INSTRUCTIONAL DESIGN AND ASSESSMENT

A Medical Mission to Guatemala as an Advanced Pharmacy Practice Experience

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Objective. To describe the development and outcomes of an advanced pharmacy practice experience (APPE) for a medical mission trip to Guatemala.

Design. Pre-mission preparation and post-mission reflection activities were combined with in-country activities to create a 5-week APPE. During the 10-day medical mission trip, pharmacy students dispensed medications, counseled patients, conducted quality improvement assessments, and presented their findings and experiences as part of an interdisciplinary health care team.

Assessment. The students who completed the mission trip met the objectives of the APPE and reported substantial learning in the areas of interdisciplinary teamwork and cultural competency. All students' scores on the Inventory for Assessing the Process of Cultural Competence—Student Version (IAPCC-SV) increased. The majority (81%) of student-generated quality improvement recommendations were implemented by the mission team.

Conclusions. The medical mission APPE provided a rich learning environment for pharmacy students and resulted in modifications to the medical mission operation. This type of APPE could be implemented in other colleges of pharmacy via formation of partnerships with established medical mission teams as this one was.

Keywords: advanced pharmacy practice experience, experiential learning, international practice experience, medical mission

INTRODUCTION

Society is increasingly global, with expanding international trade, travel, and cultural exchange, and academia is embracing this trend. The number of US higher-education students studying abroad has more than doubled in the past decade, and hundreds of studies have detailed the outcomes of students involved in training experiences that took place outside the United States.¹ In the health professions, increasing numbers of medical, nursing, and pharmacy students are participating in international learning or service experiences.²⁻⁴ Students who study outside of the United States at some point during their academic careers tend to develop a greater appreciation for cultural differences, learn to discard stereotypes, and increase their level of cultural awareness.³ Health professions students who have participated in international clinical experiences have demonstrated benefits such as heightened clarity about career roles, including those related to underserved multicultural populations, increased compassion toward

patients, increased appreciation for and confidence in clinical skills, and increased awareness of resource use.^{5,6}

Pharmacy students and academicians recognize the importance of a global perspective with regard to health and disease, and their interest in seeking experiential opportunities around the world is growing. In 2010, 300 students from 35 pharmacy colleges and schools participated in elective practice experiences in other countries, yet an additional 235 students were unable to participate because of limited space or funding.⁴ The American Association of Colleges of Pharmacy's Research and Graduate Affairs Committee published a report in 2010 on the globalization of pharmacy education, highlighting the current status of global educational opportunities in US pharmacy schools and pointing the organization in new directions in its efforts to establish and maintain global partnerships and educational experiences.⁴ Published papers in the pharmacy education literature describe elective courses with an international or medical mission experience embedded, and elective experiential learning opportunities abroad.⁷⁻⁹

International learning experiences can address several points in the doctor of pharmacy (PharmD) curriculum. For example, travel and exposure to the healthcare system in a developing country may promote student

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learning in the areas of “cultural competence, health literacy and health disparities and competencies needed to work as a member of or on an interprofessional team,” as emphasized in Standard 9 of the Accreditation Council for Pharmacy Education (ACPE) Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree.⁹ In addition, the high priority of public health needs in developing countries may provide traveling students with a unique opportunity to “promote health improvement, wellness, and disease prevention,” as emphasized by ACPE Accreditation Standard 12.¹⁰

In this paper, we describe the development of an advanced pharmacy practice experience (APPE) at North Dakota State University College of Pharmacy, Nursing, and Allied Science that was built on an international medical mission trip, as well as the educational objectives, structure, and outcomes of the learning experience. The authors proposed that a medical mission would serve as a rich environment for experiential learning for pharmacy students, that the cultural competence of participating students would increase, and that pharmacy student performance of a quality improvement assessment of the mission’s operations would result in implementation of their quality improvement recommendations.

DESIGN

A short-term medical mission APPE was implemented in partnership with an established Christian medical mission that had supported a medical mission team for 10 consecutive years (since 2001). The goal of the Episcopal Diocese of North Dakota Medical/Dental Mission is to provide ambulatory and preventative healthcare services to several small rural communities in Guatemala. The mission team was originally composed of physicians, nurse practitioners, medical students, nurses, nursing students, dental assistants, linguists, and general helpers, with approximately 25 participants each year. In an effort to initiate global experiential training for North Dakota State University (NDSU) pharmacy students, and add provision of pharmacy services to the mission, 2 faculty preceptors approached the mission director, proposing that pharmacy students and faculty members join the team.

A 5-week elective APPE was designed. A syllabus for the APPE detailing the objectives, planned activities, and timeline was developed and approved by the NDSU PharmD program Experiential Education Committee. The learning objectives (Table 1) for the students during the APPE were designed to integrate with the NDSU PharmD program’s ability-based outcomes as well as with experiential program goals and objectives. The 5-week

APPE was designed to involve 1 week of preparation locally prior to departure, 10 days abroad, and 2.5 weeks of reflection, reporting, and assessment upon return to the United States. Required activities during the APPE were divided into pre-mission, in-country (abroad), and post-mission activities.

Students were made aware of the APPE opportunity via verbal presentation. Students were informed that they need not possess Christian affiliation to be selected, but would be required to attend (but not participate in) a Christian worship service held during the time in Guatemala. Interested students submitted an essay describing their desire to participate in the APPE during the fall of their P3 year. The experiential director, 2 faculty preceptors, and the mission director interviewed all students who turned in an essay during the spring of the P3 year. Criteria for selection of students included flexibility, positive attitude, and willingness to engage in teamwork. Ability to speak Spanish was desired, but not required. In 2010, 3 students were interviewed and 2 students were selected for and completed the APPE. In 2011, 6 students were interviewed and 2 students were selected and completed the learning experience. In both years, students not selected for the APPE were designated as alternates in case one of the selected students was unable to participate in the APPE. The students selected in 2010 had little or no Spanish-language experience or instruction prior to beginning the APPE. Both students selected in 2011 had completed a Spanish minor prior to their travel to Guatemala.

Pre-Mission Activities

On the first day of the APPE, the practice experience objectives, assignments, and travel arrangements, were reviewed. Students completed the Inventory for Assessing the Process of Cultural Competence—Student Version (IAPCC-SV).¹² This is a 20-item instrument designed to measure the level of cultural competence among undergraduate students in the health professions. Permission to use the IAPCC-SV was obtained prior to data collection and analysis.

Pre-mission activities were designed to prepare students for the mission experience. Each student was required to research topic areas and deliver presentations on 3 different formulary medications, 3 different disease states that are prevalent in Guatemala, and 1 aspect of Guatemalan culture. The presentations were approximately 30 to 60 minutes in length and were delivered to one another and the APPE preceptors. Daily 60- to 90-minute lessons in introductory and medical Spanish were given by one of the APPE preceptors. In addition, students were given a brief introduction to performing a needs assessment in preparation for conducting a basic

Table 1. Student Learning Objectives for a Medical Mission Advanced Pharmacy Practice Experience

Attitudes and Values
Describe cultural, language, and current healthcare circumstances in Guatemalan communities that will be encountered on the medical mission.
Document and reflect on personal and professional experiences, processes encountered, and lessons learned from the medical mission.
Communication
Provide medication and health-related patient counseling to Guatemalan community members while on the medical mission with or without use of an interpreter.
Deliver an oral presentation to NDSU faculty, staff and students discussing the medical mission experience including evaluation of and recommendations for improvement of pharmacist-provided services on future medical mission trips.
Prepare a written manuscript for publication regarding the medical mission experience and learning.
Scientific Foundation
Identify and describe the pathophysiology and characteristics of disease states likely to be encountered on the medical mission including (but not limited to): parasitic infections, musculoskeletal pain, gastrointestinal pain, and malnutrition.
Identify the mechanisms of action, pharmacokinetic principles, potential adverse drug reactions, potential drug interactions, and place in therapy of all medications on the medical mission formulary.
Patient-Centered Care
Identify and discuss the roles of all disciplines represented by healthcare providers and healthcare students on the medical mission team.
Provide patient-centered care in cooperation with other medical mission health care team members based upon sound therapeutic principles and evidence-based data, taking into account relevant, social, cultural, and economic issues.
Systems Management
Formally summarize and evaluate the pharmacy operation and pharmacist provided services on the medical mission.
Identify strategies and design a written plan to improve pharmacy operations and pharmacist-provided services on future medical mission trips.
Public Health
Participate in the provision of effective health promotion and disease prevention services to the Guatemalan communities where healthcare services will be provided on the medical mission.

quality-improvement assessment of the medical mission operation. This training involved reading a section of a textbook¹³ and discussing what they read with preceptors. Total time spent by the students in preparing for and completing all pre-mission activities was approximately 40 hours.

In-Country Activities

In-country activities involved operating a pharmacy at the various mission clinic sites. Students were expected to adhere to recommended safety guidelines at all times.¹⁴ At each clinic site, the students and faculty preceptors developed systems for medication stocking, dispensing, recordkeeping, and patient counseling, to maximize workflow efficiency. Ambulatory patients were seen by a health care practitioner (n = 4) who evaluated and cared for patients and wrote necessary prescriptions from the medication formulary. The APPE students were responsible for reviewing all prescriptions for appropriate dosing and indication, dispensing medication, keeping records, and counseling patients. Trained interpreters were available at all times for translation of patient consultation and Spanish medication label information. Students also

participated in nutritional counseling and patient blood pressure and blood glucose measurement and assessment, and provided verbal health promotion and disease prevention information to patients based on these assessments. In addition, students worked closely with other members of the medical team, observing and participating in nursing consultations, dental assessments, the patient registration process, and at least 1 prescriber consultation each clinic day. Students discussed and resolved medication therapy problems with prescribers and patients as they arose. All student clinical activities were supervised by faculty preceptors.

The APPE students were responsible for maintaining adequate supplies of formulary medications for transport to clinic sites each day. At the conclusion of the last clinic day, the students led the entire mission team in conducting an inventory of all formulary medications remaining. These remaining medications were left in Guatemala for a local physician partner to dispense as appropriate.

Finally, APPE students were asked to reflect daily on their experiences during the mission trip, as well as to note inefficiencies, and/or gaps in care which could be included in their quality improvement assessment activities. They

were each provided with a journal on day 1 of the APPE and were expected to record entries on a daily basis during the mission and throughout the remainder of the APPE.

Post-Mission Activities

Upon returning to the United States, APPE students wrote a reflection paper to document their experience. Daily discussions were held with preceptors reviewing disease states, patient cases, and public health challenges seen while in Guatemala and the roles of the different members of the interprofessional team. Students also developed and delivered a formal presentation to the university community that included their reflections and experiences.

The students were required to prepare a document reporting the results of their quality-improvement assessment and detailed recommendations for future action based on the needs-assessment lesson during the pre-mission portion of the APPE. The students discussed this document with the faculty preceptors, and then revised and submitted it to the mission director who provided feedback and implemented the students' recommendations in future missions. A sub-assignment of the quality-improvement assessment was the creation of an organized electronic document summarizing the medication inventory taken at the end of the medical mission trip. Finally, students repeated the IAPCC-SV. Total time required to complete all post-mission activities was approximately 100 hours.

EVALUATION AND ASSESSMENT

Faculty and administration members evaluated students' performance in the APPE based on evidence of student learning, cultural competence development, and acceptance of quality improvement recommendations made by APPE students. Research activities within the APPE were reviewed by the NDSU Institutional Review Board and students gave their informed consent prior to the start of the practice experience. Participation in research activities was not a condition of acceptance or participation in the APPE.

Several methods were used for evaluation and assessment of student learning and performance. First, preceptors provided informal formative feedback to students on a daily basis regarding students' medical mission activities. In addition, students were evaluated on their presentations, quality improvement assessment documents, and formal reflection papers as these related to the overall practice experience objectives. Finally, students underwent summative evaluation using NDSU's standardized evaluation rubric required for assessment of all experiential learning. This evaluation rubric was cross-mapped

with the objectives for the APPE as well as with program-level ability-based outcomes. The evaluation rubric and corresponding cross-map of outcomes are available from the authors upon request. Students successfully completed all APPE objectives. The students' professional behavior, excellent patient-care activities, and diligence with patient communication contributed to positive summative evaluations. Students reported that the required activities were adequate in duration and intensity for the time allotted. Portions of each student's formal reflection papers have been published.^{15,16}

Students' journals were collected and reviewed by preceptors at the conclusion of the APPE. All students reported that substantial learning took place during the APPE. In their journals, students detailed facts and ideas about their learning which included: statistics about disease and the history of natural disasters in Guatemala, their emotions and reactions to circumstances, development of patient-care skills, and ideas of how to adjust mission workflow processes to correct inefficiencies. Faculty members further reviewed journal entries and formal reflection papers for themes and noted consistency of reported learning in the following areas: cultural competence, global health challenges, interprofessional health-care teamwork, and communication skills.

Students also reported what they learned during the APPE in presentations to the university community. They described their developing perceptions of the functions and impact of an interdisciplinary team. The students also expressed the ways in which they had learned to adapt to their circumstances, as they systematically prepared, dispensed, and counseled patients on medications based on available resources.

Changes in students' cultural competency were determined by comparing IAPCC-SV baseline and endpoint scores. This instrument was selected because it was developed for use with students in health professions, and because the IAPCC-R, from which it was based, has been reliably used and validated to assess nursing, medicine, and pharmacy practitioners.^{17,18} The IAPCC-SV tool uses a 4-point Likert-type scale (1 = strongly agree and 4 = strongly disagree). The response to each item is assigned a score and total scores range from 20 to 80, indicating whether students are: culturally incompetent (20 to 40), culturally aware (41 to 59), culturally competent (60 to 74), or culturally proficient (75 to 80). Analysis of the baseline and endpoint scores on the IAPCC-SV showed that the 4 students' cultural competence increased during the APPE. The students' average score on the IAPCC-SV was 60.8 at baseline. The average score on the last day of the APPE was 65.5, representing a 4.7 point or 8% increase (Table 2). No student's cultural competence level

Table 2. Change in Pharmacy Students' Cultural Competence Scores Before and After Participation in a Medical Missions Advanced Pharmacy Practice Experience^a

Student	Baseline IAPCC-SV Score	Endpoint IAPCC-SV Score	Score Change, Points (%)
1 (2010)	57 (culturally aware)	61 (culturally competent)	4 (7)
2 (2010)	60 (culturally competent)	66 (culturally competent)	6 (10)
1 (2011)	64 (culturally competent)	71 (culturally competent)	7 (11)
2 (2011)	62 (culturally competent)	64 (culturally competent)	2 (3)

^a Students' cultural competence was assessed using the Inventory for Assessing the Process of Cultural Competence—Student Version (IAPCC-SV).

decreased during the APPE, and 1 student moved to a higher cultural competence category by the end of the APPE.

As a result of the quality improvement document prepared by APPE students, several changes to the medical mission and its pharmacy operations have been proposed and implemented. In 2010, APPE students identified 16 focus areas for improvement of the medical mission preparations and/or operations in 4 main categories: patient care (n = 1), formulary (n = 5), pharmacy operations (n = 4), and administration (n = 6) and provided recommendations for each. Examples of identified focus areas and recommendations are included in Table 3. Prior to the 2011 trip, 13 of the proposed recommendations (81%) from 2010 had been implemented by the medical mission team. In 2011, APPE students identified 24 focus areas in 4 main categories (mission preparation, 4; formulary, 13; personnel, 2; and clinic logistics, 5), including 3 recommendations that were carried forward from the 2010 report. Feedback regarding implementations from the mission director and interprofessional team has been positive.

The resources necessary for implementation of the APPE involved faculty time (approximately 40 hours total for 2 faculty preceptors) for syllabus development and coordination with the medical mission director and the experiential director. Ongoing annual resources necessary to continue the APPE include faculty time for interviewing

interested students, formulary management activities, travel, and precepting of students (approximately 120 hours annually). Additional costs, including those for passports, immunizations, airfare and in-country lodging, transportation, and meals, were approximately \$1,700 per person per APPE offering.

DISCUSSION

We proposed that pharmacy student participation in a short-term medical mission would serve as a rich learning and development opportunity for the students and result in implementation of the students' quality improvement recommendations. The environment before, during, and after the medical mission APPE was intensely focused on learning. This educational experience gave students a rare opportunity to integrate lecture/textbook, clinical, and cultural concepts in a meaningful way. In the course of filling prescriptions for patients in Guatemala, the students simultaneously wrestled with cultural differences, health care disparities, evidence-based treatment guidelines, public health issues, pharmacy workflow, formulary management, interdisciplinary team work, language barriers, and patient-centered care. Student learning was associated with and reinforced by the Professional Competencies and Outcome Expectations for the PharmD curriculum as described in ACPE Accreditation Standard 12.¹⁰ For example, in the process of creating the quality improvement document, APPE students independently

Table 3. Quality Improvement Focus Areas and Recommendations for Operation of a Medical Mission Made by Pharmacy Students

Category	Focus Area	Recommendation
Formulary	Lack of evidence-based treatment for scabies	Eliminate Itch-B-Gone from the formulary. Add permethrin topical cream for treatment of scabies.
Pharmacy Operation	Inefficient use of time regarding initial organization of medications upon arrival in Guatemala	Organize all medications based on indication/category upon arrival in Guatemala.
Personnel	Inconsistent pharmacy helpers and subsequent medication and counseling errors	Designate consistent pharmacy assistant(s) for preparation and dispensing of medications and ensure proper training.
Patient Care	Incomplete and improper medication labeling	Provide labeling inclusive of pictograms in order to increase understanding and rates of compliance.

identified focus areas for improvement. The students recognized issues in the provision of patient-centered care that needed to be addressed and worked to “ensure efficient, cost-effective use of resources in the provision of patient care”⁹ when creating their recommendations.

The APPE students reported considerable learning through a variety of assessment mechanisms. Reflections and presentations by the students consistently confirmed learning in the areas of interdisciplinary team approaches to patient care, pharmacy workflow, and communication. The preceptors’ evaluations of the students supported these student self-assessments of learning. The environment of the medical mission APPE led to student development of and improvement in cultural competence. The APPE students consistently stated that the medical mission experience spurred their development as future pharmacists and clarified for them the impact they could make in their profession.

The increases seen from baseline to endpoint IAPCC-SV scores indicate development of culturally sensitive attitudes and behaviors. Though no data are available describing the clinical significance of changes in IAPCC-SV scores, our results are consistent with results reported after a short-term international experience completed by chiropractic students.¹⁹ Interestingly, 3 of the 4 students who completed the medical mission APPE had previously participated in medical mission activities and/or foreign language courses yet their IAPCC-SV scores still increased. This indicates that regardless of the level of prior exposure to culturally diverse experiences, the APPE provided an opportunity for growth in cultural competence. The change observed in IAPCC-SV scores may have been artificially small because students who sought out and were selected for this APPE may already have had higher baseline levels of cultural competence than a general population of pharmacy students would have. Conversely, because applicants were all students in the fourth year of the PharmD program, they may have had relatively high baseline levels of cultural competence as a result of pharmacy school training and experiences. Finally, we did not assess the students’ IAPCC-SV scores after the pre-activities portion of the APPE and therefore, we cannot differentiate between gains in cultural competence that occurred prior to and during the actual mission. All of these explanations for changes in cultural competence warrant further exploration.

The medical mission was improved because of the students’ application of their pharmacy skills and findings from their quality improvement assessments. The majority of the recommendations made by the students were accepted and implemented, thus improving the efficiency and workflow of the medical mission’s operations, and the

evidence-based treatment and patient care provided by the medical mission team.

Several factors contributed to the success of this APPE. Establishment of a partnership with a medical mission that was already in operation minimized the amount of faculty time necessary for implementation. Also, faculty coordination with the director of experiential learning and the university’s Study Abroad Office helped to ensure that quality and safety controls were in place during the APPE. The development of APPE-specific learning objectives tied to the PharmD program’s ability-based outcomes, employment of an approved syllabus, and use of the NDSU PharmD program standardized faculty-to-student ratio for APPEs ensured the rigor and high quality of the APPE. Use of multiple assessment mechanisms during the APPE enabled students and faculty preceptors to frequently gauge student learning. Finally, students published their APPE experiences and learning in local and state publications, increasing the APPE’s visibility.

Our findings regarding the APPE are comparable to those in reports of other short-term international learning experiences. Anderson and colleagues found that business students’ intercultural sensitivity was enhanced after a 4-week study abroad course. Pharmacy students completing a medical mission elective classroom preparation course followed by an 8-day medical mission to Jamaica reported improved understanding of the relevant medical literature and the profession of pharmacy, as well as improved understanding of the pharmacist’s role on an interdisciplinary team. Impact of this learning experience on students’ cultural competence and sensitivity was not described.

Additionally, a review of the literature regarding international experiences in United States medical schools reported that medical students who participated in international health experiences strengthened their existing skills and knowledge, and reported greater appreciation for the importance of cross-cultural communication and understanding of cultural differences.^{5,7,20}

Limitations to the implementation of the medical mission APPE included the costs of time and travel for 2 faculty members and 2 students, as well as the health and safety risks involved with international travel. Although no students or faculty members experienced illness or injury beyond mild traveler’s sickness, the potential for health and safety concerns must always be considered. Evaluation of the APPE, student learning, and growth of cultural competence is limited by the small sample size. Furthermore, the student learning and cultural competence development reported during the APPE may not be generalizable to that which occurs in other international locations or medical mission teams. Due to the timing of

the IAPCC-SV administration, we cannot definitively determine whether improvement in scores was a result of in-country experiences or the APPE as a whole.

Improvements to the APPE are already in progress. After gaining experience during the first year of the APPE, the faculty preceptors determined that travel to Guatemala by just 1 faculty preceptor, rather than 2, would still allow for maintenance of the quality of the APPE. Because of the documented benefit of pharmacy student participation in the medical mission, the mission director now approves 3 team slots for pharmacy personnel, filled by 2 pharmacy students and 1 pharmacy faculty preceptor on an annual basis. In addition, the medical mission director and faculty member are pursuing the addition of nursing faculty members and students to further enhance the interdisciplinary team. Faculty members are also investigating the feasibility of tracking all student interventions during the mission clinics and measuring the impact of the implementation of quality improvement recommendations made by the students.

Several suggestions made by the APPE students will be incorporated including: use of a consistent method of recording clinic productivity data, availability of hard-copy drug references, and allowance for more time to spend with other medical disciplines during clinic days. Finally, the faculty preceptors and students agree that performance of a quality improvement assessment should gradually be phased out as a post-mission activity in future years as processes improve. Instead, a larger emphasis will be placed on completion of a public health project. Specifically, students in both years of the APPE wished they would have had more time to implement the use of pictograms on medication labels as a means to enhance medication use and adherence.

SUMMARY

As curriculum and accreditation standards continue to focus on interdisciplinary education, public health, cultural competence, and patient-centered care, colleges and schools of pharmacy must ensure these areas are being addressed during pharmacy practice experiences. All of these were addressed during this medical mission APPE. Students reported significant learning, increased their cultural competence scores, and improved the medical mission operation. This type of APPE could be implemented in other colleges and schools of pharmacy via formation of partnerships with established medical mission teams.

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