INSTRUCTIONAL DESIGN AND ASSESSMENT

A Rubric to Assess Critical Literature Evaluation Skills

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Objective. To develop and describe the use of a rubric for reinforcing critical literature evaluation skills and assessing journal article critiques presented by pharmacy students during journal club exercises.

Design. A rubric was developed, tested, and revised as needed to guide students in presenting a published study critique during the second through fourth years of a first-professional doctor of pharmacy degree curriculum and to help faculty members assess student performance and provide formative feedback. Through each rubric iteration, the ease of use and clarity for both evaluators and students were determined with modifications made as indicated. Student feedback was obtained after using the rubric for journal article exercises, and interrater reliability of the rubric was determined.

Assessment. Student feedback regarding rubric use for preparing a clinical study critique was positive across years. Intraclass correlation coefficients were high for each rubric section. The rubric was modified a total of 5 times based upon student feedback and faculty discussions.

Conclusion. A properly designed and tested rubric can be a useful tool for evaluating student performance during a journal article presentation; however, a rubric can take considerable time to develop. A rubric can also be a valuable student learning aid for applying literature evaluation concepts to the critique of a published study.

Keywords: journal club, rubric, literature evaluation, drug information, assessment, evidence-based medicine, advanced pharmacy practice experience

INTRODUCTION

There has been increased interest over the past decade in using evidence-based medicine (EBM) as a basis for clinical decision making. Introduced in 1992 by the McMaster University-based Evidence-Based Medicine Working Group, EBM has been defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients." Current best evidence is disseminated via original contributions to the biomedical literature. However, the medical literature has expanded greatly over time. Medline, a biomedical database, indexes over 5000 biomedical journals and contains more than 15 million records.² With this abundance of new medical information, keeping up with the literature and properly utilizing EBM techniques are difficult tasks. A journal club in which a published study is reviewed and critiqued for others can be used to help keep abreast of the literature. A properly designed journal club can also be a useful

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educational tool to teach and reinforce literature evaluation skills. Three common goals of journal clubs are to teach critical appraisal skills, to have an impact on clinical practice, and to keep up with the current literature.^{3,4} Journal clubs are a recognized part of many educational experiences for medical and pharmacy students in didactic and experiential settings, as well as for clinicians. Journal clubs have also been described as a means of teaching EBM and critical literature evaluation skills to various types of medical residents.

Cramer described use of a journal club to reinforce and evaluate family medicine residents' understanding and use of EBM concepts. Pre- and posttests were used during each journal club to assess the residents' understanding of key EBM concepts related to the article discussed. Pretest scores improved over the year from 54.5% to 78.9% (p < 0.001) and posttest scores improved from 63.6% to 81.6% (p < 0.001), demonstrating the journal club's ability to help residents utilize EBM techniques. Linzer and colleagues compared a journal club to a control seminar series with regard to medical interns' reading habits, epidemiology and biostatistics knowledge, and ability to read and incorporate the medical literature into their practice of medicine. Forty-four interns were

randomized to participate in the journal club or a seminar series. After a mean of 5 journal club sessions, 86% of the journal club group improved their reading habits compared to none in the seminar group. Knowledge scores increased more with the journal club and there was a trend toward more knowledge gained with sessions attended. Eighty percent of the journal club participants reported improvement in their ability to incorporate the literature into medical practice compared to 44% of the seminar group.

Journal clubs have also been used extensively to aid in the education and training of pharmacy students and residents. The journal club was a major component in 90% and 83% of drug information practice experiences offered by first professional pharmacy degree programs and non-traditional PharmD degree programs, respectively.⁷

When a journal club presentation is used to promote learning, it is important that an appropriate method exists for assessing performance and providing the presenter with recommendations for improvement. Several articles have listed important questions and criteria to use when evaluating published clinical studies.⁸⁻¹¹ However, using such questions or criteria in the form of a simple checklist (ie, indicating present or absent) does not provide judgments of the quality or depth of coverage of each item. ¹² A rubric is a scoring tool that contains criteria for performance with descriptions of the levels of performance that can be used for performance assessments. 12,13 Performance assessments are used when students are required to demonstrate application of knowledge, particularly for tasks that resemble "real-life" situations. 14 This report describes the development and use of a rubric for performance assessments of "journal club" study critiques by students in the didactic curriculum and during an advanced pharmacy practice experience (APPE).

DESIGN

Two journal article presentations have been a required part of the elective drug information APPE at the West Virginia Center for Drug and Health Information for many years. For these presentations, students select a recent clinical study to evaluate and present their study overview and critique to the 2 primary drug information preceptors. Prior to rubric development, these presentations were evaluated using a brief checklist based upon the CONSORT criteria for reporting of randomized controlled trials. 15 Work on a scoring rubric for the student presentations began in 2002. The first step in its development involved identifying the broad categories and specific criteria that were expected from the journal club presentation. The broad categories selected were those deemed important for a journal club presentation and included: "Content and Description," "Study Analysis,"

"Conclusion," "Presentation Style," and "Questions." The criteria in "Content and Description" involved accurate and complete presentation of the study's objective(s), rationale, methods, results, and author(s)' conclusion. Other criteria within the rubric categories included important elements of statistical analyses, analysis of study strengths and weaknesses, the study drug's role in therapy, communication skills, and ability to handle questions appropriately and provide correct answers. The first version of the rubric was tested in 2003 during the drug information APPE, and several rubric deficiencies were identified. Some sections were difficult to consistently interpret or complete, other criteria did not follow a logical presentation sequence, and a few of the levels of performance were based on numbers that were difficult to quantitate during the presentation. For example, the criteria under "Content and Description" were too broad; students could miss one aspect of a study's design such as blinding but correctly identify the rest, making it difficult to accurately evaluate using the rubric.

Version 2 of the rubric was reformatted to remedy the problems. The description and content categories were expanded to make it easier to identify the specific parts of the study that the students should describe, and the "Study Overview" category was divided into distinct parts that included introduction, study design, patients/ subjects, treatment regimens, outcome measures, data handling method, dropouts per group, statistics, results, and conclusion. To facilitate ease of use by evaluators, a check box was placed next to each item within the individual parts. This format also allowed the student to see in advance exactly which criteria they needed to include during their presentation, as well as any that were later missed. The use of a checklist also aided evaluators when determining the overall score assigned to the subsections within this category. "Study Analysis and Critique" directed students to refer to the "Study Overview" category as a guide to the parts of the study they should critically analyze. "Study Conclusion" divided the scoring criteria into an enumeration of key strengths, key limitations, and the conclusion of the group/individual student. "Preparedness" included criteria for knowledge of study details and handling of questions. The "Presentation" category included criteria for desired communication skills. This rubric version was tested during 8 journal club presentations during the drug information rotation, and on a larger scale in 2003 in the required medical literature evaluation course for second-professional year students. During the second-professional year journal club assignment, groups of 2 or 3 students were each given 1 published clinical study to evaluate, which they later presented to 2 evaluators consisting of a faculty member

plus either a fourth-professional year drug information rotation student or a pharmacy resident. The faculty members evaluating students included the 2 rubric developers as well as 2 additional faculty evaluators. The evaluators first completed the rubric independently to assess student performance; evaluators then discussed their scores and jointly completed a rubric that was used for the grade. The rubric was given to the students in advance to serve as a guide when preparing their journal club presentation. In addition, to provide students with actual experience in using the rubric, 2 fourth-professional year drug information APPE students each presented a journal article critique to the second-professional year class. The fourthprofessional year students first gave their presentations to the drug information preceptors as practice and to ensure that complete and accurate information would be relayed to the second-professional year class. The second-professional year students then used the rubric to evaluate the fourth-professional year students' presentations; the completed rubrics were shared with the fourth-professional year students as feedback.

Based on student and evaluator feedback at the end of the journal club assignment, additional revisions to the rubric were needed. Students stated they had difficulty determining the difference between the "Study Analysis and Critique" category and the key strengths and weaknesses parts of the rubric; they felt they were simply restating the same strengths and weaknesses. Students also felt there was insufficient time to discuss their article. The evaluators had difficulty arriving at a score for the "Study Analysis and Critique" category, and students often did not know the important aspects to focus on when critiquing a study. Revisions to the rubric included expanding the presentation time from a maximum of 12 to a maximum of 15 minutes, explaining that the strengths and weaknesses should relate to the areas listed under "Study Overview," and stating that only the key limitations that impacted the study findings should be summarized as part of the conclusion.

Version 3 of the rubric was tested during the 2004 journal club assignment for the second-professional year students. A brief survey was used to obtain student feedback about the rubric and the assignment as a tool for learning to apply literature evaluation skills. The rubric was revised once again based on the feedback plus evaluator observations. Through use of the first 3 versions of the rubric, the evaluators continually noted that students skipped key areas of the analysis/critique section when presenting their journal articles. Thus, for version 4, a list of questions was developed by the drug information faculty members to aid students in identifying the key considerations that should be included in their analysis

(Appendix 1). To prepare this list, several sources were located that detailed questions or issues to take into account when evaluating a published study. 8-11 Specific questions were also added based upon areas that were consistently overlooked or inappropriately discussed during the journal club presentations. Version 4 of the rubric was used by the 2 primary drug information preceptors to evaluate the fourth-professional year student journal club presentations during the drug information rotation. Following each fourth-professional year student's journal club presentation, each evaluator independently completed the rubric. The evaluators then met together to briefly review their scores, discuss discrepancies, and modify their individual scores if desired. This was important because one evaluator would occasionally miss a correct or incorrect statement made by a student and score the student inappropriately lower or higher for a particular section. Based upon further feedback from students and evaluators, final revisions were made to the rubric. The final and current version (Appendix 2) was used for all subsequent fourth-professional year journal club presentations, for the second-professional year students' journal club assignments during 2005 and 2006, and for a new, similar journal club assignment added to the curriculum for third-professional year students in 2006. Feedback about the finalized rubric was obtained from the secondand third-professional year students.

To evaluate the rubric's reliability, 3 drug information faculty members used the final rubric to evaluate the journal club presentations by 9 consecutive fourth-professional year drug information experiential students. Intraclass correlation coefficients were calculated for each rubric section and the total score.

ASSESSMENT

Five versions of the rubric were developed over a 3-year time period. The majority of the revisions involved formatting changes, clarifications in wording, and additions to the criteria. However, the change that appeared to have the greatest positive impact on the student presentations was the addition of the specific questions that should be considered during the study analysis and critique. Second- and third-professional year student feedback from the final version of the rubric is shown in Table 1 and is very positive overall. Representative comments from the students included: "Very helpful for putting the class info to use," "Great technique for putting all concepts together," and "This assignment helped me to become more comfortable with understanding medical studies." The suggestions for change primarily involved providing points for the assignment (it was graded pass/fail for the second-professional year students), better scheduling (the

Table 1. Pharmacy Students Feedback Concerning a Journal Club Assignment in Which the Rubric Was Used for Evaluation

	Second-Professional Year				Third-Professional Year	
	2005		2006		2006	
Survey Item	Mean [†] (SD)	% Pos [‡]	Mean [†] (SD)	% Pos [‡]	Mean [†] (SD)	% Pos [‡]
The journal club evaluation form was clear and easy to read.*	4.24 (0.59)	82.5	4.49 (0.68)	92.0	4.32 (0.59)	93.9
The evaluation form served as a useful guide when preparing my presentation.*	4.56 (0.55)	94.0	4.59 (0.66)	93.3	4.43 (0.63)	92.5
The evaluation form included all the important aspects associated with critically assessing an article.*	4.37 (0.54)	92.5	4.61 (0.57)	96.0	4.36 (0.71)	89.6
The journal club assignment helped me to learn to apply my literature evaluation knowledge to an actual study.	4.24 (0.61)	86.0	4.28 (0.8)	86.5	4.09 (0.82)	77.6
The Journal club assignment helped me to better understand the literature evaluation material from class.	4.25 (0.61)	86.0	4.27 (0.79)	84.0	4.12 (0.82)	77.6
I feel that I am better able to critically evaluate a published study after completing a journal club assignment.	4.17 (0.73)	82.5	4.20 (0.81)	81.3	3.96 (1.0)	70.1

^{*}Items specific to rubric

journal club assignment was due at the end of the semester when several other assignments or tests were scheduled), and providing more pre-journal club assistance and guidance to students. A small number of students indicated they still found it confusing to critique a study after the journal club assignment, which was expected since literature evaluation skills take considerable practice and experience to master.

A survey of 7 recent fourth-professional year students who used the rubric to prepare for journal club presentations and who were also evaluated using the rubric found that all of the students agreed or strongly agreed with each item shown in Table 1. One representative comment was, "I was surprised at how articles appear to be good when I first read them but then after going through them again and using the form, I was able to find so many more limitations than I expected. I definitely feel that journal club has helped me to interpret studies better than I had been able to in the past." Several fourth-professional year students took the rubric with them to use during other rotations that required a journal club presentation. After establishing that the rubric was user-friendly to evaluators and that students could clearly follow and differentiate the various sections, the reliability of the rubric in each of the 12 rating areas was determined (Table 2). The intra-class correlation coefficient demonstrated a high level of correlation between evaluators for each student for 11 of the 12 areas. A score of 0.618 was found for the section involving the students' response to questions. This was still considered acceptable; however, given that a fairly low variability in ratings affected the intra-class correlation coefficient due to the small scale (0-3 points) used in the rubric, with a relatively small number of observations. The intra-class correlation coefficient was calculated using the fourth-professional year students' journal club evaluations from the drug information rotation. Thus,

Table 2. Rubric Intraclass Correlation Coefficients (N = 9)

Rubric Section	Intraclass Correlation Coefficient (95% CI)*
Total score	0.916 (0.774-0.978)
Introduction/design/patients	1.0 (1.0-1.0)
Treatments/outcome measures/data handling	0.778 (0.485-0.938)
Statistics/results/author's conclusion	0.911 (0.760-0.977)
Analysis and critique	0.909 (0.756-0.976)
Study conclusion	0.888 (0.708-0.971)
Knowledge of study details	1.0 (1.0-1.0)
Response to questions	0.618 (0.240-0.883)
Speaking style	1.0 (1.0-1.0)
Timing	1.0 (1.0-1.0)
Distractors	0.92 (0.783-0.979)
Eye contact	1.0 (1.0-1.0)

^{*95%} confidence interval

[†]Based on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree

[‡]Positive response = agree or strongly agree

by necessity, the evaluators consisted of the 2 primary faculty drug information preceptors and a drug information resident. These evaluators had previously used the rubric and the 2 faculty evaluators worked to develop the rubric. This may have increased the level of correlation between evaluators due to their familiarity with the sections of the rubric.

About 5 minutes are required for an individual evaluator to complete the rubric, with an additional 5 minutes needed for score comparison and discussion. In almost all cases, the reasons for any differences were easily identified through discussion and resulted from an evaluator simply missing or not correctly hearing what was said during the presentation. In general, evaluators found the rubric easy to use and did not require an extensive amount of time to consistently assess literature evaluation skills.

DISCUSSION

A rubric can be a useful tool for evaluating student performance in presenting and critiquing published clinical studies, as well as a valuable learning aid for students. However, developing a rubric that appropriately guides students in achieving the targeted performance, provides proper student feedback, and is user-friendly and reliable for evaluators requires a significant initial investment of time and effort. Multiple pilot tests of the rubric are generally required, with subsequent modifications needed to improve and refine the rubric's utility as an evaluation and learning tool. Once the rubric is developed, though, it can be used to quickly evaluate student performance in a more consistent manner.

As part of the development and use of a rubric, it is important that the rubric's criteria be thoroughly reviewed with students and they are provided the opportunity to observe examples of desired performance. Once a rubric is used to evaluate student performance, the completed rubric should be shared with students so they can identify areas of deficiency. This feedback will help enable students to appropriately modify their performance.

The journal club evaluation rubric can be used when teaching literature evaluation skills throughout all levels of education and training. Students early in their education will probably need to extensively refer to and rely upon the supplemental questions to help them identify key considerations when analyzing a study. However, as students progress with practice and experience and their literature evaluation skills are reinforced in actual clinical situations, their need to consult the supplemental questions should diminish.

CONCLUSION

Despite the considerable time and effort invested, the evaluation rubric has proven to be a valuable and ultimately timesaving tool for evaluating student performance when presenting a published study review and critique. More importantly, the rubric has provided students with clear expectations and a guide for desired performance.

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Appendix 1. Study Analysis and Critique – Supplement.

Study Analysis and Critique – Supplement: Important Considerations for Each Study Part

Authors/Introduction

- If potential conflicts of interest exist, did they appear to influence the study's objective, methods, or conclusions?
- Was an appropriate scientific background and rationale provided?
- Is the stated objective or hypothesis consistent with the research question that needed to be addressed?

Methods

Design

- Is study design appropriate and optimal to fulfill objective/hypothesis?
- Was method used to assign patients to treatment groups appropriate and clearly described?
- Were all involved with study appropriately blinded? Was success of blinding determined? Was unblinding likely?

Patients/Subjects

- Were there any problems with how or from where patients were enrolled?
- Were the inclusion and exclusion criteria appropriate and representative of the population of interest? What additional criteria, if any, would have strengthened the study?
- How was sample size determined? Was the initial sample size adequate for each primary outcome measure?

Treatment Regimens

- If an active control used, was it an appropriate selection?
- Were the study drug(s) and any active control(s) dosed and administered appropriately and in a comparable manner?
- Were the drug(s) administered for a sufficient duration?
- Were the different groups handled similarly except for treatments studied?

Outcome Measures

- Were primary and secondary outcome measures clearly defined? Were any methods needed to enhance their quality (e.g., training of investigators or patients, standardization among multicenter sites, etc.) and were these performed?
- Were outcome measures appropriate and optimal given the study objective?
- Was timing of outcome measurements appropriate and of adequate frequency and duration?

Methods (Continued)

Data Handling

- Was it clear how many patients were in each analysis? Did the data handling method used significantly affect interpretation of study findings?
- Was the number of patients accounted for at each step of the study? Could the reasons for dropout affect the clinical usefulness of therapy?

Statistics

- Were appropriate statistical tests used for all primary outcomes? Were secondary outcomes analyzed appropriately?
- Was power appropriate for all primary and secondary outcome analyses, considering dropouts? If subgroup analyses performed, was power sufficient?

Results

- Were any significant differences apparent among groups at baseline that could influence study results?
- Were results reported for each measure described in Methods section?
- Were the measure(s) of variability used appropriate and sufficient?
- Were findings statistically and clinically significant?
- Was Type II error likely for non-statistically significant findings?
- Was compliance addressed and could this have influenced study results?
- Were there factors (e.g., study setting, diet, other confounding variables) besides the treatments used that could have affected the results observed? If so, were they accounted for or controlled for in the study?
- Were differences in adverse effects among groups statistically analyzed?

Discussion/Conclusion

- Were results interpreted appropriately by authors?
- Did authors adequately explain key study limitations and any discrepancies from other similar studies?
- Were authors' conclusions consistent with the results and study limitations and extrapolated appropriately?

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Journal Club Presentation – Evaluation Rubric

Presenter(s):		Reviewer:				
Crit	teria					
I. STUDY C	OVERVIEW	3 Points	2 Points	1 Point	0 Points	Score
☐ Study objective Methods - Design	ment used ubjects from where? usion criteria		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 Treatments use Dosages/admin Therapy durant Methods - Outcome M Secondary measu Methods - Data Hand Intention to treetc # lost to follow Reasons for dre	ed nistration on Measures assures atling at, per protocol,		Accurately and completely reported ALL relevant treatment regimens, outcome measures, and data handling components	Accurately and completely reported MOST of relevant treatment regimens, outcome measures, and data handling components	Did not accurately and completely report MOST of relevant treatment regimens, outcome measures, and data handling components	
Methods - Statistics □ Tests used □ Power of study Results □ Results for eac □ Confidence int □ p-values □ Compliance □ Adverse events Conclusion □ Authors' concl	h outcome measure ervals s usion(s)	s	Accurately and completely reported ALL relevant statistics, results, and authors' conclusion components	Accurately and completely reported MOST of the relevant statistics, results, and authors' conclusion components	Did not accurately and completely report MOST of the relevant statistics, results, and authors' conclusion components	
II. STUDY ANALYSIS AND	4 Points	3 Points	2 Points	1 Point	0 Points	Score
CRITIQUE						
Analyzed all parts of study (refer to Supplement sheet for guidance)	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 & their impact overlooked or inaccurate	Multiply x 2 for this field only

III. STUDY						
CONCLUSION	3 Points Conclusion summarized		2 Points Conclusion did not	1 Point Conclusion did n	0 Point	ts Scor
Clear, Concise Conclusion Stated	accurately & 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		summarize accurately & completely one of the following: the key points to be taken from study; the drug's role in therapy or clinical practice implications; or the need for any further research in area	summarize accurate completely two of following: the key p to be taken from st the drug's role in th or clinical practi implications; or the for any further rese in area	the Failed to gi conclusio udy; OR crapy conclusio ce completel need inaccurat	n n ly
Comments for Study Conclusion:						
IV. PREPAREDNESS		3 Points	2 Points	1 Point	0 Points	Scor
Knowledge of Study Details			Presenters each well prepared; thoroughly explained ALL details of study	Not all presenters w prepared OR thoroughly explaine only some study details	OR did not	ed t
Response to Questions	Correctly answered ALL questions in a confident manner		Correctly answered ALL questions in a non-confident manner OR correctly answered MOST questions in a confident manner	Correctly answere MOST questions in non-confident mann OR correctly answered only SOM questions	a answered al ner questions Of handled	II R
Comments for Preparedness:						
V. PRESENTATIO	N	3 Points	2 Points	1 Point		
Speaking Style			Spoke clearly; easy to hear and understand	Difficult to hear or understand SOME things spoken	Difficult to hear understand MOS things spoken	
Timing				Within 12 minutes (+/- 3 minutes)	>15 or <9 minute	es
Distracters ("uhs, uhms, etc.) C Distracting Mannerisms	OR		Used few (or no) distracters or distracting mannerisms	Used several distracters or distracting mannerisms	Used distracters distracting mannerisms throughout	or
Eye Contact			Maintained eye contact throughout	Occasionally looked at evaluators	Read the presentation	
Comments for Presentation:					<u> </u>	
				_		
				TOTAL COORE	FROM BOTH SID	EC