BRIEF

An Online, Multi-institutional Debate on Diabetes Medications by Advanced Pharmacy Practice Experience Students

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Objective. The purpose of this study was to evaluate changes in advanced pharmacy practice experience (APPE) students’ knowledge and to 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. Students debated via the Lincoln-Douglas format whether the preferred second-line therapies for patients with type 2 diabetes mellitus are either glucagon-like peptide-1 receptor agonists or sodium-glucose cotransporter-2 inhibitors. Matched pre- and post-APPE knowledge scores were measured using a seven-item assessment tool. A 22-item post-debate survey measured student perceptions of the activity.

Results. Pre- and post-APPE knowledge scores were compared in 32 students, yielding an 86% response rate. Knowledge scores improved 32% (59% pre vs 87% post). Thirty-three students completed the perceptions survey, yielding an 89% response rate. Students reported that 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 that incorporating 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

In Doctor of Pharmacy (PharmD) programs, 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. The experiential education environment provides multiple opportunities to evaluate whether students have acquired the necessary skills to achieve these outcomes. 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 that students give highly structured and rehearsed presentations that may lack depth, superficially echo the strengths and weaknesses as stated by the authors, fail to arrive at their own conclusions, and/or misapply the results to patient care.

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. 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, the skills needed in a debate more closely reflect the problem-solving skills that are necessary for clinical decision-making during direct patient encounters and collaborative discussions with team members.

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Furthermore, the communication skills needed to justify one’s position and persuade observers parallel 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.\textsuperscript{10-15} In these studies, most outcomes include student-reported improvements in skills such as critical thinking, literature evaluation, clinical decision-making, communication, and teamwork. Knowledge-based outcomes are less often reported but have demonstrated some improvement.\textsuperscript{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.\textsuperscript{10}

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

Debates in pharmacy education have traditionally been conducted with students debating fellow classmates within the same institution. However, more recently, virtual meeting technology has provided 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 individual learning.\textsuperscript{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 in 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.\textsuperscript{19} Luc and colleagues demonstrated that a multi-institutional debate-style journal club with surgical trainees improved examination scores and was preferred by participants over the traditional journal club.\textsuperscript{20} To our knowledge, no research has measured the impact of a multi-institutional APPE student debate as an alternative to a journal club. The purpose of this pilot study was to evaluate changes in APPE students’ knowledge and to 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, predebate 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 (Canvas; Instructure Inc). At their discretion, each faculty member provided predebate preparations on diabetes medications and cardiovascular outcome trials. Each of the three institutions provided one to three students who were expected to actively participate. Debate teams could comprise 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 a coin toss; thus, students had to prepare for both viewpoints. Debating synchronously via videoconference using the Lincoln-Douglas format (Table 1), students had to argue whether the class of glucagon-like peptide-1 receptor agonists or the class of sodium-glucose cotransporter-2 inhibitors are the preferred second-line therapies in patients with type 2 diabetes mellitus.\textsuperscript{10} 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 end of the rotation.

An online knowledge assessment in the form of a seven-item multiple choice and short answer survey was collaboratively designed by the faculty and administered at the beginning and end of APPEs. Pre- and post-APPE scores were matched for each student using a unique identifier code, allowing for intrastudent analysis of knowledge change. A 22-item postdebate survey was created using a five-point Likert scale (“strongly agree” to “strongly disagree”) to measure student perceptions on the achievement of the learning objectives and on the collaboration...
experiences with students from other institutions. A survey link was emailed to all students after completion of the APPE, and a second email reminder was sent 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 the paired t test was used to compare knowledge scores. The study was approved by the institutional review boards at each college.

RESULTS

Thirty-seven student pharmacists participated in 10 scheduled debates from May 2020 through April 2021. Baseline characteristics revealed that 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-APPE knowledge scores were compared in 32 students (86% response rate). Knowledge scores improved 32% (59% pre vs 87% post) ($p < .001$). Thirty-three students completed the perceptions 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 that the debate activity deepened their knowledge about diabetes medications (88% strongly agreed) and the cardiovascular outcome trials associated with those classes (91% strongly agreed). They also enjoyed interacting with students in their preparation for the debate activity (85% strongly agreed or agreed), yet this enjoyment decreased during the debate (58% strongly agreed or agreed). When compared to previous journal club assignments, a greater proportion of students reported the debate activity increased their critical thinking skills ($p = .03$), knowledge about diabetes medications ($p = .01$), and ability to retain information ($p < .01$) (Table 3).

DISCUSSION

The novel incorporation of an online, multi-institutional 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 students’ improvement on the knowledge assessment. In addition, it was
well received by the students based on their reported perceptions of the assignment. Students’ overall improvements on the evidence-based knowledge assessment and their positive perceptions of the debate were 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 clinical debates as an alternative to journal clubs. Uniquely, this study used 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, their enjoyment was less pronounced 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 postdebate debriefings, students commented on how the multi-institutional interactions were 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 seven-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

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

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

Abbreviations: 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.

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

<table>
<thead>
<tr>
<th>Perceptions of debate</th>
<th>Perceptions of journal club</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA/A, %</td>
</tr>
<tr>
<td>Increased my critical thinking skills</td>
<td>90.9</td>
</tr>
<tr>
<td>Increased my knowledge retention</td>
<td>90.9</td>
</tr>
<tr>
<td>Increased my confidence in evaluating primary literature</td>
<td>87.9</td>
</tr>
<tr>
<td>Increased my knowledge of diabetes medications</td>
<td>81.8</td>
</tr>
</tbody>
</table>

Abbreviations: SA=strongly agree; A=agree; N=neutral; D=disagree; SD=strongly disagree.

* Chi-square test.
conducted discussions on the cardiovascular outcome trials, others used review articles as roadmaps for their discussions or used a card game as a method 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 cardiovascular outcome trials 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 comparator group during the rotation may have led 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 justify greater exploration of incorporating debates into experiential education. Future endeavors may expand upon this pilot project by including a journal club comparator arm, standardizing the predebate cardiovascular outcome trials foundational knowledge preparation, and more comprehensively evaluating the benefits and limitations of the multi-institutional 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 prerecordings of foundational content could be shared across schools to reduce scheduling conflicts and reduce faculty workload. Additionally, the knowledge assessment tool needs to be expanded beyond the seven-item questionnaire, and more application-based questions should be incorporated. An objective structured clinical examination 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 that incorporating 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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REFERENCES


