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Comparison of Traditional Versus Evidence-Based Journal Club Formats

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Key Words: journal club, pharmacy, evidence based medicine, student

Abstract

Purpose: The objective of the study was to compare a traditionally structured journal club with an evidence based structured journal club during an advanced clinical pharmacy rotation and to determine the best utilization that aligns with recent changes to the pharmacy school accreditation standards.

Methods: The study included 21 students who completed journal club utilizing the traditional journal club format and 24 students who utilized an evidence based journal club format. Background characteristics, student reported beliefs, and mean critical evaluation skills scores were evaluated and compared in each group.

Results: There were no statistically significant differences between the two cohorts in mean overall percentage grade for the activity. Students in the traditional cohort received significantly higher grades for the Study Analysis and Critique section (90.97 ± 12.18 versus 81.25 ± 11.18 , $P=0.01$) as well as for the Preparedness section (96.11 ± 8.03 versus 85.0 ± 17.13 , $P=0.002$). Students in the evidence based cohort received statistically superior grades for the Presentation Skills section (96.43 ± 6.39 versus 82.47 ± 14.12 , $P=0.0004$).

Conclusion: An evidence based journal club is a reasonable and effective alternative to the traditionally structured journal club when the primary objective is to assist students in understanding evidence based concepts and to apply current literature to clinical practice.

Introduction

As the curricular landscape in schools of pharmacy evolves, there has been a recent augmentation of required introductory experiential experience.¹ According to the accreditation standards, “the introductory pharmacy practice experiences should begin early in the curriculum, be interfaced with didactic course work that provides an introduction to the profession, and continue in a progressive manner leading to entry into the advanced pharmacy practice experiences.” Because of this, pharmacy students are increasingly exposed to evidence based medicine, both theoretical and practical aspects, earlier in the curriculum. By the time the typical pharmacy student now enters their advanced pharmacy practice rotations, they have firsthand experience of the use of evidence based medicine to impact patient care.

One required component of many advanced clinical pharmacy practice rotations is the presentation of an article in a journal club setting to fellow students and healthcare providers. The goals of many journal clubs are to teach literature appraisal skills, apply the literature to practice, and to remain current with practice guidelines.²⁻⁴ In a traditional journal club, article selection is literature driven, based on the

interest of the presenter or preceptor and there is a great emphasis on critical appraisal skills (Table 1).⁵ However, this method of critical appraisal is often taught in a nonsystematic way.⁶ It is the most common format of journal club used in residency programs and has also been termed “Journal Clubs for Transmission of Information” because it transmits superficial knowledge of new developments in a particular topic or area.³ Presenters are either assigned an article to present or choose something current in the literature. One of the challenges of a traditional journal club in pre-doctorate education is creating enthusiasm and fostering appreciation of the process, especially before students have had significant opportunities to apply their knowledge to real-life patient scenarios. Many students seem to just “go through the motions” without appreciating the full clinical importance of the activity. Because of this, it has been suggested by some disciplines to use this format sparingly because of the great emphasis on experimental methodology.⁷

Evidence-based medicine was introduced in 1992 by the McMaster University-based Evidence-Based Medicine Working Group.⁸ Journal club has been demonstrated as an effective tool to improve the understanding of evidence-based medicine concepts.⁹ An evidence based journal club allows students to formulate a clinical question that they encounter during their clinical rotation (Table 1). In order to answer the question, they must locate the best evidence, critically appraise it for validity, and apply the results to their clinical practice. Evidence based journal clubs have been

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previously described.^{6, 10-21} Though there are some variations in the descriptions of these formats, most are centered around a clinical question, finding evidence, systematically evaluating the evidence, and applying the results to clinical practice.

The cardiology rotation at Creighton University is an elective inpatient pharmacy practice experience that develops the student's ability to make rational decisions concerning cardiovascular medications in the patient care setting. The student acquires specialized knowledge concerning major cardiovascular disease states, invasive and noninvasive cardiovascular diagnostic techniques, and the pharmacology, pharmacokinetics, and clinical use of cardiac drugs. The journal club activity comprises 5% of the student's final grade for the rotation.

In light of recent changes to the pharmacy school accreditation standards, with evidence based medicine embedded earlier in the curriculum, it was decided to evaluate the best use of journal club on an advanced clinical rotation. This study was intended to provide data to consider modification of journal club format in order to accommodate the evolving skills sets of the advanced pharmacy practice rotation students. To do this, we assessed differences in critical literature evaluation skills and students' beliefs between a traditionally structured journal club and an evidence-based structured journal club during an elective cardiology pharmacy rotation.

Methods

The study was reviewed by the Creighton University Institutional Review Board (IRB) and was deemed exempt (IRB #08-14957). Data were collected from 55 students on an elective cardiology rotation at BryanLGH Medical Center East in Lincoln, Nebraska between April 2008 and October 2010. For the first part of the study, between April 2008 and September 2009, 31 students completed journal club utilizing the traditional journal club format. Between November 2009 and October 2010, 24 students utilized an evidence based journal club format.

Regardless of the journal club format, all students in the study were provided with an article entitled "Presenting at Journal Club: A Guide" at the beginning of the rotation.²² Though not formally stated in the guide, the content of this document is more applicable to the traditional format in that it provides guidance on systematic review of an individual article. In this study, it served as a review of skills that students were taught in the didactic portion of our curriculum. Students were also provided with a copy of the rubric used to grade the journal club, which was adapted with

permission from Blommel and Abate (Appendix A).²³ Areas evaluated included Study Overview, Study Analysis and Critique, Study Conclusion, Preparedness, and Presentation. This tool was chosen for both cohorts as it has been demonstrated that structured review instruments used during journal clubs increases participants' satisfaction and improves perceived educational value without increasing workload.^{24, 25} Students in both cohorts were required to turn in copies of the articles they were presenting by the second week of the rotation.

Journal clubs were held in the pharmacy conference room of the hospital that the students were completing their rotation at usually on the 4th or 5th week of the rotation. They were typically held between 1400-1500 during shift change to ensure that staff pharmacists would be able to attend. Staff pharmacists were notified by email one week in advance and again reminded the morning of the journal club. Snacks and beverages were provided by the students. Typical attendance included 3-4 students on rotation, the pharmacy preceptor, 2-6 pharmacists, and 2-4 pharmacy students on other rotations (general hospital or drug information). Students were instructed to bring enough copies of the articles for all those attending. The journal club was completed within one hour and according to the rubric, students were encouraged to evaluate each individual article within approximately 12 minutes.

Students in the traditional format cohort received instructions regarding the selection of their journal articles based on a traditional journal club format. Specifically, they were told to individually select a current research article relating to cardiovascular pharmacotherapy from a peer-reviewed cardiology, medicine, or pharmacy journal such as *Journal of the American College of Cardiology*, *Circulation*, *Pharmacotherapy*, *Annals of Pharmacotherapy*, *Lancet*, etc. All articles were reviewed and approved by the rotation preceptor prior to proceeding with the critical appraisal and were either original randomized controlled trials or meta-analyses. During the journal club meeting, students, typically four per rotation, individually presented their article and critical appraisal according to the guide and rubric provided. After the presentation, the audience was given the opportunity to ask the students questions about the article.

Students in the evidence based cohort received instructions regarding the selection of their article based on an evidence-based medicine format (Table 1).²⁶ After the first two weeks of the rotation, the students met with the preceptor as a team to define a relevant cardiovascular therapeutic clinical topic based on a patient case or question they encountered. If the students had difficulty identifying a relevant topic, then

the preceptor would make suggestion, many based on Journal Club topics suggested by *The Pharmacist's Letter*.²⁷ Due to time constraints of the journal club presentation (one hour) and the fact that the evidence based format required critical evaluation of more than one article, students were permitted to work in teams for this format. The students were then instructed to systematically search all literature and choose the most appropriate articles to answer the clinical question as a team. The preceptor may have suggested an original pivotal research trial to include in the presentation, but it was up to the students to locate other trials, meta-analyses, and applicable published guidelines from peer-reviewed cardiology, medicine, or pharmacy journals on their own. Like the traditional cohort, students in the evidence-based cohort reviewed the articles with the preceptor and received approval prior to proceeding with the critical appraisal. Teams presented between 2-4 articles that consisted of randomized controlled trials, meta-analyses, and also published guidelines. During the evidence based journal club meeting, the cases leading to the clinical question (if any) were briefly reviewed, the clinical question was explained, and the literature search was described. The articles were then critically appraised in the same manner utilized for the traditional journal club. Articles were presented in order of the highest level of evidence first, starting with evidence-based guidelines, if applicable. Finally, students in the evidence based cohort were also asked to relate the literature back to the initial patient case and describe applicability to practice.

Students were individually graded by the rotation preceptor using the standardized rubric (Appendix A).²³ A numeric grade was assigned for each of the five compulsory sections: Study Overview (6 points), Study Analysis and Critique (8 points), Study Conclusion (3 points), Preparedness (5 points), and Presentation (7 points). The Study Overview section included analysis and presentation of the introduction, methods (design, patients, treatment regimens, outcome measures, data handling, statistics), results, and conclusion sections. The Study Analysis and Critique section evaluated the student's ability to state a clear and concise conclusion including key points to be taken from the study, the drug's role in therapy or clinical practice implications, and the need for further research. The Study Conclusion section evaluated the student's ability to state a clear and concise conclusion about key points of the literature, the role of the therapy in clinical practice, and implications and need for further research. The Preparedness section assessed the students' knowledge of study details and response to questions. The Presentation section assessed the students' speaking style, timing, use of distracters, and eye contact.

After the journal club presentation was completed, anonymous surveys were distributed to the students (Appendix B). Students were instructed to complete them immediately after the journal club. However, they were not returned to the preceptor until the end of the rotation after grades were assigned to avoid any perception that answers would impact grade assignment. Students were informed that the surveys would be used to improve the overall structure of journal club.

The first three questions of the survey (Appendix B) were intended to gauge the student's level of experience in journal club participation during clinical rotations, whether or not they had completed a drug information rotation, and the number of journal articles that they routinely read. The fourth question asked whether or not they intended to engage in routine reading of scientific literature in their practice after graduation (Likert scale, strongly disagree through strongly agree). The fifth question intended to measure the amount of time in hours they spent preparing for journal club. The sixth question asked what prompted them to choose their article and was used to confirm cohort assignment. Answers included input from preceptor, random selection, interesting article, article was relevant to a drug therapy problem/question during rotation, controversial clinical issue, or classic/historical article having a large impact in cardiology. Questions 7-8 assessed the students' perceived effect of journal club on their critical appraisal skills and its ability to re-enforce the importance of using current cardiology evidence in daily therapeutic decision making (Likert scale, strongly disagree through strongly agree). Question 9 was intended to gauge their perceived background knowledge in biostatistics, research design, and evidence based medicine (very extensive, extensive, sufficient, minimal, or no formal training). Question 10 was intended to extract what goals students believe a journal club ought to achieve. Answers included to be instilled with the routine habit of reading scientific journals, to learn how to critically appraise an article, to learn about current research, stay up to date, and to learn how to use literature to solve a therapeutic problem. Finally, the last question was intended to measure the overall educational value that students place on journal club (Likert scale strongly disagree through strongly agree).

Statistics

All results were de-identified, entered into a spreadsheet, and analyzed using SPSS version 18 (SPSS, Chicago, Ill). Background characteristics surveyed including prior experience with journal clubs, completion of the drug information rotation, mean number of journal articles read, intent to read journals after graduation, preparation time for

journal club, and beliefs about training were compared to assess for baseline differences between the two cohorts using the Chi Square test for categorical variables and independent t tests for continuous variables. Student reported beliefs were also compared between the two cohorts including perceived improvement in critical appraisal skills, perceived re-enforcement of using evidence in daily decision making, and appreciation of the educational value of journal club, using the Chi Square test. Mean critical evaluation skills scores for each cohort were averaged and compared using independent t tests. Finally, student reported reasons justifying article selection were compared using the Chi Square test. A P-value less than or equal to 0.05 was considered statistically significant.

Results

Demographics

There were no statistically significant differences between the two cohorts in background characteristics surveyed (Table 2). This included prior experience with journal clubs, completion of the drug information rotation, mean number of journal articles read per week, intent to read journals after graduation, preparation time for journal club, and beliefs about training in biostatistics, research design, and evidence based medicine.

Student Beliefs

There were also no significant differences in student reported beliefs including perceived improvement in critical appraisal skills, perceived re-enforcement of using evidence in daily decision making, and appreciation of the educational value of journal club, between the two cohorts (Table 3). The majority of students in both cohorts agreed that their critical literature appraisal skills improved after journal club, that the activity re-enforced the importance of using current evidence to make decisions, and that they appreciated the educational value of the activity.

Student Performance

There was no significant difference between the mean overall percentage grade for the activity between the two cohorts (traditional 89.94 ± 6.51 versus evidence based 90.87 ± 5.23 , $P=0.52$) (Table 4). Likewise, there was no significant difference in the mean percentage grade between the two cohorts for the Study Overview Section (21% of the total grade). There was also no significant difference in the mean percentage grade between the two cohorts for the Study Conclusion Section (10% of the total grade).

In contrast, there were significant differences between the two cohorts in three of the individual compulsory sections. Students in the traditional cohort received significantly higher

grades for the Study Analysis and Critique section (28% of total grade) when compared to the evidence based cohort (90.97 ± 12.18 versus 81.25 ± 11.18 , $P=0.01$). Students in the traditional cohort also received higher grades for the Preparedness section (17% of total grade) when compared to the evidence based cohort (96.11 ± 8.03 versus 85.0 ± 17.13 , $P=0.002$). The only section in which students in the evidence based cohort received statistically superior grades was the Presentation Skills section (96.43 ± 6.39 for evidence based versus 82.47 ± 14.12 for traditional, $P=0.002$).

Journal Article Selection

Table 5 compares student-reported reasons for article selection between the two groups, which was captured to ensure cohort assignment. While all students in the evidence based cohort indicated that article selection was driven by input from their preceptor, as intended, in the traditional cohort, the most common justification for article selection was that the "content looked interesting" (71%) followed by "random selection" (32%). The second most common reason for selection in the evidence based cohort was "controversial clinical issue" (21%).

Discussion

Recent changes to the pharmacy school accreditation standards affirm that pharmacy students need to be educated to deliver patient-centered care while emphasizing evidence-based practice. Therefore, students are now exposed to evidence-based medicine much earlier in their education. They begin clinical rotations with greater exposure and a better understanding of evidence based guidelines, including but not limited to study design, clinical questions, levels of evidence, grades of recommendation, and trials scoring through the SORT evidence rating scale at American Family Physician.²⁸ It was decided to evaluate the best use of journal club on an advanced clinical rotation by comparing traditional journal club format with evidence based journal club format.

In this study, we found that students in the traditional cohort received significantly higher grades for the Study Analysis and Critique section as well as for the Preparedness section. This indicates that utilizing a traditional journal club format may be more effective when the goal is to focus on intense critique and analysis of an individual study rather than to place focus on defining a relevant clinical question and evaluating literature to assess that question. In the traditional journal club, students tended to go more in depth in their analysis and critique of the individual article as opposed focusing more on the larger clinical impact of the evidence.

Bazarian et al compared the performance of medical residents after exposure to journal clubs in either an evidence based format or traditional format for one year in a case-controlled trial.⁶ Of the 32 residents enrolled, half were assigned to the traditional approach (control) and the other half, from a different site, to an evidence based approach. Before and after the study period, participants were given a factitious article to evaluate in an essay format to assess critical appraisal skills. They found no significant difference in the improvement in test scores between the two formats (1.80 for traditional and 1.53 for evidence based, $P=0.90$). They also found a wide variation of scores in the evidence-based group, with some students even regressing while the control students clustered around the mean. The authors propose that because evidence based medicine was a new way of thinking, a degree of “unlearning” of less systematic approaches of critical appraisal may have been necessary before understanding the new approach. This may also explain why students in the traditional cohort of our study received better grades in the Study Analysis and Critique section and Preparedness section

We found that students in the evidence based cohort received statistically superior grades for the Presentation Skills section. Students performing the evidence based journal club were presenting as a team versus presenting the journal article as individuals. Anecdotally, students seemed more relaxed and confident presenting in a team format and having their peers to assist in fielding the questions and comments from the audience. Students appeared to prefer the evidence based format over the traditional format which may, in part, be due to the team-based approach. The students were also more engaged and had a stronger vested interest because they could directly see the relationship between the journal club and a clinical question or patient case observed while on rotation.

Though not formally captured, unsolicited qualitative feedback from students regarding the evidence based journal club format was positive. Most of these comments came from students who had completed traditional journal clubs on other rotations. They often voiced preference for the evidence based format because of the opportunity to think critically about an article and relate it back to a patient case on rounds. It has been suggested that traditional journal club formats do not provide such reinforcement and therefore do not complete the experiential learning cycle because the evidence gained is not always used in day to day practice as modeled by faculty members.⁷

While all students in the evidence based cohort indicated that article selection was driven by input from their preceptor, in

the traditional cohort, the most common justification for article selection was that the “content looked interesting” (71%) followed by “random selection” (32%). These data indicate that without the guidance of an evidence-based framework, students in a traditional journal club do not necessarily choose articles based on relevance to clinical practice.

Other than participating in and grading the journal club activity itself, most of the front-end preceptor time devoted to this endeavor involved assisting the students with topic and/or article selection. Preceptor time was perceived to be the same for both formats. For the traditional format, students would typically email the preceptor 2-3 articles asking for input about which would be most appropriate to present. For the evidence based format, students needed preceptor assistance most often to develop a topic or clinical question of interest.

Limitations

It is important to consider potential limitations of our study. This study was nonrandomized and the two cohorts were evaluated back to back. There were no changes to the didactic or experiential curriculum during the years of this study therefore the impact of this is probably minimal. The fact that there was only one preceptor, obviously unblinded, to critique all of the students’ analyses could have led to bias on the part of the assessor. However the use of a standardized rubric should have limited this bias. Having only one assessor also limited the sample size to the number of students who completed the elective cardiology clinical rotation during the defined time period. This could have affected our ability to detect a clinically significant difference in the outcomes evaluated, though our results for overall performance are similar to those reported by Bazarian et al.⁶

A notable difference between the two cohorts was that the traditional based cohort presented their journals individually while the students in the evidence based cohort presented their journal analysis as a group. The team presentation format could have affected the students’ grades in addition to the possibility of an uneven level of effort and performance between the members of the group. In addition, both cohorts received a copy of the same rubric which was used to assess both groups. This was chosen to use as an evaluation tool for both the traditional and evidence based journal formats, although it was originally created to be a tool for a more traditional design in which the students were given the opportunity to individually choose a current research article of their choice. Therefore, this rubric could be missing some components that would be beneficial when specifically evaluating a more evidence based format.

This would include an evaluation of students' incorporation of a trial scoring rating scale, levels of evidence, grades of recommendation and ability to relate the evidence back to the original patient case.

Conclusion

Based on the results of this study, it is necessary to consider what skills the educator would like to emphasize when facilitating a student journal club. If the goal of the activity is to stress critical literature evaluation skills and students' understanding of statistics and appropriate statistical tests, then a traditional journal club format may be the most appropriate option. However, if the ultimate objective is to teach and support evidence based medicine while emphasizing the ability of students to apply their literature evaluation skills to their clinical practice, then an evidence based format is a viable alternative.

Based on little change in overall scores, student feedback, and our changing curriculum, we will continue to utilize the evidence based journal club format in order to promote the development of critical thinking skills and encourage the use of evidence based medicine in everyday practice. Using the new format could continue to foster the most effective learning environment for pharmacy students as well to support the current pharmacy school accreditation standards. As more students complete the new curriculum with greater experience with evidence based medicine earlier on in their schooling, time and more research will enable us to evaluate the need to further modify our journal club format based on the changing skills set. Completing a similar study using a mixed methods approach in a larger sample of multiple rotation sites would enable researchers to formally capture student feedback and would also allow us to conduct randomization.

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Table 1. Comparison of Traditional and Evidence Based Journal Club Formats Used in This Study

	Traditional Journal Club	Evidence Based Journal Club
Emphasis	Centered around a journal article	Centered around a clinical question/problem and evidence based medicine
Methodology	Systematically evaluating an article and its experimental methodology, applying results to clinical practice	Defining the question, performing a literature search, systematically evaluating evidence including trials scoring, levels of evidence and grades of recommendation, applying results to clinical practice and patient case where question was generated
Article Selection	Variable (interest of student/resident, faculty member, availability), most randomized controlled trials	Most suitable to answer clinical question, randomized controlled trials, meta-analyses, published guidelines
Number of Articles	Usually one per student	Usually several, students worked as a team

Table 2. Background Characteristics for Students Completing Journal Club

	Traditional (n=31)	Evidence Based (n=24)	Statistical Significance
First Journal Club Experience	14 (45.2%)	9 (37.5%)	P=0.5678
Completed Drug Information Rotation Prior to Journal Club	17 (55.8%)	11 (45.8%)	P=0.5076
Mean Number of Non-Textbook Journal Articles Read Per Week (\pm Standard Deviation)	0.94 \pm 1.06	1.4 \pm 1.10	P=0.139
Plan to Engage in Routine Reading of Scientific Literature After Graduation (Strongly Agree or Agree)*	23 (74.2%)	22 (91.7%)	P=0.1588
Prepared for 4 or More Hours for Journal Club	25 (80.6%)	16 (66.7%)	P=0.2379
Students' Beliefs that Background Training/Knowledge in Biostatistics, Research Design, and Evidence Based Medicine was Sufficient**	18 (58.1%)	15 (62.5%)	P=0.7391

*Derived from a 5 point Likert Scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

** (Sufficient, Extensive, or Very Extensive)

Table 3. Student-Reported Survey Beliefs After Journal Club

	Traditional (n=31)	Evidence Based (n=24)	Statistical Significance
Students' Beliefs Critical Appraisal Skills of Pharmacy Literature Improved Because of this Activity (Strongly Agree or Agree)*	24 (77.4%)	18 (75%)	P=0.8341
Students' Beliefs that this Experience Re-enforced the Importance of Using Current Cardiology Evidence in Daily Therapeutic Decision Making (Strongly Agree or Agree)*	28 (90.3%)	23 (95.8%)	P=0.6237
Appreciate Educational Value of Journal Club (Strongly Agree or Agree)*	30 (96.8%)	24 (100%)	P=1.0000

*Derived from a 5 point Likert Scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Table 4. Assessment for Students Completing Journal Club

	Traditional (n=31)	Evidence Based (n=24)	Statistical Significance
Mean Grade (%) for Study Overview Section (\pm Standard Deviation) Weight: 21% of total grade	91.20 \pm 13.50	87.50 \pm 7.46	P=0.31
Mean Grade (%) for Study Analysis and Critique Section (\pm Standard Deviation) Weight: 28% of total grade	90.97 \pm 12.18	81.25 \pm 11.18	P=0.01
Mean Grade (%) for Study Conclusion Section (\pm Standard Deviation) Weight: 10% of total grade	92.59 \pm 16.16	100.00 \pm 0	P=0.07
Mean Grade (%) for Preparedness Section (\pm Standard Deviation) Weight: 17% of total grade	96.11 \pm 8.03	85.0 \pm 17.13	P=0.002
Mean Grade (%) for Presentation Skills Section (\pm Standard Deviation) Weight: 24% of total grade	82.47 \pm 14.12	96.43 \pm 6.39	P=0.0004
Mean Total Grade (%) (\pm Standard Deviation)	89.94 \pm 6.51	90.87 \pm 5.23	P=0.52

Table 5. Student Reported Reasons for Article Selection*

	Traditional (n=31)	Evidence Based (n=24)	Statistical Significance
Input from Preceptor	5 (16.1%)	24 (100%)	P<0.0001
Random Selection	10 (32.2%)	1 (4.17%)	P=0.0152
Looked Interesting	22 (71.0%)	4 (16.67%)	P<0.0001
Relevant to a Drug Therapy Question/Problem	6 (19.3%)	2 (8.33%)	P=0.4429
Controversial Clinical Issue	4 (12.9%)	5 (20.83%)	P=0.4817

*Students were allowed to select more than one answer

APPENDIX A
Journal Club Presentation – Evaluation Rubric

Presenter(s): _____ Reviewer: _____

Criteria					
I. Study Overview	3 Points	2 Points	1 Point	0 Points	Score
Introduction <input type="checkbox"/> Authors' affiliations/study support <input type="checkbox"/> Relevance <input type="checkbox"/> Study objective(s) & rationale <input type="checkbox"/> Feasibility Methods – Design <input type="checkbox"/> Case-controlled, cohort, controlled exp., etc. <input type="checkbox"/> Type of design (cross-over, parallel, etc.) <input type="checkbox"/> Blinding <input type="checkbox"/> Treatment allocation Methods – Patients/Subjects <input type="checkbox"/> How enrolled/from where? <input type="checkbox"/> Inclusion/exclusion criteria <input type="checkbox"/> # enrolled per group <input type="checkbox"/> Baseline differences		Accurately and completely reported ALL relevant introduction, study design, and patients/subjects components	Accurately and completely reported MOST of the relevant introduction, study design, and patients/subjects components	Did not accurately and completely report most of the relevant introduction, study design, and patients/subjects components	
Methods – Treatment Regimens <input type="checkbox"/> Treatments used <input type="checkbox"/> Controls used <input type="checkbox"/> Dosages/administration <input type="checkbox"/> Therapy duration Methods – Outcome Measures <input type="checkbox"/> Primary measures <input type="checkbox"/> Secondary measures <input type="checkbox"/> Timing Methods – Data Handling <input type="checkbox"/> Intention to treat, per protocol, etc. <input type="checkbox"/> # lost to follow-up <input type="checkbox"/> Reasons for dropouts		Accurately and completely reported ALL relevant treatment regimens, outcome measures, and data handling components	Accurately and completely reported MOST of the relevant treatment regimens, outcome measures, and data handling components	Did not accurately and completely report most of the relevant treatment regimens, outcome measures, and data handling components	
Methods – Statistics <input type="checkbox"/> Null and alternative hypothesis <input type="checkbox"/> Tests used <input type="checkbox"/> Power of study Results <input type="checkbox"/> Results for each outcome measure <input type="checkbox"/> Confidence intervals <input type="checkbox"/> <i>p</i> -values <input type="checkbox"/> Type II error <input type="checkbox"/> Compliance <input type="checkbox"/> Confounding variables <input type="checkbox"/> Adverse events Conclusion <input type="checkbox"/> Authors' conclusion(s) <input type="checkbox"/> Limitations <input type="checkbox"/> Related to outcome(s) <input type="checkbox"/> Relevance <input type="checkbox"/> Applicability		Accurately and completely reported ALL relevant statistics, results, and conclusion components	Accurately and completely reported MOST of the relevant statistics, results, and conclusion components	Did not accurately and completely report most of the relevant statistics, results, and conclusion components	

Comments for Study Overview:						
II. Study Analysis and Critique	4 Points	3 Points	2 Points	1 Point	0 Points	Score
Analyzed all parts of study	ALL parts appropriately critiqued, with ALL relevant questions accurately addressed with strengths, weaknesses, and their impact described	Missed only ONE or TWO considerations or relevant questions in critique, with the rest appropriately addressed with strengths, weaknesses, and their impact described	MOST parts appropriately critiqued; some relevant questions with strengths, weaknesses, and their impact overlooked or inaccurate	Only SOME parts appropriately critiqued; most relevant questions with strengths, weaknesses, and their impact overlooked or inaccurate	Failed to appropriately critique any part; all relevant questions with strengths, weaknesses, and their impact overlooked	Multiply x 2 for this field only
Comments for Study Analysis and Critique:						
III. Study Conclusion	3 Points	2 Points	1 Point	0 Points	Score	
Clear, concise conclusion stated	Conclusion summarized accurately and completely all of the following: key points to be taken from study (which reflected study limitations); drug's role in therapy or clinical practice implications; AND need for any further research in area	Conclusion did not summarize accurately and completely one of the following: key points to be taken from study (which reflected study limitations); drug's role in therapy or clinical practice implications; AND need for any further research in area	Conclusion did not summarize accurately and completely two of the following: key points to be taken from study (which reflected study limitations); drug's role in therapy or clinical practice implications; AND need for any further research in area	Failed to give conclusion OR conclusion completely inaccurate		
Comments for Study Conclusion:						
IV. Preparedness	3 Points	2 Points	1 Point	0 Points	Score	
Knowledge of Study Details		Presenters each well prepared; thoroughly explained ALL details of study	Not all presenters well prepared OR thoroughly explained only some study details	No presenter well prepared OR did not thoroughly explain any study details		
Response to	Correctly	Correctly	Correctly	Incorrectly		

Questions	answered ALL questions in a confident manner	answered ALL questions in a non-confident manner OR correctly answered MOST questions in a confident manner	answered MOST questions in a non-confident manner OR correctly answered only SOME questions	answered all questions OR handled questions unprofessionally	
Comments for Preparedness:					
IV. Presentation	3 Points	2 Points	1 Point	0 Points	Score
Speaking Style		Spoke clearly; easy to hear and understand	Difficult to hear or understand SOME things spoken	Difficult to hear or understand MOST things spoken	
Timing			Within 12 minutes (+/- 3 minutes)	>15 or <9 minutes	
Distracters ("uhs, uhms", etc.) OR distracting mannerisms		Used few (or no) distracters or distracting mannerisms	Used several distracters or distracting mannerisms	Used distracters or distracting mannerisms throughout	
Eye Contact		Maintained eye contact throughout	Occasionally looked at evaluators	Read the presentation	
Comments for Presentation:					
Additional Comments:				TOTAL SCORE FROM BOTH SIDES (MAX = 29 pts)	

Weight = 5% of final grade for elective cardiology rotation.

Adapted with permission from: Blommel ML, Abate MA. A rubric to assess critical literature evaluation skills. *Amer J Pharm Ed* 2007;71(4): Article 63.

APPENDIX B
Journal Club Evaluation

Today's date: _____

1. This was my first journal club experience during clinical clerkships.

Yes _____ No _____

2. I have completed a drug information clerkship.

Yes _____ No _____

3. I currently read the following number of non-textbook journal articles per week:

- a. 0
- b. 1
- c. 2
- d. 3
- e. 4
- f. ≥ 5

4. I plan to engage in routine reading of scientific literature in my practice.

- a. Strongly Disagree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly Agree

5. I spent the following number of hours preparing for this journal club:

- a. <1
- b. 1
- c. 2
- d. 3
- e. 4
- f. ≥ 5

6. The following prompted me to choose the article(s) I selected for journal club presentation? (Circle all that apply)

- a. Input from my preceptor
- b. Random selection – in the current cardiology literature that involved pharmacotherapy
- c. I thought the content looked interesting
- d. The article(s) was/were relevant to a drug therapy problem/question that I came across during this clerkship
- e. The article(s) was/were relevant to a controversial clinical issue
- f. The article is considered a “classic” or historical article having a large impact on the practice of cardiology
- g. Other: _____

7. My critical appraisal skills of pharmacy literature improved because of this activity.

- a. Strongly Disagree
- b. Disagree
- c. Neutral
- d. Agree
- e. Strongly Agree

8. This journal club experience re-enforced the importance of using current cardiology evidence in daily therapeutic decision making.
- Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree
9. I would describe my background training/knowledge in biostatistics, research design, and evidence based medicine prior to clerkships as:
- Very extensive
 - Extensive
 - Sufficient
 - Minimal
 - No formal training
10. Rank in the order of importance the goals(s) you think a journal club ought to achieve. If an item listed below is not important to you, do not include the item in your ranking.
- To be instilled with the routine habit of reading scientific journals
 - To learn how to critically appraise an article
 - To learn about current research/stay up to date
 - To learn how to use literature to solve a therapeutic problem
 - Other, please explain _____
11. I can appreciate the educational value of journal club.
- Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree