

INSTRUCTIONAL DESIGN AND ASSESSMENT

Current Events Project in a Pharmacotherapy Course

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Objective. To implement and assess a current events project added to the curriculum of a pharmacotherapy course in a doctor of pharmacy (PharmD) program.

Design. Third-year PharmD students researched a current event topic related to infectious diseases and prepared a written and verbal summary that was presented to their classmates.

Assessment. Scores on course examinations and quizzes to assess students' knowledge of current events material were equal to or better than non-current events material. Based upon a student self-assessment survey, this active-learning activity increased students' awareness of current events related to pharmacy practice, and their understanding of the process to prepare and present information to a group in a statistically significant manner. There was a positive but not significant improvement in students' desire to prepare and present information to a group; ability to evaluate, organize, and present information in a written report; and ability to verbally present material to a group.

Conclusion. The addition of a current events presentation as an active-learning activity significantly increased students' awareness of current events related to pharmacy practice and their understanding of the process to prepare and present information to a group.

Keywords: current events, peer teaching, active learning, pharmacotherapy

INTRODUCTION

The curriculum committee at North Dakota State University College of Pharmacy, Nursing and Allied Sciences began a curriculum mapping and assessment program in 2006. This process led to careful evaluation of curricular content, delivery, and assessment methods in the pharmacy professional program. An exploration of teaching methods revealed that an opportunity existed to incorporate a larger focus on active-learning modalities in the classroom consistent with Guideline 11.2 of the 2007 Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree, which specifies that "Instructors should employ active learning strategies. . .wherever possible."¹ In addition, evaluation of the third-year pharmacy curriculum revealed a lack of opportunities for students to actively investigate issues and to educate their peers and/or other healthcare providers about these. Because of the time required to adequately teach the concepts that are already well established within a specific practice area in pharmacy (eg, antibiotic usage guidelines

in infectious diseases), faculty members found it challenging to research and thoroughly cover emerging issues and late-breaking literature relevant to their topic areas (eg, new drug approvals). This led to concern that students may not be aware of emerging issues in pharmacy practice, or have the necessary experience to actively investigate and communicate these issues to others. Both of these curricular deficiencies were of concern as they are, at least in part, emphasized by the Accreditation Council for Pharmacy Education (ACPE) Standards and the Center for Advancement of Pharmacy Education (CAPE) educational outcomes. Specifically, ACPE Standard 11, Guideline 11.1, stipulates that "Students should also be encouraged to participate and assist in participating in the education of others, including. . .other students, and healthcare providers."¹ Additionally, the CAPE Pharmacy Practice Supplemental Educational Outcomes specify that pharmacy graduates should be able to "maintain professional competency in providing pharmaceutical care by committing oneself to being an independent, self-initiated life-long learner"² including the ability to "identify and analyze emerging issues, products, and services that may impact patient-specific and population-based pharmaceutical care."² In an attempt to combine these 2 objectives and to address the perceived curricular deficiencies described above, the investigators sought to develop and implement an active-learning activity that

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focused the students' attention on emerging issues in pharmacy and gave them an opportunity to practice communications skills.

Learning is enhanced when students are actively involved in discovering, manipulating, and/or personalizing information.³ Peer teaching⁴ or "students teaching other students"⁵ is one of the most promising active-learning methods. When students are placed in the role of teacher, the resulting variety of presenters and presentation modes motivates students and sparks their interest and may lead to enhanced learning compared with traditional lecture formats.^{6,7} Also, teaching current events to students may spur self-initiated learning outside of the classroom. High school students who took classes requiring them to pay attention to government, politics, or national issues reported increased interest in those issues outside of school.⁸ Educating student pharmacists about current events and emerging issues in pharmacy may achieve the same beneficial outcomes and produce better educated and informed pharmacy practitioners. Hence, the investigators developed and implemented a current events assignment to be completed and presented by third-year PharmD students. The infectious diseases pharmacotherapy course was a natural fit because of the numerous emerging diseases and treatments that occur at any given time (eg, H1N1 influenza and its vaccine). The investigators hypothesized that the awareness and knowledge of the class in regard to pharmacy practice-related current events would increase as a result of actively preparing and verbally delivering a current events presentation, as well as from listening to presentations given by their peers in the course.

DESIGN

In previous years, the infectious diseases pharmacotherapy course was entirely taught via lecture and case studies presented by an instructor in a large classroom. Student assessment of learning was performed entirely with 5 quizzes and 4 examinations throughout the course. Although course and instructor evaluations were consistently positive, the course coordinator desired to incorporate active learning into the course, and create a meaningful activity that involved peer teaching and learning.

The course was reorganized to allow 4 class periods (12% of the course) to be used for student presentations regarding current events in infectious diseases. In order to make time in the course for the presentations, some previous course material was covered in less detail because of further discussion in other pharmacotherapy courses (eg, vaccine-preventable diseases), or was eliminated completely. Eliminated material consisted of infectious diseases that are seen less commonly in pharmacy prac-

tice (eg, sudden acute respiratory syndrome, complicated intraabdominal infections, antimicrobial prophylaxis for inpatient surgery, bioterrorism). The course grading was modified to include a 10% active-learning component for this new exercise.

The primary goal of this activity was to increase students' awareness and knowledge of current issues in infectious diseases. A secondary goal was to provide an active-learning activity requiring students to investigate a current issue and then give a presentation on it to their peers. The procedure for this project is illustrated in Figure 1. Each student selected a partner; unmatched students were assigned a partner by the course coordinator. Each student group performed a literature or media search for material and relevant topics based on sources suggested by the course coordinator. They submitted their preferences (at least 2) of current events related to infectious

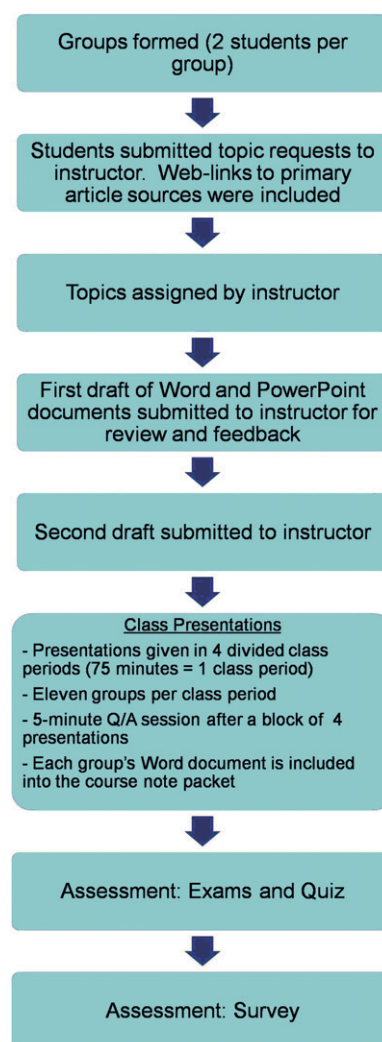


Figure 1. Procedure flowchart for a current events project implemented in a pharmacotherapy course.

disease topics to the course coordinator. Current events were defined as happening within the most recent year. Suggested topics included: new medication/vaccine, new FDA indication for an existing medication/vaccine, original research article from a journal, review article from a journal, new boxed warning issued by the FDA, new treatment guidelines, recent outbreak of an infectious disease, and new generic status/formulation. The course coordinator provided suggested sources for topic selection. They included, but were not limited to Medscape, Pharmacist's Letter, *Journal of the American Pharmacists Association*, *American Journal of Health-System Pharmacy*, and newspaper articles. Example topics selected by the student groups are listed in Table 1. The course coordinator assigned final topics based upon group preference and relevance to the course objectives, while attempting to increase variety, prevent duplication, and provide additional content that complemented the instructor's course material.

Each group submitted a written summary of their topic and the reference article to the course coordinator at least 3 weeks prior to the assigned presentation date. The written summary was determined necessary because it served as concise class notes and allowed for practice of written communication skills. Requirements of the written summary included: title, article citation, student names, the article's impact on pharmacy practice and patient care, and contributing references. Also, within each written summary, the students authored a learning objective and a multiple-choice self-assessment question to focus the class's attention regarding examination material. The summary was required to be in Microsoft Word and limited to 1 page (one-side, single-spaced). Additionally, students submitted a Microsoft PowerPoint version of the presentation that included information similar to the written summary, with the addition of graphics (tables, graphs, pictures, etc) to enhance the presentation. The PowerPoint version was determined necessary to provide a more effective verbal presentation medium, and to give students more practice with using this form of technology.

The course coordinator evaluated both documents to ensure adequate depth, accuracy, and compliance with the project requirements. Formative feedback regarding the documents was e-mailed to the respective groups. Feedback included suggestions regarding spelling, grammar, missing document requirements, relevance to pharmacy practice, and content accuracy and consistency between the student summary and the original article. The groups made revisions and forwarded their revised documents to the course coordinator at least 1 week prior to their assigned presentation day. Instructor time to coordinate the project and provide formative feedback to students

Table 1. Current Event Topics in Infectious Disease Presented by Pharmacy Students in a Pharmacotherapy Course

The Largest Measles Outbreak Since 1996
Ondansetron in Gastroenteritis
Current Management of H. Pylori in the Elderly
Severe Acute Respiratory Syndrome
Indication Change for Influenza Vaccine in Children
Is There a Link Between SIDS Deaths in Infants and S. aureus?
UTI Resistance to Bactrim
Aptivus (tipranavir) - A New HIV Medication
TNF-Blockers to Get Fungal Disease Warning
Multi-drug Resistant Tuberculosis
PDF Inhibitors: An Emerging Class of Antibacterial Drugs
Imovax Rabies Vaccine
Daptomycin and S. aureus
Hanta Virus
Hopes of Malaria Vaccine by 2010
Shingles Vaccine
FDA Issues Approvable Letter for Ceftobiprole for Treatment of Complicated Skin Infections
Moderate Success for New Polio Vaccine
New Vaccine Formulations: Kinrix and Pentacel
FDA Approves First U.S. Vaccine for Humans Against the Avian Influenza Virus H5N1
Salmonella Outbreak in St. Paul, MN
Telbivudine: A New Treatment for Hepatitis B
FDA Approves Rotarix
Relationship of Pneumocystis Antibody Response to Severity of COPD
Tamiflu - Increased Psychiatric Warnings
Vancomycin Treatment Against MRSA May Fail When MICs Are Lower Than Current Breakpoints
Group B Strep and Its Danger to Newborns
Recent Outbreak of Bubonic Plague in Prairie Dogs in SD - Potential Spread to Humans
U.S. Vaccination Plan Puts Health Care Workers First Assessment and Management Of Bacterial Keratitis in Contact Lens Wearers
Altabax: A New Topical Antimicrobial
E. Coli Patch for Travelers Diarrhea
Don't Skimp on the Gym because of MRSA
Doribax: A New Carbapenem Antibiotic
PPI Therapy: A Risk Factor for C. difficile Diarrhea in Hospitalized Patients
Myths about Influenza and Influenza Vaccine
The Maximum Dose of Amoxicillin for Pediatrics
HPV Vaccination for Males
Quinolones and Tendon Rupture
Is Re-emerging Superbug The Next MRSA?
Doctors Reconsider Antibiotics for Chronic Lyme Disease Sufferers
Clostridium Difficile: Changing Diagnosis, Epidemiology, And Treatment
Deciding When to Start Antiviral Medications for HIV
Potential H. Pylori Vaccination
HIV Vaccine: Challenges and Prospects

(about 30 minutes per group) was the only resource utilized to implement this project.

Four 75-minute class periods were used to complete the 46 presentations (11-12 per class). These 4 class periods were dispersed throughout the second half of the course, after the principles of infectious diseases pharmacotherapy were taught by the course instructor. Spacing out the presentation days allowed the instructor to more evenly accommodate the increased workload of providing formative feedback to the student groups. Each group had 5 minutes to give their PowerPoint presentation. Each student in the group was involved with the written revisions and verbally delivered a portion of the presentation. The class was given copies of the corresponding Word presentation documents and these were considered the course notes for that class period. Time for questions and answers was allowed at the end of every fourth presentation.

Twenty-nine of the 46 questions created by the student groups were included on subsequent quizzes and examinations. The instructor selected those questions that were most relevant to pharmacy practice, followed the course learning objectives, and assessed students' knowledge of the current events discussed in class. The instructor modified the selected questions in part or entirely, but they remained focused on each group's learning objective. The modified questions were evaluated for clarity and design by the chairs of the college's curriculum and assessment committees, the college's associate dean for academic affairs, and the pharmacy practice department chair. The class was made aware that the questions would follow the learning objectives but would not be taken verbatim from the student presentations.

EVALUATION AND ASSESSMENT

After completion of the infectious diseases pharmacotherapy course, an anonymous electronic survey was administered to students to assess the current events project. Survey questions were evaluated for clarity and

design by the chairs of the college's curriculum and assessment committees, the college's associate dean for academic affairs, and the pharmacy practice department chair. The survey instrument asked students to rate the following statements both before presentations and after presentations (ie, once from each perspective): awareness of current issues in infectious diseases; ability to evaluate, organize, and present information in a written report; ability to verbally present material to a group; desire to prepare and present information to a group; and understanding of the process to prepare and present information to a group. Responses were based on a 5-point Likert scale. Open-ended questions also were included in the survey for students to provide comments and formative feedback regarding the experience. The open-ended questions asked what was most enjoyable, if anything, about the current events presentations, and what changes, if any, were recommended for future projects.

Evaluation of each survey question compared the class's before presentations mean score to the after presentations mean score (Table 2). Because the data were collected anonymously, results were evaluated using the *z* test of unmatched samples. The class's mean correct score was used to assess performance on examination questions regarding the current events material. In further analysis, student performance on current events questions was compared to noncurrent events questions using the matched sample *t* test. Additionally, the sign test was used in the event of a skewed data set.

Of the 92 students enrolled in the course in fall 2008, 79 completed the student self-assessment survey instrument. Responses suggested an increase in students' awareness of infectious disease-related current events (2.9 pre-presentations vs. 4 post-presentations; $p < 0.001$). Another significant improvement involved understanding of the process to prepare and present information to a group (3.8 vs. 4 ($p = 0.019$)). Although not significant, positive changes occurred in students' ratings of 3 other

Table 2. Pharmacy Students' Assessment of a Current Events Project in Infectious Disease Added to the Curriculum of a Pharmacotherapy Course

Question	Before Presentations, Mean (n=79)	After Presentations, Mean (n=79)	<i>P</i> ^a
My awareness of current events in infectious diseases.	2.9	4	<0.001
My ability to evaluate, organize, and present information in a written report.	4	4.1	0.087
My ability to verbally present material to a group.	3.8	4	0.079
My desire to prepare and present information to a group.	3.2	3.5	0.051
My understanding of the process to prepare and present information to a group.	3.8	4	0.019

Scale: 1 = poor, 2 = below average, 3 = average, 4 = good, 5 = excellent

^a *P* value for the *z* test of unmatched samples

items: desire to prepare and present information to a group (3.2 to 3.5; $p = 0.051$); ability to evaluate, organize, and present information in a written report (4 to 4.1; $p = 0.087$); and ability to verbally present material to a group (3.8 to 4; $p = 0.079$). Students' mean responses to the 4 items regarding completion of the active-learning activity were: the current events presentations increased their awareness of infectious diseases (mean score = 4.2); the current events presentations provided a valuable enhancement to their overall knowledge of infectious diseases (mean score = 4); the current events presentation increased their ability to evaluate, organize, and present information in a written report (mean score = 3.8); the current events presentation increased their ability to verbally present material to a group (mean score = 3.7; Table 3).

Students' quiz and examination scores on the material related to the current events presentations were high (Table 4). Overall, students scored very well on the current events material, with a mean of 26 of 29 questions correct (90%). On quiz 1 and examination 1, mean and median proportions of correct responses were higher for current events questions than for non-current events questions ($p < 0.05$). On examination 2, the mean proportion of correct responses was lower for current events questions than for non-current events questions ($p < 0.05$). However, at the median, because of the skewed distribution, the difference was not significant ($p = 0.15$), implying that students answered equal proportions of current and non-current events questions correctly on examination 2.

Verbal presentations were completed, on average, in the 5-minute timeframe as planned. Based upon the instructors' perceptions, there was a seamless transition between groups, and the presentations did not seem rushed. Class attendance appeared similar to non-current events presentation days, but this was not formally assessed. The non-presenting students appeared to be actively engaged, and asked an average of 1 question to each presenting group in the allotted time following the presentations.

Student responses on open-ended questions included: "I obtained a general knowledge of current issues. Now on the job if a patient asks a question about a particular current issue I will have at least some knowledge on *how* to answer the question." "We had access to a lot of information that we may not have had time to cover." "I enjoyed learning how to research a topic." "This project provided a low pressure environment to gain experience presenting pharmacy material to a group." Students received all 20 points for the assignment if they completed the required elements of the written and verbal components, and adhered to formative feedback by the instructor regarding accuracy and consistency between the student summary and the original article. This activity was worth 10% of the total course grade.

DISCUSSION

Based on students' self-assessment, creating and delivering current event presentations significantly increased their awareness of current events in infectious diseases. In addition, this exercise significantly increased students' understanding of the process to prepare and present information to a group. Students generally agreed that the current events presentations increased their awareness of infectious diseases, and provided a valuable enhancement of their overall knowledge of infectious diseases.

The class was undecided with this project's ability to increase their ability to evaluate, organize, and present information in a written report, and to increase their ability to verbally present material to a group. It is unclear whether this was due to students' perception of sufficient abilities in these areas prior to the completion of the project, or whether this project was unsuccessful in promoting improvement in these areas. This finding warrants further study.

Students commented that they enjoyed this active-learning method and realized that there is an abundance of emerging information that impacts the pharmacy profession. Student comments suggested that this

Table 3. Pharmacy Students' Assessment of the Impact of Completing a Current Events Project in Infectious Disease

Question	Mean (n = 79)
The current events presentations increased my awareness of infectious diseases.	4.2
The current events presentations provided a valuable enhancement to my overall knowledge of infectious diseases.	4
My current events presentation increased my ability to evaluate, organize, and present information in a written report.	3.8
My current events presentation increased my ability to verbally present material to a group	3.7

Scale: 1 = strongly disagree, 2 = disagree, 3 = in between, 4 = agree, 5 = strongly agree

Table 4. Quiz and Examination Results in a Pharmacotherapy Course

	Current Events Questions, Mean Correct Score, % (n=92)	Non-Current Events Questions, Mean Correct Score, % (n=92)	<i>P</i> ^a	<i>P</i> ^b
Examination 1	93.1 (14 of 15)	80.4 (24.1 of 30)	< 0.05	< 0.05
Quiz 1	94 (5 of 5)	87.6 (4.4 of 5)	< 0.05	< 0.05
Examination 2	83 (7.5 of 9)	87.8 (30.7 of 35)	< 0.05	0.15

^a Matched sample *t* test

^b Sign test of the median

active-learning approach is effective for teaching emerging material that may otherwise be omitted under traditional classroom instruction. Other comments hinted toward students' development of lifelong learning skills. Examples included: "I learned a new tool for identifying and locating new and current information;" "This project increased awareness of the need to be proactive about continuing to learn upon graduation;" "I realized that knowledge needed to help my patients may not always come from the classroom."

Students answered current events questions accurately or more accurately than non-current events quiz and examination questions. This may indicate the following: students were more interested in the current events material, students learned as well or better from their peers than from the instructor, and/or students were more familiar with the material because of viewing the original self-assessment questions their group and other groups composed. This finding requires further study to provide valid conclusions.

Although communication courses are common in PharmD curricula, this active-learning activity provided additional practice using research and presentation skills. This peer-teaching activity is also attractive from a faculty standpoint, because it does not require additional technologic resources beyond a computer and projector. Because it focuses on current events, the project can be completed by students in subsequent classes/years because of continually emerging issues. Also, this focus allows it to be used in virtually any type of course.

A weakness of this project is that the survey was conducted entirely at the end of the project, and this may have impacted responses to the "before presentation" questions since the students may have assessed their own skills differently at that particular time. Barriers include an increase in faculty time, primarily reviewing presentation drafts. Student comments regarding dislikes and suggested improvements included the following: "There was a lot of information presented in a short amount of time," "I would prefer having the instructor

lecture," "I suggest developing a method for improving class attendance on presentation days", and "There were way too many test questions from the presentations." Each of these suggestions was mentioned only once in the survey results, so there was no apparent recurring theme for improvement.

CONCLUSION

The addition of a current events project to the curriculum of an infectious disease course provided a positive learning and teaching experience overall. It met the investigators' objective of implementing an active-learning exercise that involves peer teaching and learning and provided a venue to progress towards meeting curricular standards at North Dakota State University College of Pharmacy, Nursing, and Allied Sciences. Based upon self-assessment, this active-learning activity significantly increased student awareness of current issues in infectious diseases, and their understanding of the process to prepare and present information to a group.

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