

BRIEF**An Online, Multi-Institutional APPE Student Debate on Diabetes Medications**

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Objective. The purpose of this study was to evaluate change in APPE student knowledge and measure student perceptions of an online, multi-institutional debate curriculum as an alternative to a journal club to improve critical thinking skills related to diabetes medications.

Methods. All APPE students assigned to four faculty (n=37) at three different colleges during the 2020-2021 academic year received instruction on diabetes medication classes and their cardiovascular outcome trials (CVOTs). Students debated via the Lincoln-Douglas format whether glucagon-like peptide-1 receptor agonists (GLP-1 RAs) or sodium-glucose cotransporter-2 inhibitors (SGLT2i) classes are the preferred second-line therapies in patients with type 2 diabetes mellitus (T2DM). Matched pre and post-knowledge scores were measured using a 7-item assessment tool. A postdebate 22-item survey measured student perceptions of the activity.

Results. Pre- and post-knowledge scores were compared in thirty-two students yielding an 86% match rate. Knowledge scores improved 32% (59% pre vs. 87% post). Thirty-three students completed the survey yielding an 89% response rate. Students reported the debate activity was beneficial (100%) and rated it more effective than a journal club at improving critical thinking skills and knowledge retention.

Conclusion. Preliminary results suggest the incorporation of an online, multi-institutional debate as an alternative to journal clubs during APPE rotations was well received. Further research is warranted on the impact of the multi-institutional debate and how to best deliver it during the APPEs of a pharmacy curriculum.

Keywords: critical thinking, debate, journal club, online, multi-institutional

INTRODUCTION

Pharmacy education outcomes and standards emphasize the need for experiences and assessments that are designed to transform the learner into one who can problem solve, evaluate literature, synthesize information, and make evidence-based, patient-centered clinical judgements.^{1,2} The experiential education environment provides multiple opportunities to evaluate whether students have acquired the necessary skills to achieve these outcomes.^{3,4} Journal clubs are one pedagogical method to assess critical thinking and problem-solving skills during advanced pharmacy practice experiences (APPEs). However, their limitations often include a highly structured and rehearsed presentation that may lack depth, a superficial echoing of the strengths and weaknesses as stated by the authors, failing to arrive at their own conclusions, and/or misapplying the results to patient care.⁵⁻⁷

The use of debates in the experiential educational environment may overcome some of the shortcomings of journal club presentations. Debates require the exercise of logic, critical thinking skills, clear spontaneous communication, increased breadth of evaluated literature, and a more robust and engaging educational value for attendees.⁸⁻¹⁰ Students must demonstrate that they can analyze and synthesize literature to argue their position, refute the opposition when necessary and apply data to real life scenarios. Thus, a debate more closely reflects the problem solving skills that are necessary for clinical decision-making during direct patient encounters and collaborative discussions with team members. Furthermore, the communication skills used to justify one's position and persuade the observer, parallels the actions that pharmacists employ when advocating for patients to the health care team.

Debates as a component of the didactic pharmacy curriculum have been previously described.¹⁰⁻¹⁵ The majority of the outcomes in these studies include student-reported improvements in skills such as critical thinking, literature evaluation, clinical decision making, communication, and teamwork. Knowledge-based outcomes were less reported, but demonstrated some improvement.¹² Overall, debates have been well received by students as a teaching method. Given the effectiveness of debates in improving student knowledge, literature evaluation skills and communication abilities, it seems that debates are underutilized in pharmacy education.¹⁰

The use of debates during APPEs as an alternative to journal clubs during APPEs is not well studied.^{16,17} Toor et al concluded debates could be employed to teach literature evaluation skills, but some participants reported they had not completed a journal club therefore a fair comparison was impossible.¹⁶ Recently, Steuber and colleagues found no differences in knowledge scores among participants who participated in both debates and journal clubs.¹⁷ Nonetheless, debates during experiential education can be considered as an alternative to journal clubs; however impediments may include higher faculty workload and time commitment, a lack of evaluation tools, and potential difficulty in judging student performances to provide meaningful feedback.⁷

Debates in pharmacy education have traditionally been conducted with students debating fellow classmates within the same institution. However, more recently, virtual meeting technology provides an opportunity for multi-institutional collaboration. A multi-institutional debate format creates unique opportunities for students to interact with a more diverse group of peers and participate in cooperative learning---an educational strategy known to advance critical thinking beyond the potential of the individual learning.¹⁸ Benefits of a multi-institutional debate format may include improving communication and collaboration skills, inspiring cooperation and competition to enhance learning, and fostering a greater sense of community. Online platforms can aid scheduling, expand participation and eliminate geographic barriers. Moreover, the newfound familiarity with virtual meeting technology resulting from the COVID-19 pandemic has opened the door to expand experiential education activities to include multi-institutional interactions.¹⁹ Luc and colleagues demonstrated that a multi-institutional debate-style journal club with surgical trainees improved exam scores and was preferred by participants over traditional journal club.²⁰ To our knowledge, no research has measured the impact of multi-institutional APPE student debate as an alternative to a journal club. The purpose of this pilot study was to evaluate change in APPE student knowledge and measure student perceptions of an online, multi-institutional debate curriculum as an alternative to a journal club to improve critical thinking skills related to diabetes medications.

METHODS

Faculty at three colleges of pharmacy developed and agreed upon the learning objectives, pre-debate content, debate procedures, and assessment metrics. At the beginning of the 2020-2021 academic year, faculty coordinated ambulatory care APPE calendars with the goal of scheduling debates at least three weeks from the start of each rotation. Debates began as early as May 2020 and continued through April 2021. Faculty oriented their students to the debate activity (ie, format, evaluation rubric) and provided access to shared, online resources via a free learning management system (Open Canvas). At their discretion, each faculty member provided pre-debate preparations on diabetes medications and cardiovascular outcome trials (CVOTs). Each of the three institutions provided one to three students who were expected to actively participate. Debate teams could be comprised of students from the same institution or mixed between

institutions in order to create balanced groups. Team positions were determined on the day of the debate by coin toss, thus students had to prepare for both viewpoints. Students debated synchronously via videoconference using the Lincoln-Douglas format (Table 1) whether glucagon-like peptide-1 receptor agonists (GLP-1 RAs) or sodium-glucose cotransporter-2 inhibitors (SGLT2i) classes are the preferred second-line therapies in patients with type 2 diabetes mellitus (T2DM). This debate format was chosen because it is the most common debate method employed in pharmacy education research. A debriefing with all participants immediately followed the conclusion of the debate. Individual faculty reviewed rubric evaluations with their respective learners by the conclusion of the rotation.

An online 7-item multiple choice and short answer knowledge assessment was collaboratively designed by the faculty and administered at the beginning and end of APPEs. Pre- and post- scores were matched for each student using a unique identifier code, allowing for intra-student analysis of knowledge change. A 22-item post-debate survey was created using a 5-point Likert scale (strongly agree to strongly disagree) to measure student perceptions in the achievement of the learning objectives and of the collaboration experiences with students from other institutions. A survey link was emailed to all students after completion of the APPE with a second email reminder approximately one week later. Both instruments were piloted and revised during the 2019-2020 APPE academic year after five scheduled debates. Primary adjustments to the surveys included knowledge question revisions and addition of a patient case. All data were analyzed using descriptive statistics. Chi-square test was used to compare debate and journal club categorical data and paired t-test to compare knowledge scores. The study was approved by the institutional review board at each college.

RESULTS

Thirty-seven student pharmacists participated in ten scheduled debates from May 2020 – April 2021. Baseline characteristics revealed 49%, 27% and 24% of respondents were enrolled at Auburn, East Tennessee State and Roosevelt Universities, respectively. A majority of all students (70%) had prior debate experience. Pre- and post-knowledge scores were compared in thirty-two students (86% response rate). Knowledge scores improved 32% (59% pre vs. 87% post) ($p < 0.001$). Thirty-three students completed the survey (89% response rate). Survey results were very positive with a large majority of respondents reporting “strongly agree” or “agree” on the overall debate learning experience (Table 2). Respondents reported the debate activity deepened their knowledge about diabetes medications (88% strongly agree) and the CVOTs associated with those classes (91% strongly agree). They also enjoyed interacting with students in their preparation for the debate activity (85% strongly agree or agree), yet this decreased during the debate (58% strongly agree or agree). When compared to previous journal club assignments, a greater proportion of students reported the debate activity increased their critical thinking skills ($p = 0.03$), knowledge about diabetes medications ($p = 0.01$), and ability to retain information ($p < 0.01$) (Table 3).

DISCUSSION

The novel incorporation of an online, multi-institution debate during an ambulatory care APPE rotation to improve student pharmacists' critical thinking skills and enhance evidence-based knowledge of diabetes medications was effective as demonstrated by the improvement in knowledge assessment. In addition, it was well received by the students based on their reported perceptions of the assignment. The overall improvements on the students' evidence-based knowledge assessment and positive perceptions of the debate are similar to previous studies.^{10-13, 18, 20} Importantly, the significant improvement in their knowledge scores along with the students' positive perceptions of educational gains and overall experience provide preliminary supporting data for more broadly offering a clinical debate as an alternative to journal club. Uniquely, this study utilized an online, multi-institutional component allowing learners the opportunity to prepare and collaborate with other APPE students. Interestingly, while they enjoyed interacting with other students in the preparation process, the findings were less favorable during the actual debate. One potential reason for this discrepancy could lie in the differences in student personalities. The debate interaction may have been more challenging for introverted students. During the post-debate debriefings, students commented on how the multi-institutional interactions was beneficial in augmenting knowledge gaps supporting the cooperative learning theory. Lastly, when compared to previous journal club experiences, students reported the debate required more extensive preparation, but was significantly better at improving their critical thinking skills and knowledge retention.

Limitations of this pilot study include a small sample size of survey respondents. In addition, the knowledge assessment instrument was an unvalidated, short 7-item tool; however, the investigators piloted the instrument during the previous year and revised it to improve reliability. Also, while the debate structure and process remained consistent, each participating faculty member elected to facilitate the acquisition of diabetes medication foundational knowledge independently and in a fashion that best suited their rotation design. While some conducted discussions on the CVOTs, others utilized review articles as roadmaps for their discussions or used a card game as methods to augment retention. Still, this variable strengthens external validity as faculty at other institutions could more easily adopt and replicate the

debate while using a variety of techniques to bolster background knowledge. This investigation lacked a comparator group which makes it impossible to determine whether the debate itself or the time spent with faculty reviewing CVOTs beforehand led to the improved knowledge. This difference may have also accounted for the nonsignificant difference found in students' perception of confidence in primary literature evaluation (Table 3), although all students reported previous completion of at least one traditional journal club assignment. In addition, the lack of a journal club compactor group during the rotation may lead to recall bias. Finally, the variability of college participation for each debate was due to a lack of academic APPE calendar consistency. Despite these limitations, the results presented justifies greater exploration of incorporating debates into experiential education. Future endeavors may expand upon this pilot project through inclusion of a journal club comparator arm, standardization of the pre-debate CVOT foundational knowledge preparation, and greater evaluation of the benefits and limitations of the multi-institution collaboration.

Given our findings, we have noted several areas for further improvements. The student orientation process to the debate could ideally be conducted virtually with all participating students. Although this would be challenging given the off-cycle start to APPEs among the institutions, it would verify consistent provision of information to all participants. This would also allow for students to initially meet earlier during their rotations across the institutions. Alternatively, asynchronous pre-recordings of foundational content could be shared across schools to reduce the scheduling conflicts and reduce faculty workload. Additionally, the knowledge assessment tool needs to be expanded beyond 7-item questions and more application-based questions should be incorporated. An objective structured clinical examination (OSCE) could also be created to assess application of direct patient care skills. Finally, adding more assessment questions aimed at the multi-institutional collaboration could also be helpful in justifying the coordination of individual school calendars.

CONCLUSION

Our preliminary results suggest the incorporation of an online, multi-institutional debate as an alternative to journal clubs during APPE rotations was well received. Future goals are to improve the assessment instruments and incorporate a comparator. Further research is warranted on the impact of the multi-institutional debate and how to best deliver it during the APPEs of a pharmacy curriculum.

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Table 1. Debate Structure and Format

Category	Description of Activities	Time
Opening Arguments	Student introductions including names of colleges represented and the medication class to promote as second-line for the treatment of T2DM after metformin. The argument clearly states the favored position and is supported by evidence-based outcomes. Negative outcomes of the other medication class can be introduced to further support the position.	4 minutes per team
Work Period	Student teams are sent to breakout rooms to discuss and collaborate on how to rebut any information presented by opposing team	4 minutes total
Rebuttal	Refute opponent's argument and identify any errors or omissions. Offer new evidence, if applicable, to support contentions.	3 minutes per team
Question and Answer	Open debate period where students and/or faculty may directly ask questions of the opponent.	10 minutes total
Closing Arguments	Summarize the favored position and why it is more important than the opponent's position. Remind the audience of any arguments your opponent did not discuss or were conceded. End with a strong appeal to adopt the favored position.	2 minutes per team
Post-Debate Debriefing	Open discussion among the participants on the debate assignment and how it compared to a journal club activity in terms of preparation time, literature evaluation, development of critical thinking skills, and knowledge retention	No limit

T2DM=Type 2 Diabetes Mellitus

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Table 2. Student Perceptions of Debate Preparation and Learning Experience (n= 33)

Survey Item	SA (%)	A (%)	N (%)	D (%)	SD (%)
The debate was a helpful learning experience	70.0	30.0	0	0	0
I gained new knowledge about CVOTs for antihyperglycemic medications	90.9	9.1	0	0	0
I gained a deeper understanding of GLP-1 RA and SGLT2 inhibitor class of medications	87.9	12.1	0	0	0
I enjoyed interacting with other student pharmacists to prepare for the debate	63.6	21.3	12.1	3.0	0
I enjoyed interacting with students from other colleges of pharmacy during the debate	39.4	18.2	39.4	3.0	0
I prefer a team debate structure over individual debate structure	60.6	21.2	18.2	0	0
I felt the pre-debate PowerPoint assignment helped prepare me for the debate	63.6	36.4	0	0	0
I felt prepared to defend my team's position (either GLP-1 RA or SGLT2 inhibitors) for the debate	54.5	45.5	0	0	0
I felt prepared to argue against the other team's position (either GLP-1 RA or SGLT2 inhibitors)	51.5	45.5	3.0	0	0
I spent more time preparing for the debate as compared to a traditional journal club	45.5	36.3	9.1	9.1	0

SA=strongly agree; A=agree; N=neutral; D=disagree; SD=strongly disagree

CVOT=cardiovascular outcome trial; GLP-1 RA=glucagon-like peptide-1 receptor agonist; SGLT2=sodium-glucose cotransporter-2

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Table 3. Student Perception of Debate Versus Journal Club (n= 33)

Student Perceptions of	Frequency of Responses				<i>p</i> -value*
	Debate		Journal Club		
	SA/A (%)	N/D/SD (%)	SA/A (%)	N/D/SD (%)	
Increased my critical thinking skills	90.9	9.1	66.7	33.3	0.03
Increased my knowledge retention	90.9	9.1	57.5	42.5	<.01
Increased my confidence evaluating primary literature	87.9	12.1	75.8	24.2	0.34
Increased my knowledge of diabetes medications	81.8	18.2	51.5	48.5	0.01

SA=Strongly Agree; A=Agree; N=Neutral; D=Disagree; SD=Strongly Disagree

*Chi-Square test

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