Student Self-Ratings of Skill Acquisition from a Clinical Controversy Debate in a Third Year Pharmaceutical Care Lab

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Keywords: debate, therapeutics, active learning, recommendations, clinical controversy

Abstract

Objectives: To evaluate student perspectives of a clinical controversy debate activity designed to improve their skills to effectively approach and communicate complex therapeutic dilemmas. **Design:** A clinical controversy debate activity was implemented in the fall semester of the third year pharmaceutical care laboratory curriculum. Topics were chosen based on controversies encountered in practice. Students were assigned to groups of 5-6 and subdivided to the pro or con of the topic. Each debate lasted 25 minutes. Students completed a self-assessment asking them to rate eight skills (e.g. selecting appropriate references, analysis of literature, defending and predicting arguments, composing and delivering the presentation, and persuading the audience) before and after the debate as: novice, developing, skilled, facilitating/leading, or educating. Results were analyzed descriptively and the pre-post ratings were compared using a Wilcoxon Signed Rank Test. **Results:** 140 (84.8%) students responded to the self-assessment survey. The skill that students rated most highly prior to the debate was selecting appropriate resources and primary literature, with only 7.1% rating themselves as novice. After completing the debate, the skill rated with the greatest improvement was predicting opposing arguments with 47.1% rating as developing and 40% rating as skilled. All eight skills had statistically significant improvements pre- and post-assignment (p < 0.001). **Implications:** Preparing arguments for and against treatment options is an important clinical skill, used regularly by pharmacists. A clinical controversy debate activity resulted in reports of improvement on eight measures of evidence based medicine-related skills.

Introduction

The Accreditation Council for Pharmacy Education (ACPE) standards require students to graduate with the ability to provide patient-centered care, including designing, implementing, evaluating, and adjusting pharmacy care plans that are evidence-based. Students should possess skills in literature evaluation and understand the principles of research design and analysis.[1]

A review of medical curricula found that the most common learning objective in teaching evidence-based medicine (EBM) was improving critical appraisal skills. However, out of 18 reports, only seven curricula evaluated teaching effectiveness.[2] In response, medical schools have attempted to teach and evaluate evidence-based medicine education through student perception[3] and student performance.[4] Pharmacy schools have reported implementing EBM in an elective course to prepare students for advanced pharmacy practice experiences[5] and an elective course in alternative medicine.[6] Better strategies to implement and evaluate the teaching of EBM have been requested.[7,8]

Bradshaw et al. comments that clinical debates are a pedagogical process for students to hone evidence-based clinical abilities for practice.[9] Debates entail the ability to evaluate and understand literature, work in a team, and deliver a comprehensive and convincing argument. Debates are a teaching strategy that promotes student interaction, expands students' perspectives on a given issue, creates doubt about the existence of one clear answer, and requires students to organize arguments and evidence before deriving a solution.[9]

Debates have been used in the education of health professional students including nursing[10], dentistry[11], and medicine[12]. Debates have also been used in pharmacy education to develop analytic and evaluative skills in pharmacy management[13], the US health care system[14], and pharmacokinetics[15].

The use of debates for clinical education has also been described. Gonyeau et al. describe an oral presentation series, which included a 30-minute therapeutic controversy debate. The debate required teams of two pharmacy students to provide an evidence-based case for or against the clinical topic. Students were evaluated on presentation skills, content, and analytic/synthetic approach to literature.[16]

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Additionally, an endocrinology and reproductive science clinical debate required students to find and reconcile information from multiple sources, review literature, make evidence-based decisions, weigh and reconcile conflicting information, utilize impromptu reasoning skills, and work effectively in a team. A retrospective pre-post self-assessment was used to assess participants' abilities ratings. All of the skills improved significantly after the assignment, with the greatest improvement in weighing and reconciling conflicting information.[12]

In addition to exercising EBM skills, debates may be helpful in developing skills related to making and supporting recommendations. The acceptance rate of student pharmacist recommendations has been reported as ranging from 35%-89%[17-21], suggesting room for improvement. In addition, in two studies, verbal recommendations from fourth-year pharmacy students were accepted significantly more than written recommendations.[18,21] Focused practice presenting and supporting a position could further aid the effectiveness of student recommendations.

This project outlines an example of innovation in teaching EBM. The clinical controversy debates are innovative in that they foster both EBM skills and the skills required to support therapeutic recommendations. Furthermore, this project investigated pharmacy students' self-ratings of skill prior to and following the clinical controversy debates using a novel rating system.

Case Study
Design
Clinical controversy debates were implemented in the drug information section of the third year pharmaceutical care laboratory sequence in a dual campus Doctor of Pharmacy program. A total of 165 students participated in the debate assignment. The purpose was to help students learn how to effectively communicate and support complex therapeutic decisions encountered in the provision of pharmaceutical care, using EBM. Topics were selected based on controversies commonly encountered in practice, including issues found in the Pharmacist's Letter[22] and Physician's First Watch[23]. Thirty topics were intentionally selected to vary in clinical areas including ambulatory care, pediatrics, oncology, and infectious disease. Examples are available in Table 1.

Table 1: Examples of Debate Topics

Inhaled corticosteroids in children and risk of stunted growth
Tamoxifen for breast cancer prevention
Daily azithromycin for the prevention of COPD exacerbations
Warfarin 4 weeks vs. 12 weeks follow-up for patients with stable INRs
Use of tenofovir for the prevention of HIV in high-risk populations
Phentermine plus topiramate for weight loss

Objectives (Table 2) for the debate activity were constructed based on a previously described process for teaching EBM and consultation with previous debate literature.[12,16] The five-step process for teaching EBM includes: developing a question using the populations-intervention-comparison-outcome (PICO) format[24]; finding research that may answer the question; evaluating the research for validity, impact, and applicability; applying the information to clinical decision making; and periodically evaluating one's effectiveness.[7] The objectives that were developed were also used in the rubric as evaluation criteria.

Table 2: Clinical Controversy Debate Objectives and Evaluation Criteria

1. Select appropriate resources and primary literature to answer a therapeutic dilemma
2. Critically analyze and evaluate clinical literature, pointing out strengths or weaknesses of key trials on therapeutic dilemmas
3. Apply literature to decision making/position based on patient population, intervention, endpoints, and statistics
4. Defend pros or cons of treatment options or courses of therapy, based on the evidence for indication, effectiveness, safety, and convenience
5. Predict opposing arguments, and prepare appropriate responses to uphold own argument
6. Compose a clear, concise, and well-organized oral presentation within allotted time frame
7. Deliver a professional presentation with self-assurance, and a clear and authoritative voice
8. Establish and persuade listeners with credibility

Students were assigned to groups of five to six, with two to three students for each pro and con side of the debate. There were a total of 30 unique topics between both campuses. Topics were randomly assigned to student groups. Each group presented their own debate, and also served as the audience for a second group's debate. Students had two to five weeks

to prepare for the debates. Presentations occurred over the course of one month. One resident teaching assistant on each campus scored each performance using a rubric. Each presentation was 30 minutes total, using the format outlined in Figure 1.

Advice was given to students on preparing for the debates (See Appendix A). Resources provided included search engines for primary literature (e,g, Medline®, PubMed®) and sources for tertiary literature (e.g. Micromedex®, UpToDate®, DynaMed®). Students were instructed to review material from both sides of the debate to be prepared for rebuttals. Office hours and e-mail access with the resident teaching assistants were available to students.

Student Perception
The University of Minnesota IRB reviewed this project and determined this work to be exempt. Students were asked to complete a self-assessment identifying the component of the activity that was most helpful in improving clinical controversy skills (See Appendix B). Students also completed a retrospective pre- and post-assessment on their debate skills. Eight skills were rated as: novice (1), developing (2), skilled (3), facilitating/leading (4), or educating (5). This rating system was modified from a system used for self-assessment in our drug literature evaluation course. This rating system is consistent with terminology promoted by Pangaro[25], which is designed to reflect the roles a student may play when utilizing these skills (e.g. educating others). It also comments on factors that distinguish levels of performance such as consistency, prompting required, confidence and results. A similar rating system used in a self-assessment of pharmacy student professionalism has been shown to address the ceiling effect often observed in student self-assessments.[26]

Using the retrospective pre- and post-assessment approach, the pre-activity assessment occurs after the activity is completed, at the same time as the assessment of post-activity skills. This approach has been used to measure change in subjects' functioning prior to the assignment. The retrospective pre- and post-assessment approach may be more desirable because it eliminates the need to test participants twice and may help avoid response-shift bias.[27,28] Studies in pharmacy education have used the retrospective pre- and post-tool for measurement. Examples of uses include: assessment of student learning about the patient experience[29], learning related to diabetes care[30], knowledge and confidence concerning the prevention of medication errors[31], learning outcomes of a pharmacy and therapeutics committee competition[32], development of positive advisor/advisee relationships[33], improvement in skills and

confidence in counseling patients[34], and development of health literacy knowledge and skills[35]. A Wilcoxon Signed Rank Test was performed to compare the retrospective pre- and post- scores. An independent samples median test was performed to assess for differences in student response by campus. Students were also asked to give feedback on improvements for the debate assignment in the future.

A total of 140 (84.8%) students provided responses to the self-assessment. Four students did not complete the portion of the self-assessment rating the most helpful component. Practice in applying literature to decision making was the activity component that was rated most helpful (Table 3).

Table 3: Student Ratings for Which Component was Most Helpful in Improving their Therapeutic Debate Skill (N=136)

Activity Component	Number (%)
1. Select resources	10 (7.4)
2. Analyze literature	28 (20.6)
3. Apply literature to decisions	48 (35.3)
4. Defend treatment options	15 (11.0)
5. Predict opposing arguments	22 (16.2)
6. Compose presentation	4 (2.9)
7. Deliver presentation	3 (2.2)
8. Establish credibility	6 (4.4)

Both before and after the debate activity, the skill that respondents rated most highly was selecting appropriate resources. The greatest change was reported in predicting opposing arguments, with 47.1% of respondents rating their skill as Developing and 40% rating as Skilled after the activity (Figure 2). Additionally, students reported changes in their skill to apply literature to decision-making with the percent reporting Novice declining from 22.1% to 2.9%. All eight skills had statistically significant improvements in students' median ratings pre- and post- assignment (p < 0.001). There were no differences in median responses between campuses.

Student Performance
Upon completion of the debate, each objective was rated by the resident teaching assistant on a scale of 1-3 points, using the rubric in Appendix C. The maximum number of points groups could receive was 26. The average score was 21.80 [range 14-26]. Final ratings assigned included Exceptional (score of 21-26, noted as S+), Satisfactory (score of 14-20, noted as S), and Unsatisfactory (score of 9-13, noted as S-). Out of 44 groups, 31 groups (70.45%) received an Exceptional rating, 13 groups (29.54%) received a Satisfactory rating, and no groups received an Unsatisfactory rating.

Discussion

This project implemented an innovative approach to practicing EBM skills and exercising skills necessary to making pharmacotherapeutic recommendations. Students evaluated the debate activity, rating applying and analyzing literature as the most helpful skills targeted by this assignment. Similarly, Timpe et al. assessed student perspectives in achieving learning objectives before and after 17 weekly progressive drug information activities culminating in a journal club and found that students improved on skills related to selecting resources and analyzing literature.[36]

Composing the presentation (2.9% rated most helpful) and delivering the presentation (2.2% rated most helpful) were rated the least frequently as being most helpful. This may be because the design of the activity did not emphasize delivery as much as investigation. For the most part, students conducted the debates sitting down and reading their research directly from paper or computer. Delivery for the assignment could be better emphasized by clarifying expectations for a formal presentation in the assignment, and by having students present in front of more peers and more faculty members.

The greatest skill improvement was reported for predicting opposing arguments. This may be because students may not have been explicitly asked to practice this skill before. Other reported methods for developing literature evaluation skills in pharmacy students include: use of peer assessment for group work quality in a drug literature evaluation course[37], use of student response systems to evaluate learning of drug literature evaluation[38], an offering of an elective course on landmark trials[39], and weekly activities culminating in a journal club[36]. These teaching approaches do not appear to address the skills related to making therapeutic recommendations that were uniquely exercised by this debate format, including predicting opposing arguments. Interestingly, only 16% of students rated predicting opposing arguments as the most helpful, yet this is an important skill in making and supporting therapeutic recommendations. Emphasizing the value of debate preparation in building EBM skills and the value of debate delivery in building skills related to making recommendations may help students to appreciate the relevancy of both aspects of this assignment.

Students self-assessed their skill development and all eight skills had statistically significant improvements. However, it should be noted that the medians of most abilities were rated as "developing" both before and after the debate assignment. Only the abilities to predict opposing arguments and establish credibility had median ratings moved from

"novice" to "developing". Further experiences with debates may be needed to create additional skill development.

Following the debates, selecting resources was the only skill where the majority of respondents rated themselves as Skilled. For the remaining seven skills, the majority of respondent ratings were Developing, suggesting the need for additional literature evaluation and debate related skill development prior to Advanced Pharmacy Practice Experiences (APPEs).

The skills most frequently rated as Novice or Developing after the debates were defending treatment options (54.3%) and establishing credibility (60%). These skills may be targets for future interventions, such as introducing debates earlier in the curriculum and/or identifying additional learning activities that exercise these skills.

Lessons Learned

Much of the feedback from students related to topic assignments. Students were not permitted to choose their own topic. While some students felt uncomfortable discussing an unfamiliar topic, other students commented that it allowed them to understand it before encountering it in their therapeutics course. In addition, topics that had a stronger argument to one side caused some student frustration. Choosing topics for the assignment should continue to be based on relevant clinical controversies in pharmacy practice, but consideration may be taken for more equivalent arguments for both pro and con sides. Finally, 30 topics were selected for this assignment to avoid repetition. With repeated use of clinical controversy debates in various points of the curriculum, it may not be possible to generate this variety. Further experimentation with the desired amount of topic variety is needed.

Consideration must also be given to evaluation of student performance. Only one resident evaluator observed all of the debates for each campus. The resident evaluators discussed the rubric and expectations for student performance prior to the start of the first debate to help create consistency in scoring. However, it may increase student engagement and accurate assessment of student performance if more clinical faculty were also involved in observing the debates. Multiple graders would allow for more input on the evaluation of the debates. In addition, more faculty involvement may challenge students to perform at their best.

Students commented on the value of observing a sample debate prior to participating in the assignment. A sample debate could be conducted in real time or could be made available to students via video recording.

Finally, the debates assignment required time for preparation and facilitation, but was feasible to implement. Lead instructor preparation for the activity (e.g. identification of debate topics, preparing logistics, assigning students to groups) required about 6 hours. The total time for the two pharmacy residents to facilitate and evaluate 34 debates was approximately 20 hours throughout the semester. As the activity is used again, reusing previous topics will reduce the time commitment needed for instructors to prepare the assignment. With adequate resources, multiple campuses can implement this activity and achieve comparable results.

Future Research
Data was not captured for every skill assessed by the rubric during the debate presentations. Only final rubric ratings were recorded. Future research should incorporate assessment of both performance and self-rating of skills to further explore the effectiveness of this teaching method.

This project involved student self-ratings of skills pre- and post-debate using a rating system that had been developed previously within the college's curriculum. Further work is needed to refine and validate the rating system and the descriptions of the skills assessed. Student self-rating is subject to social desirability response bias and a false perception of improvement.[27] As a result, additional ratings of performance may be helpful. Peer-assessment may be an additional outcome measure for future research.

In particular, future research should explore further methods for instructor assessment of the quality of the debates. For example, although a rating of "persuasiveness" was included, it may be helpful to incorporate other measures of effectiveness, such as instructor's ratings of the student's credibility and strength of the defense of the therapeutic option. Instructor input on these variables could be helpful in validating student self-assessments and building student skill.

Conclusions
Evidence-based medicine skills are essential for today's practicing pharmacist. In addition, preparing arguments for and against treatment options is an important clinical skill used regularly by pharmacists. The clinical controversy debate assignment exercised EBM skills, as well as skills in making and supporting therapeutic recommendations. The assignment was successfully implemented in a dual campus program and evaluations from students showed self-rated improvements on eight skills. This assignment represents a teaching innovation in EBM, an area in which creative and effective teaching methods are needed in pharmacy education.
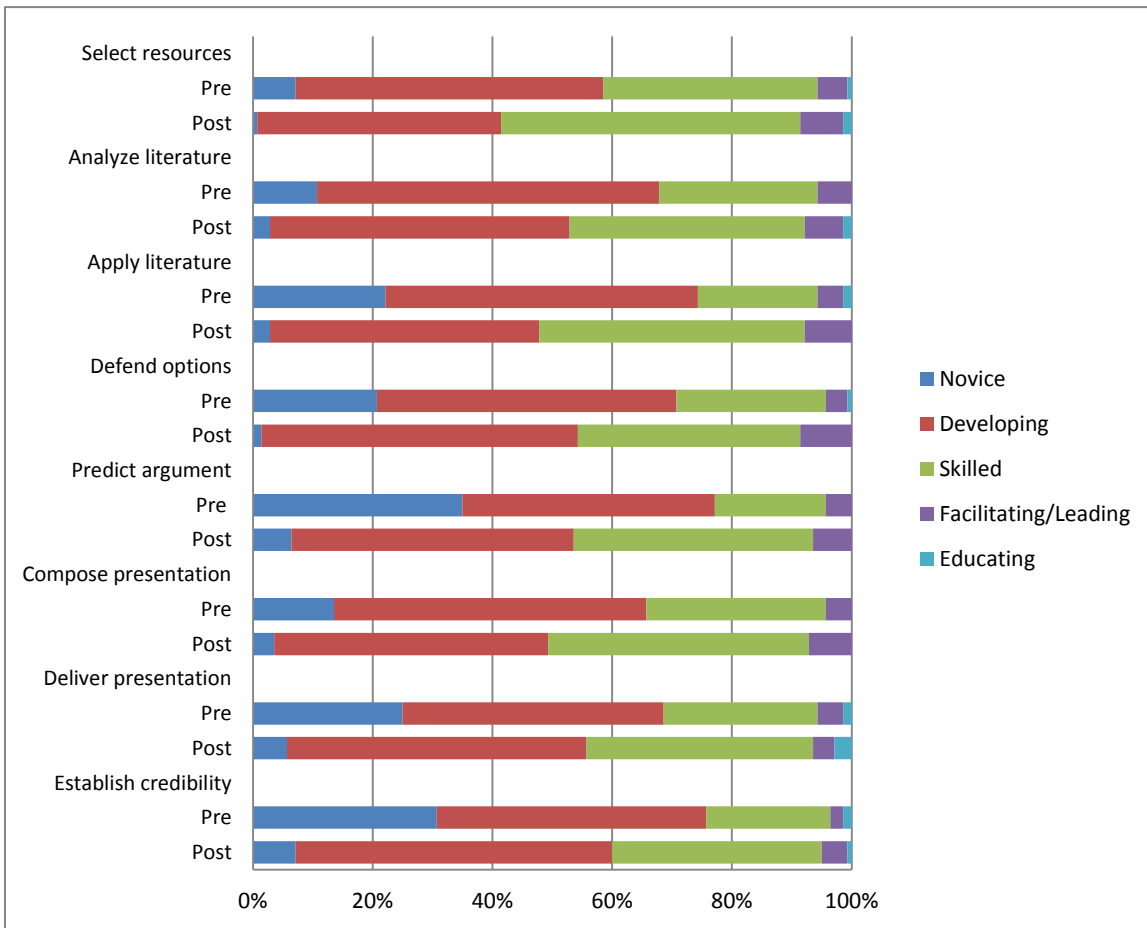
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Figure 1: Debate Format and Timing

First affirmative speech (5 minutes)

- Introduces topic and states view of controversy.
- Demonstrates why course of action should be pursued.
- Cite literature that evaluates this topic and use its strengths or weaknesses to argue view of controversy.

First negative speech (5 minutes)

- States opposing view of controversy.
- Demonstrates why course of action should not be pursued.
- Cite literature that evaluates this topic and use its strengths or weaknesses to argue opposing view of controversy.

Second affirmative speech (5 minutes)

- Indicates weakness in negative team's plan. This should be anticipated and prepared prior to the debate. Debaters must have knowledge of all affirmative and negative arguments in order to prepare a good rebuttal.
- Reaffirms benefits of affirmative plan.

Second negative speech (5 minutes)

- Indicates weakness in affirmative team's plan. This should be anticipated and prepared prior to the debate. Debaters must have knowledge of all affirmative and negative arguments in order to prepare a good rebuttal.
- Reaffirms benefits of negative plan.

Affirmative rebuttal speech (2 minutes)

- Answers negative team's attacks.
- Explains why affirmative team has won debate or key issues in debate.

Negative rebuttal speech (2 minutes)

- Answers affirmative team's attacks.
- Explains why negative team has won debate or key issues in debate.

Question/answer session for whole group (5 minutes)

- The audience is encouraged to ask thought-provoking questions and determine what the best decision may be in a clinical situation.

Figure 2: Students' Skill Self-Ratings Pre and Post Debate (N=140)

Appendix A: Assignment Advice

Tips for Effective Debate Preparation Research:
1. Use available literature search databases on the U of M biomedical library http://hsl.lib.umn.edu/biomed
   - UpToDate® is a good resource to familiarize yourself with the topic
   - DynaMed® is a good resource to find relevant literature to your topic
   - Micromedex Drugdex® provides evidence-based evaluations of medications
   - OVID Medline, PubMed, and Google Scholar are great search engines to find the primary literature available in other sources, and evaluate these yourself
2. Debaters should read all available materials on both sides of the controversy.
   - Often powerful arguments appear in only one source.
   - Failure to read every source might result in failure to anticipate that negative attack.
   - Knowledge of all written materials helps the debater to anticipate the direction and strength of the attacks.
   - This knowledge enables the debater to refute an attack more effectively.
   - Evidence from a variety of sources enhances the credibility of an argument.
   - Taking a global view of the literature may be more effective than quoting a string of points from single studies.
3. Debaters should consider the relevance of the date of evidence when searching the evidence and continually update their evidence.
4. Debaters should note that certain sources offer superior evidence for certain issues.
   - A peer-reviewed article in NEJM is much more likely to be objective than a newsletter published by a pharmaceutical company.
   - Knowledge of primary literature is usually more effective than knowledge of other sources.
   - Review articles can be helpful, but use the references section to identify the primary literature they used in the review
5. Practice, practice, practice
6. Use the physical space you are given. Pretend you are in a clinical setting speaking with a health care professional.
7. Have fun! This should be a learning experience as much as it is enjoyable. Think of creative ways to convince the audience that your side is correct.

Modified with permission from Michael Gonyeau, Clinical Professor and Director of Undergraduate Programs, Northeastern University.

Appendix B: Clinical Controversy Debates Student Self-Assessment

Name (first & last): _____

What component of this activity was most helpful in improving your therapeutic debate skills? Please only select one.

Select appropriate resources and primary literature	
Analyze and evaluate clinical literature	
Apply literature to decision making or debate position	
Defend pros or cons of treatment options or courses of therapy	
Predict opposing arguments and uphold own argument	
Compose a clear and well-organized oral presentation	
Deliver a professional presentation with self-assurance	
Establish and persuade listeners with credibility	

Please explain:

Please use the following descriptions to rate your therapeutic debate skills. You will be asked to rate what your skills were before the course and what your skills are now.

Novice: Although I have had some success with this skill in structured learning environments, my efforts have had mixed results and I am not completely confident. I consider my ability a "work in progress".

Developing: I have experienced consistent knowledge/skills gains. I have a personal awareness of my ability and know when to seek support. I have a growing confidence in this skill and endeavor to use it regularly.

Skilled: Without prompting or support from instructors or peers, I regularly use this skill and perform it reliably and consistently. I am confident in using this skill with regularly used study designs, common topics and traditional article types/journals. I use this skill efficiently and effectively without false starts or consulting directions/references.

Facilitating/Leading: I am confident in using this skill for most clinical controversies. I am the "go to" person for colleagues that are looking to develop their skills further. I regularly provide quality guidance and counsel that contributes to the success of others with this skill.

Educating: I am confident in using this skill regardless of the clinical controversy. I have sought to learn more about this skill and I have shared my learning with others. My efforts at educating others are characterized by strong interpersonal skills, use of evidence, and thoughtful teaching and learning success.

Please rate your skills prior to this activity:

Therapeutic Debate Skills	Novice	Developing	Skilled	Facilitating/ Leading	Educating
Select appropriate resources and primary literature					
Analyze and evaluate clinical literature					
Apply literature to decision making or debate position					
Defend pros or cons of treatment options or courses of therapy					
Predict opposing arguments and uphold own argument					
Compose a clear and well-organized oral presentation					
Deliver a professional presentation with self-assurance					
Establish and persuade listeners with credibility					

Please rate your skills now:

Therapeutic Debate Skills	Novice	Developing	Skilled	Facilitating/ Leading	Educating
Select appropriate resources and primary literature					
Analyze and evaluate clinical literature					
Apply literature to decision making or debate position					
Defend pros or cons of treatment options or courses of therapy					
Predict opposing arguments and uphold own argument					
Compose a clear and well-organized oral presentation					
Deliver a professional presentation with self-assurance					
Establish and persuade listeners with credibility					

Aside from time given to prepare, what component of this activity could be done better? Please explain.

_____

_____

Appendix C: Debate Evaluation Rubric
Clinical Controversy Debate Presentation Evaluation

Students:_____

Presentation Title:_____

	S + (3 Points)	S (2 Points)	S - (1 point)	Comments
Appropriate resource selection	Resources selected were primary key clinical trials relating to the topic. Several of these trials were selected and presented during the debate.	Appropriate resources were selected. Most were primary literature, and at least one trial was presented.	Resources were minimal and/or did not include primary literature. No trial was presented, or trials presented had very weak evidence.	
Literature analysis	Literature analysis was complete and thorough, and strengths or weaknesses were dissected completely.	Literature analysis was acceptable. Appropriate strengths or weaknesses were pointed out.	Literature analysis was minimal and/or few or no strengths or weaknesses were pointed out.	
Application of literature	Literature was applied to debate position, and patient population, intervention, endpoints, and statistics were thoroughly addressed from key trials.	Literature was applied to debate position, and some components related to patient population, intervention, endpoints, and statistics were addressed.	Literature was not applied to the debate, and/or none of the components of patient population, intervention, endpoints, or statistics were addressed.	
Analysis of treatment options	Pros and cons of the position were thoroughly analyzed based on the indication, effectiveness, safety, and convenience of treatment options.	Treatment options were analyzed based on the indication, effectiveness, safety, and convenience.	Treatment options were not analyzed at all, and/or indication, effectiveness, safety, and convenience was not mentioned.	
Prediction of opposing arguments	Opposing arguments were predicted and appropriate responses were clearly prepared. Arguments were well delivered to refute opposing team points.	Opposing team arguments were adequately anticipated and the team was able to uphold own argument.	Opposing team arguments were clearly unexpected and the team was unprepared to uphold own argument.	
Presentation	Presenters were clearly prepared. Arguments were presented in a clear, concise, and well-organized manner and within the allotted time frame.	Arguments were presented in a clear, concise, and well-organized manner within the allotted time frame.	Presenters were clearly unprepared. Arguments were not clear, and/or exceeded the allotted time frame.	
Professionalism	Presentations were delivered professionally with a clear, authorative, and respectful voice, and	Professionalism was evident, and presentations were delivered with a clear and	Presentations were not delivered professionally. The opposing team and/or audience were	

	would be impressive if addressed to another healthcare provider.	authoritative voice.	offended, and one or more statements would be inappropriate to use with another healthcare provider.	
Persuasion abilities	The audience and opposing team was thoroughly persuaded. Responses were strong, completely addressed, and another healthcare provider would side with this student team.	Arguments were credible and the audience may be persuaded with points presented.	The audience and opposing team was not persuaded. Responses were weak, unaddressed, and/or inappropriate.	
Self-assessment completion		Completed. Comments were respectful and professional.	Not completed and/or comments were disrespectful and/or unprofessional.	
Totals				

9-13 = S-   14-20 = S   21-26 = S+

Grade =