of the critical discussion that occurs during a journal club session or a product of the usage of an SRI prior to such discussions. An improved study would compare two groups of residents: those who are given an SRI prior to journal club discussion and those who simply are expected to perform general journal club preparation by reading articles prior to journal club with no use of an SRI. Both groups would then be asked to complete an assessment survey prior to and following journal club sessions. Comparisons of the two groups would be able to demonstrate how much influence the SRI has on critical thinking.

The question remains whether an SRI's design actually helps residents to think more critically or simply forces them to pay more attention to detail. In either scenario, residents are required to read articles more carefully and it would appear that both are a positive result of the resident use of an SRI. We feel that this question was not a focus of our study and could only be answered through a study designed with multiple various SRI forms used amongst different resident groups. And while such studies could help design a superior SRI in the future, we feel it first needs to be established whether the use of an SRI, in general, is influential on resident education.

Looking at the data available to us in this pilot study, it appears that residents are influenced by the systematic evaluation and/or critical discussion of journal articles during journal club. In order to better understand which factors are responsible for this effect, we propose that a larger prospective study be performed on orthopaedic resident journal club sessions between two groups: one that incorporates an SRI for article analysis and a control group that does not use such tools. Both groups should then complete a systematic evaluation form before and after journal club meetings for statistical comparison and analysis.

Conclusion

The systematic evaluation and/or discussion of journal articles during journal club impacts orthopaedic residents' understanding of articles analyzed. Our pilot study shows

this trend in the resident population we studied and serves as foundation for further studies to be performed. We recommend future prospective studies of multiple residents over multiple journal club sessions that evaluate the use of a Structured Review Instrument for article analysis in journal club preparation.

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Addendum – Structured Review Instrument

Systematic Manuscript Review

University of Pennsylvania, Orthopaedic Resident Journal club

Study Identification

Title _____
Consider – does title actually describe, data, conclusions, objectives?

Author conflicts of interest _____
Consider – financial, practical or philosophical (prior statements, procedures, studies/papers)

Funding source _____ Journal/Citation _____
Consider – biases due to supporting organization *Consider – trust journal, blind review, accepted for conference*

Study Design

Aspect of patient care	Treatment	Diagnostic	Prognosis and/or risk factors	Other
Basic Design	Prospective: Retrospective: Experimental:	Randomized Trial Case Control Human	Controlled Trial Case Series Cadaveric	Cohort Case Report Animal <i>in vitro/culture/molecular</i>

Consider – where is this study on hierarchy of evidence? Limitations of design? What is the paper able to tell us?

Goals (not specific end points or outcomes) or hypotheses

1. _____ 3. _____
 2. _____ 4. _____

- Is the Basic Design appropriate for the goals/hypotheses and the aspect of patient care being studied? Y N

Conceptual support for goals/hypotheses from

Evidence already in the literature Investigators' experience/observations Theoretical models

Investigators of study

Number of centers _____ Number of evaluators _____
 For procedures: Number of surgeons _____ Independent examination? Y N

Inclusion criteria

- Introduce bias? _____

Exclusion criteria

- Introduce bias? _____

Outcomes (satisfaction, radiographic, survivorship, ROM etc.)

1. Primary _____

2. Secondary _____

3. Others/complications

- a. _____
- b. _____
- c. _____

d. _____

e. _____

f. _____

- Direct or indirect (surrogate) measurement?

- Adequately address the goals/hypothesis? Y N

• Measurement tool validated? Y N

• Measurement subjective or objective?

Intervention/evaluation groups

1. _____
 2. _____

3. _____
 4. _____

- Are the groups appropriate for goals/hypotheses? Y N

Addendum – Structured Review Instrument (*continued*)

Study population demographics	Biases/criticisms?
Initial number of participants	_____
Study period	_____
Follow up period	_____
Age range	_____
Gender	_____
Co-morbidities/etiologies/mechanisms	_____

Final study populations	Group 1	Group 2	Group 3	Group 4
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N = _____

Ave f/u time _____

Final f/u % _____

- Similar demographic before the intervention/evaluation? Y N
- Is the follow up % adequate to limit bias? Y N
- Similar post intervention/evaluation course? Y N

Statistical Methods

- Statistician consulted for complex statistics? Y N
- Does the study have adequate power? Y N
- P values reported and adequate? Y N
- Were there assumptions in using tests that jeopardize the validity of the statistic? Y N
- Confidence intervals reported & adequate? Y N
- Right types of tests for data collected? Y N
- Right types for goals/hypotheses presented? Y N

Results

Outcome being compared	Groups/subgroups	Difference (And is it <u>Relative</u> OR <u>Absolute</u> ?)	Statistically significant?	Clinically important?
1.	_____	_____	Y N	Y N
2.	_____	_____	Y N	Y N
3.	_____	_____	Y N	Y N
4.	_____	_____	Y N	Y N
5.	_____	_____	Y N	Y N
6.	_____	_____	Y N	Y N
7.	_____	_____	Y N	Y N
8.	_____	_____	Y N	Y N
9.	_____	_____	Y N	Y N

- Are there interesting trends that are not statistically significant? _____

Conclusions (by author)

1. _____
2. _____
3. _____

- Authors' conclusions supported by data? Y N
- Are supporting arguments/literature offered? Y N
- Limitations of study adequately addressed? Y N
- Achieve goals / answer the hypotheses? Y N
- Are the conclusions generalizable? Y N

Implications

1. _____
2. _____
3. _____

Does this study add value to our body of literature?

- Better validates previous literature
- Brings into question previous literature
- Validates or questions traditionally held views
- Suggests something novel or different

Does it change your way of thinking? Y N

Will it / should it change your practice? Y N