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An interdisciplinary evaluation of pharmacy on a global medical mission trip

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Abstract

Objectives: To assess the impact of working with student pharmacists on a global mission trip and examine the perceptions of undergraduate and graduate students with regard to student pharmacists' participation.

Methods: Medical, nursing, and pre-health undergraduate students who participated in an interdisciplinary medical mission trip to Honduras in 2014, 2015, and 2016 completed pre- and post-test surveys to assess study objectives.

Results: Thirty-three (100%) students completed the surveys. Findings revealed non-pharmacy student awareness of pharmacy students' ability to provide assistance with the international travel clinic improved ($p<0.05$). Non-pharmacy students strongly agreed that pharmacy students understood the difficulties and nuances of their role as a healthcare professional; enhanced patient care; and medication errors in dosing, potential drug interactions and side effects would be reduced with pharmacy student participation on teams ($p<0.05$).

Conclusion: Inter-professional medical mission trips provide an opportunity for healthcare students to collaborate and understand the unique roles of healthcare team members.

Keywords: *Global Health, Inter-professional Education, Medical Missions, Pharmacy*

Introduction

According to the World Health Organisation (WHO), "inter-professional education occurs when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes" (Health Professions Networks Nursing & Midwifery Human Resources for Health, 2010). Patient care and optimal patient outcomes are the responsibility of each healthcare provider involved in interdisciplinary team-based patient-centred care. Therefore, it is imperative each member of the healthcare team understands and has a deeply rooted appreciation for each other and each team member's respective discipline.

In 2009, six health professions' national education associations formed the Inter-professional Education Collaborative (IPEC) to promote and encourage inter-professional learning. Health professions initially involved in IPEC included: medicine, osteopathic medicine, dentistry, nursing, pharmacy, and public health (Interprofessional Education Collaborative Expert Panel, 2011). By 2016, IPEC grew to represent 15 healthcare professions (Table I). Recognising that a collaborative and deliberate effort among health professions must take place at the curricular level, common core educational competencies were established and a framework for inter-professional education (IPE) was developed in 2011 by IPEC and the WHO (Inter-professional Education Collaborative Expert Panel, 2011; Health Professions Networks Nursing & Midwifery Human Resources for Health, 2010). The initial four competency domains developed in 2011 include: Values/Ethics for Inter-professional Practice, Roles/Responsibilities, Inter-professional Communication, and Teams and Teamwork.

IPE allows students to garner an understanding of their own profession while gaining an understanding of the role of other members of the healthcare team (Bridges *et al*., 2011). IPE provides students with opportunities for collaboration with other team members and students learn to overcome barriers that may be associated with negative stereotypes and perceptions that can adversely

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affect team dynamics (Ateah *et al.*, 2011; Hawkes, Nunney & Lindqvist, 2013). IPE experiences are usually designed to allow students to work with diverse patient populations and enhance the cultural understanding of these patients (Arif *et al*., 2014). Pharmacy practice and the role of the pharmacist has evolved from the traditional functions of dispensing, where an individual safely and accurately distributes medications to patients, to an individual who works side-by-side with a team of multi-disciplinary healthcare providers (Health Professions Networks Nursing & Midwifery Human Resources for Health, 2010; Blouin & Adams, 2017). Improving the awareness of pharmacists' skillset among other healthcare disciplines is essential to moving past stereotypical roles associated with the pharmacy profession (Ward, Nemire & Daniel, 2005). Colleges and schools of pharmacy, based on Accreditation Council for Pharmacy Education (ACPE) Standards 2016, are tasked with ensuring pharmacy graduates are equipped with the skills needed to be 'team-ready' to effectively contribute to an interdisciplinary team of healthcare providers (ACPE, 2016). The accrediting associations of health professions such as nursing, medicine, physical and occupation therapy, and social work emphasise the requirement of IPE in the curriculum (Zorek & Raehl, 2013; National League for Nursing Board of Governors, 2015; ACPE, 2016; Commission on Accreditation in Physical Therapy Education, 2017).

Students who participate in global medical mission advanced pharmacy practice experiences (APPEs) have a unique opportunity to appreciate the role of other disciplines on the healthcare team (Arif *et al*., 2014). Mercer on Mission (MOM) is an APPE whereby fourth-year pharmacy students at Mercer University College of Pharmacy have an opportunity to participate in an interdisciplinary healthcare team with students from other healthcare programmes across the University's campuses. MOM healthcare participants include pre-health undergraduate students, pharmacy, medicine, nursing, and marriage and family therapy students. Students apply and are selected to participate on the team. MOM team members' provide direct patient care to thousands of underserved patients through mobile community clinics in Cambodia and Honduras. Several studies have identified positive perceptions associated with IPE within the pharmacy didactic curriculum (Acquavita *et al*., 2014; Gilliland *et al*., 2016). Studies have also noted that experiential learning is more conducive to long-term, sustained positive change in intercultural development and appreciation of other disciplines (Gilliland *et al*., 2016). However, there are only a limited number of studies that have described how healthcare students' perceptions change after experiential experiences (Ateah *et al*., 2011; Hawkes, Nunney & Lindqvist, 2013). This study aims to address this deficiency in the literature by assessing the impact of working with student pharmacists and perceptions of undergraduate and graduate students with regard to student pharmacists' participation on the MOM global medical mission trip to Honduras.

Table I: The Inter-professional Education Collaborative (IPEC) Healthcare Professions

Allopathic medicine
Osteopathic medicine
Dentistry
Nursing
Pharmacy
Public Health
American Association of Colleges of Podiatric Medicine
American Council of Academic Physical Therapy
American Occupational Therapy Association
American Psychological Association
Association of American Veterinary Medical Colleges
Association of Schools and Colleges of Optometry
Association on Schools of Allied Health Professions
Council on Social Work Education
Physician Assistant Education Association

Methods

Pharmacy, medical, nursing, and pre-health undergraduate students participated in a two and a half week interdisciplinary MOM Honduras trip in 2014, 2015 and 2016 under the supervision of pharmacy, medical, and nursing faculty. The team provided at least eight full day primary care clinics to underserved Hondurans in the Departments of Olancho (2014 and 2015 teams) and Choluteca (2016 team). A total of ten pre-health undergraduates, eight pharmacy students, nine nursing students, and fourteen medical students participated in the medical mission trip during the study period. Although marriage and family therapy students attended the 2016 MOM Honduras, they were not included in this study because their interaction with the pharmacy students and other members of the team was limited due to their participation in settings outside of the Department of Choluteca. The MOM clinic operated similar to traditional physician offices; however, the MOM operations were run by students under the direct supervision of faculty.

During clinic, patients moved through three core stations: an intake station, a provider station, and a pharmacy station. Similarly, students from each discipline rotated through these stations allowing them to understand the workings of each profession in the clinic setting (Table II). Students at the intake station performed functions typically associated with the nursing profession such as recording patient's vitals and chief complaints. Patients were then assessed and evaluated at the provider station. Routine pharmacy functions including dispensing medications, calculating appropriate dosages for medications, mixing suspensions, consulting with medical students and physicians, recommending substitutions for medications as appropriate and maintaining a detailed inventory list were completed at the pharmacy station. At least one student from the respective discipline remained at each station to maintain

continuity and help train the other students. In addition, faculty members worked together to supervise and manage the stations and answer questions.

Table II: Pharmacy, Medical, Nursing, and Pre-health Undergraduate Students Interdisciplinary Mission Trip - Activities and Responsibilities

Intake Station*
Patient Registration, Vitals, Chief Complaint
1 Nursing Student + 1-2 Healthcare Students
Provider Station*
Patient Evaluation/Assessment
3-5 Medical Students + 2-3 Healthcare Students
Pharmacy Station*
Dispensing Medications, Medication Consultation, Patient Education *etc.*
1 Pharmacy Student + 1-2 Healthcare Students

*Students rotated through intake, provider, and pharmacy stations which allowed them to understand the workings of each profession in the clinic setting. At least one student from the respective discipline remained at the intake, provider, and pharmacy stations to maintain continuity and help train the other students. Each student had several opportunities to rotate through each station.

Table III: Characteristics of Pharmacy, Medical, Nursing, and Pre-health Undergraduate Students on a Medical Mission Trip to Honduras in 2014, 2015 and 2016 (N=33)

	2014 (no.)	2015 (no.)	2016 (no.)	Overall (%)
Gender	7	9	8	73
Female	4	2	3	27
Male				
Age				
18-21	3	5	3	33
22-26	4	5	5	43
27-30	3	1	3	21
30-39	1	0	0	3
Ethnicity				
Caucasian	3	11	10	73
African American	1	0	1	6
Asian	3	0	0	9
Latino	1	0	0	3
Indian	1	0	0	3
Other	2	0	0	6

Non-pharmacy students (n=33) involved with the mission trip were invited to complete a pre-test survey prior to the start of clinic and a post-test survey on the final clinic day to assess their perceptions of pharmacy students' contributions to the medical team before and after the medical trip. Literature was reviewed to develop the survey, which consisted of 14 questions with 11 Likert scale questions (1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree) and three open-ended questions to allow for individual expression (Table IV & Table V).

Demographic data was collected (*i.e.* age, gender, years of education completed, area of study, and ethnicity) and analysed using descriptive statistics. Statistical analysis was based on a significance level (p) of 0.05 with a two-tailed independent t-test to compare mean responses before and after the mission trip. Independent samples t-test and Mann Whitney were conducted as appropriate to determine whether there were statistically significant differences between the two groups. Results of the survey were compared to assess perception changes occurring as a result of the interactions with pharmacy students during the clinical experience. Data were analysed using SPSS 21.0 software. The study was approved by Mercer University's Institutional Review Board and a waiver of informed consent was granted.

Table IV: Students' responses to pre-test and post-test surveys of an interdisciplinary medical mission trip

Survey Item†	Pre-test Mean N=33 (SD)	Post-test Mean N=33 (SD)	*p* value
1. Pharmacy students add value to patient care with regard to medication counseling and potential side effects.	3.79 (0.49)	3.88 (0.33)	0.38
2. I am aware that pharmacy students provide assistance with the international travel clinic in areas other than pharmacy.	3.42 (0.75)	3.76 (0.50)	0.04*
3. I trust the medication information provided by pharmacy students.	3.79 (0.42)	3.82 (0.39)	0.76
4. Pharmacy students should fill each medication as prescribed with a primary focus to keep the "line" moving to prevent longer wait times for patients.	2.36 (0.90)	2.24 (0.87)	0.58
5. Pharmacy students should take the most personal responsibility (*i.e.* more than nursing and/or medical students) in ensuring patient understanding of directions for use for their medications.	2.73 (0.84)	2.82 (0.81)	0.66
6. I feel that pharmacy students understand the difficulties and nuances of my role as a health care professional.	3.21 (0.70)	3.55 (0.62)	0.04*
7. As members of the healthcare team, pharmacy students enhance patient care.	3.73 (0.45)	3.94 (0.24)	0.02*
8. Medical and nursing students/professionals save time and treat more patients when student pharmacists complete medication counselling and reviews.	3.36 (0.65)	3.42 (0.75)	0.73
9. Medication errors in dosing, potential drug interactions and side effects will be reduced with pharmacy student participation on the healthcare team.	3.70 (0.47)	3.97 (0.17)	0.03*
10. I prefer to use a medication database for drug information rather than discussing recommendations with a pharmacy student.	2.06 (0.70)	1.91 (0.88)	0.44
11. In my prior personal and/or professional experiences with pharmacy students, I see a difference in community (traditional dispensing roles) versus clinical pharmacy (patient care roles) with regards to patient care.	3.00 (0.61)	3.21 (0.78)	0.22

†Likert scale used: Strongly Disagree=1; Disagree=2; Agree=3; Strongly Agree=4
SD = Standard Deviation
*Difference between group means significant at p<0.05 confidence level.

Results

A total of 33 students were surveyed during the medical mission trips conducted in 2014, 2015 and 2016. Overall, the majority of students were female (73%) while more than 97% of the respondents were less than 30 years of age. Ethnicity varied among the medical mission teams with 73% reporting as Caucasian, 6% African American, 9% Asian, 3% Latino, 3% Indian and 6% other. Table III contains further information about the characteristics of the students by year of mission trip completion.

Although the medical mission trips to Honduras consisted of unique interdisciplinary teams each year, there were common similarities in regard to key activities and responsibilities. The roles included, but were not limited to: patient in-take and health history, triage, patient health education, diagnosis and treatment, pharmacy related tasks, and interpreter. A summary of student activities and responsibilities is provided in Table II. The patient in-take station involved opportunities for students to have one-on-one conversations with the patients. Gathering information by taking patient health histories was vital for the success of the mission trip. Students also checked blood pressure and patient glucose levels as well as checked pulse and basic diagnostics. Based on knowledge, skills, ability and training, students dispensed medications and provided medication consultations/patient education. Pharmacy students in particular controlled how medicines were distributed. Lastly, students contributed as interpreters alongside local Hondurans based on their foreign language skills.

Table V: Pre-test and post-test survey selected open-ended comments from interdisciplinary members of a medical mission team

Q12 The greatest barrier I perceive in working with pharmacists on a healthcare team is:		
Area of Study	**Pre-test responses**	**Post-test responses**
NURSING	NR	There was no barrier in working with them. They were helpful to me when I was in the pharmacy. They were great in intake as well.
MEDICAL	Knowing the reasoning why we choose certain medications.	If I should instruct patients on how to take the drugs.
UNDERGRAD	NR	The greatest barrier was my lack of knowledge of the different meds.
UNDERGRAD	Perceptions that they aren't as skilled or trustworthy as actual medical school residents.	The lower perception of them. They helped doctors constantly throughout this trip and we could not have done this without them.
MEDICAL	Clear understanding of each profession's role.	They sometimes contradicted what the attending recommended and vice versa.
MEDICAL	Getting time to discuss the optimal drugs with them.	Access to discuss with pharmacists.
Q13 What do you see as the primary role of pharmacy students on this Mercer on Mission interdisciplinary team to Honduras?		
Area of Study	**Pretest responses**	**Posttest responses**
NURSING	Pharmacy students have a greater understanding of medications and are able to answer our questions and counsel patients.	Their primary role is counselling patients about their meds and being available for consult.
UNDERGRAD	To help everyone understand how medications should be used.	To distribute meds and communicate with doctors if a better med should be used.
UNDERGRAD	Medication – why, when and how to take them. They know more about what the patient will take when the doctor is not around.	Medicine direction, helping the doctors in treatment, and understanding dosing and interactions.
NURSING	Dispensing medication and counselling.	Keeping everything organised. They really made sure everything ran smoothly. Patient education.
MEDICAL	Counseling patient on drug use, side effects and working with med students on understanding the different meds option.	To work along with medical students in figuring out the most effective treatment.
MEDICAL	Educate others on drugs and do quality check on med team's orders.	Contribute input to prescribing meds and contraindications.
Q14 Do you have any further feedback about pharmacy student participation on the health care team that has not been explored in this survey?		
Area of Study	**Pretest responses**	**Posttest responses**
NURSING	NR	I really enjoyed working with the pharmacy students on this trip. They know so much about meds, which is awesome! They were also great at intake and in the med pods. I learned a lot from them.
UNDERGRAD	No	The pharmacy students are amazing and I don't think pharmacists get enough credit for their role in health care as much as physicians do even though they are both doctors.

NR = No response

The respondents' answers to questions about pharmacy students' ability to contribute to an interdisciplinary medical mission team were compiled and the average answer and standard deviation were calculated for each survey item. The average responses to the questions are shown in Table IV. Findings revealed that pharmacy students' ability to provide assistance with the international travel clinic in areas other than pharmacy improved before and after the medical mission trip ($p<0.05$). Responses showed significantly high ratings (strongly agree/agree) for the pre- and post-test items: 1) I am aware that pharmacy students provide assistance with the international travel clinic in areas other than pharmacy; 2) I feel that pharmacy students understand the difficulties and nuances of my role as a healthcare professional; 3) As members of the healthcare team, pharmacy students enhance patient care; and 4) Medication errors in dosing, potential drug interactions and side effects will be reduced with pharmacy student participation on the healthcare team (mean range 3.21 – 3.94 on a scale of 1=strongly disagree to 4=strongly agree). Although non-significant, there were slightly lower ratings for the following pre- and post-test items: 1) Pharmacy students should fill each medication as prescribed with a primary focus to keep the "line" moving to prevent longer wait times for patients; 2) Pharmacy students should take the most personal responsibility (*i.e*. more than nursing and/or medical students) in ensuring patient understanding of directions for use for their medications; and 3) I prefer to use a medication database for drug information rather than discussing recommendations with a pharmacy student (mean range 1.91 – 2.82 on a scale of 1=strongly disagree to 4=strongly agree).

The 33 students participating in the medical mission trips over the years 2014, 2015 and 2016 were also asked to answer three open-ended questions. The most frequently reported responses were identified. Although the range of possible answers was extensive, noteworthy responses were those identified as provided by 10% or more of students.

Overall, responses indicated that students perceived the assistance provided by pharmacy students to be highly valuable. The open ended survey questions prompted responses about: 1) the greatest barrier perceived in working with pharmacists on a healthcare team; 2) the primary role of pharmacy students on an interdisciplinary mission team; and 3) additional feedback on pharmacy student participation on the healthcare team. Select comments by the inter-professional team members are provided in Table V.

Themes that emerged from student comments were that: (1) Pharmacy students have a greater understanding of medications; (2) Pharmacy students are indispensable; and (3) Pharmacy students play a key role in patient education and counselling. Common words used to describe the pharmacy students included: counsellors, helpers, executors, organisers, educators, and guides. Students clearly indicated that they felt that this experience was a positive and valuable opportunity to communicate closely with pharmacists, nurses, physicians and patients. Rather than indicating specifically what the students learned, the responses to these questions indicated target areas for improvement. Non-pharmacy students noted barriers as their lack of knowledge on medications and their misconceptions of pharmacy students (*e.g*. incorrect perceptions that pharmacy students are shy and aren't as skilled as other health professionals). Several students mentioned that this was their first time working side by side with a pharmacy student.

Discussion

The primary outcomes were to: (1) assess the impact of working with student pharmacists on a global mission trip; and (2) examine the perceptions of undergraduate and graduate students with regard to student pharmacists' participation on a global medical mission team. Overall findings of this study identified a statistically significant improvement from several pre- to post-test prompts. These results suggest that undergraduate and graduate students gained a greater understanding of the student pharmacists' ability to assist in clinical activities (*e.g.* checking patients' vitals in the intake station, providing on-demand consultation at the provider station, recommending therapeutic substitutions, compounding, *etc*.) beyond the stereotypical roles associated with the pharmacy profession (Ward *et al.*, 2005). Requiring students to rotate through each station enabled students to experience and appreciate the challenges associated with the roles of other members of the healthcare team. While in the pharmacy, medical, nursing, and pre-health undergraduate students teamed up with the pharmacy students to review the indication and appropriateness of each prescription to identify and address any issues that may have resulted in medication-related harm. This process likely positively influenced participants' perception of the role of pharmacy students in mitigating medication adverse events.

These findings are similar to a study conducted by Clements *et al*. that evaluated members of an interdisciplinary medical mission team regarding pharmacy contributions (Clements, Rager & Vescovi, 2011). The medical mission experience consisted of three separate teams that included one pharmacist and two pharmacy students among other members of the medical team. All thirty-six survey respondents in the study strongly agreed that the pharmacist was helpful in making therapeutic substitutions based on medication availability. In addition, 97.2% strongly agreed that the pharmacist's contributions to the team were necessary for the success of the trip. Although pharmacy students participated in the medical mission trip, survey questions centred on the 'pharmacist' title, likely highlighting the combined presence of pharmacy professionals (*i.e.* student pharmacists and the pharmacy faculty). A 2013 study assessed medical providers' (Medical Doctor or Doctor of Osteopathic Medicine) perceptions of student pharmacists participating as members of a general medicine team (Lancaster *et al*., 2013). Study results

revealed that providers had a positive perception of the contributions of student pharmacists; ≥ 90% agreed or strongly agreed that students were prepared for rounds, possessed pertinent patient information, and responded to drug information questions in an appropriate time. In addition, the majority of surveyed providers (61.8%) perceived student participation to be beneficial to the healthcare team. While the participants and setting are different from those of this study, the results demonstrate how student pharmacists' participation on an interdisciplinary team may be perceived outside of the medical mission setting.

In general open-ended responses indicated a greater appreciation of the value that could be added by pharmacy students, decreased barriers to working with pharmacy students on a global medical mission trip, and improved awareness of clinical roles and positive impact of pharmacy students in treatment decisions concerning patient care. These themes highlight a shift in the attitude towards pharmacy students and their roles as members of the healthcare team. These outcomes mirror the results of a study that assessed healthcare students' attitudes towards IPE and the role of pharmacists on an inter-professional international experience (Arif *et al*., 2014). The investigators reported a 'noteworthy' number of non-pharmacy students who developed an appreciation for the role of pharmacists in public health. Results suggested that service oriented IPE may improve collaboration of healthcare models (Arif *et al*., 2014). Additional studies confirm positive changes in healthcare students who participate in IPE (Bridges *et al*., 2011; Hawkes *et al*., 2013; Henderson *et al.*, 2013). These changes may result in lasting change leading to shared skills, values, and respect for the roles of other healthcare professionals (Bridges *et al*., 2011).

Although the undergraduate and graduate health professional students generally had a positive attitude toward student pharmacists, a few survey questions revealed a slightly negative trend from pre-test to post-test. Clinic days were long, fast paced, and exhausting which may have affected students' attitudes regarding the role of the pharmacy in managing wait times for patients, especially at the end of the day as the other two stations were done with their assignments. In addition, students may have chosen to rely on an alternative medication resource rather than leave their station to consult with a pharmacy student if a pharmacy student was not readily available as the day progressed. Similar to community pharmacy, patients received counselling on their medications at the pharmacy station likely resulting in the students associating the role of ensuring patient understanding of medication to the pharmacy students. This parallels the perception providers (*i.e.* physicians, nurse practitioners, physician assistants) associated with pharmacy services in a recent study (Albanese, Pignato & Monte, 2017). Recognising the differences among the roles of different health professions also allows the student to better understand their own role and may help, or hinder collaborative efforts (Hawkes *et al*., 2013; Hean *et al*., 2006).

This study had several limitations. The mission team developed camaraderie through working and living together throughout the experience. As a result, this rapport may have positively affected the perception of the participants regarding the pharmacy students' role. The sample size is small due to the nature of this activity; however, all undergraduate and graduate students voluntarily participated and the study is similar in size to a previous IPE mission study (Clements, Rager & Vescovi, 2011). Although pharmacy students provided consults, interventions, and recommended medication substitutions, this information was not captured during this medical mission trip due to the pace of clinic. Future research capturing these important contributions may be helpful in providing additional information regarding the value of pharmacy students on a medical mission trip. Despite these limitations, survey results highlight statistically significant changes in the role of student pharmacists on an inter-professional global medical mission trip.

Conclusion

The global medical mission trip provided an opportunity for students to work as members of the healthcare team to deliver effective patient care and increase awareness of professional differences. Further research is needed to evaluate the impact of these interdisciplinary experiences on decreasing barriers between pharmacists and practitioners in clinical practice and the impact of specific tasks (*i.e.* interventions, substitutions) on a medical mission trip.

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