ABSTRACT

The purpose of this study was to quantify and compare interprofessional skills among first year pharmacy students who participated in healthcare and non-healthcare setting service-learning experiences. This was a survey-based pre/post comparison of interprofessional attitudes among student pharmacists during a first professional year service-learning course comparing two cohorts at healthcare-related sites versus non-healthcare sites. The Interprofessional Attitudes Scale (IPAS) was administered to students in fall 2021 and spring 2022. Healthcare and non-healthcare sites were compared using unpaired t-testing comparing the mean sums of Likert scores. This longitudinal cohort survey encompassed a total of 110 of 117 eligible first-year pharmacy students completed the pre-survey, (96% response rate), and 78 of 112 eligible students completed the post-survey (71% response rate). From pre to post survey, there was a positive increase of the mean Likert scores in all five IPAS subsections. There was no significant difference of mean Likert scores displayed between the sample of healthcare and non-healthcare students from the pre-survey to the post-survey in each of the five IPAS subsections. There was no difference in pre/post mean Likert scores of the five subsections of the IPAS in first-year pharmacy students, regardless of placement at healthcare or non-healthcare related sites.

A COMPARISON OF HEALTHCARE AND NON-HEALTHCARE SERVICE-LEARNING ENVIRONMENTS ON INTERPROFESSIONAL LEARNING IN FIRST-YEAR PHARMACY STUDENTS' EXPERIENTIAL CURRICULUM

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Interprofessional education (IPE) is incorporated into health science curricula to foster collaboration between medical professionals and improve the safety and quality of patient care (Greiner & Knebel, 2004). Following a call to action by the Institute of Medicine and the Accreditation Council for Pharmacy Education, interprofessional education has become a significant component of the education that healthcare professionals are to receive (Greiner & Knebel, 2004; Accreditation Council for Pharmacy Education, 2015). While IPE has shown large benefits to improving practice models, it may be challenging to implement at the learner level due to availability of learning sites; access barriers to educational sites; preceptor availability for IPE experiences; restrictive curricula and schedule requirements between different health sciences programs; and/or attitudes towards performing IPE among other health disciplines (Lash et

al., 2014; West et al., 2016). Despite barriers to implementation of IPE, health science schools continue to look for opportunities for interprofessional education in their curriculum to meet accreditation standards (West et al., 2016; Accreditation Council, 2015).

As defined by the World Health Organization, interprofessional collaborative practice and education is the combination of at least two individuals from different healthcare backgrounds who work to deliver high quality care to patients. Individuals will learn about, from, and with each other to enable effective collaboration and improve health outcomes (World Health Organization, 2010). Including providers within and outside of the typical health care setting and from multiple professions introduces students to unique perspectives that can aid in developing important interprofessional, communication and collaboration skills.

Service-learning is an experiential learning teaching methodology that exposes learners to teams and a variety of providers outside of the typical healthcare system (Infante et al., 2015). Service-learning is an effective strategy for promoting community-based interprofessional education among student pharmacists (Sevin et al., 2016). While there is much literature describing interprofessional service-learning among health professional students, a recent systematic analysis determined that the majority of service-learning experiences among health science students occur in a community setting, rather than a healthcare setting, showing that more robust assessment methods and differing IPE settings are needed (Stetten et al., 2019). There is a paucity of data comparing service-learning IPE outcomes within healthcare settings to those outside of typical healthcare settings, and a need for more robust assessment methods in this area is needed.

The University of Pittsburgh School of Pharmacy (Pitt Pharmacy) has a unique service-learning program for first professional year pharmacy students as part of its experiential learning curriculum (Drab et al., 2004). This long-standing experience integrates learners into community-based settings across the region for early exposure to communication, civic involvement, humanistic care of patients, and social awareness of unmet medical needs. This experience exposes students to various providers within and outside of the healthcare system (Drab et al., 2004). While some of the school's service-learning sites are part of a medical practice where traditional healthcare is rendered, the majority occur in a community site, aligning with national trends. The objective of this study is to compare IPE outcomes of students placed in a traditional healthcare service-learning site to those who were placed in non-healthcare settings and teams. We hypothesize that pharmacy students will still develop positive attitudes towards interprofessional practice despite participating in non-healthcare teams at service-learning sites.

Methods

The study was conducted with first-year pharmacy students during the initial sessions of their experiential learning course, "Community Health," in the fall 2021 semester. The course spans two semesters as Community Health 1 and Community Health 2 using service-learning as a teaching methodology. For the course, students were assigned to diverse community sites throughout the region such as centers for

older adults, free clinics, food pantries, literacy programs, shelters for persons experiencing homelessness, and dispensaries. The students were required to complete approximately 40 hours of service-learning each semester, spread to be approximately four hours per week as part of the required curriculum. All students completed structured reflections to optimize learning including descriptions of the roles of various team members at the sites.

The experiential learning leadership team and the investigators divided the service-learning sites into two cohorts: healthcare setting and non-healthcare setting sites. Healthcare setting sites included ambulatory care health centers, substance use disorder rehabilitation facilities, free healthcare clinics, health insurance navigation assistance, wellness facilities, medical marijuana dispensaries, and nursing and rehabilitation centers. Non-healthcare setting sites included centers for older adults, food pantries, shelters for persons experiencing homelessness, community engagement centers, independent living skills facilities, organizations that foster community inclusion for people with disabilities, literacy programs, after-school programs for children, and the Young Men's Christian Association (YMCA) organizations. Eligible participants were assigned to either healthcare or non-healthcare service-learning sites via a lottery system unrelated to study methodology.

This was a pre/post-survey study with a longitudinal cohort of pharmacy students using the Interprofessional Attitudes Scale (IPAS). The IPAS is a validated survey designed to measure five competency domain subsections for interprofessional collaborative practice. It consists of 27 items with a five-point Likert Scale where 1 = Strongly Disagree and 5 = Strongly Agree. The five IPAS subsections assessed are: (1) Teamwork, Roles, and Responsibilities (nine questions), (2) Patient-Centeredness (five questions), (3) Interprofessional Biases (three questions), (4) Diversity and Ethics (four questions), and (5) Community-Centeredness (six questions) (Norris, 2015).
All first-year students aged 18 years and older were eligible for participation. In September 2021, students were introduced to the survey concept and research project during the class time for their Community Health course, and pre-surveys were administered prior to the start of on-site learning experiences. Students completed the post-survey at the end of the service-learning experience using Qualtrics in April 2022. Students created unique, anonymous identifiers that were used to link their pre-survey responses to the post-survey responses. Participation in the survey was optional and students were given extra credit points as an incentive to participate or the option to submit an alternative assignment for extra credit. This study was approved by the Institutional Review Board at the University of Pittsburgh.

The survey took students approximately 10 minutes to complete and had students rating their agreements with various statements using the Likert scale described above. Both pre and post-surveys were assessed via the means of the sum of the overall Likert Scores by subsection. Unpaired t-tests were used to determine changes in numerical Likert values to demonstrate changes in student attitudes from a statistical standpoint. These t-tests compared differences in student responses between the two cohorts. Data were rendered from Qualtrics and analyzed using SPSS. The p value was set to <0.05 to reduce the chances for incurring a type I error. A confidence interval of 95% was used.

The analysis included a comparison of IPAS Subsection means between the entire student population pre and post-survey, a comparison of IPAS Subsection means between only those in the healthcare cohort pre and post-survey, and a comparison of IPAS Subsection means between those in the non-healthcare cohort pre and post-survey.

Results

A total of 110 of 117 eligible first-year pharmacy students completed the pre-survey, (96% response rate) and 78 of 112 eligible students completed the post-survey (71% response rate). Table 1 describes the demographics of the students in the two cohorts (healthcare and non-healthcare). There was an overall positive increase of the mean Likert scores in four out of five subsections pre and post-experience (Table 2). Specifically, there was a statistically significant increase in the Patient Centeredness Subsection with a mean difference of 0.55 (std. dev. 1.67, p= 0.020 CI95%). Similarly, there was also a statistically significant increase in the Interprofessional Bias Subsection with a mean difference of 1.09 (std. dev. 2.61, p= 0.005 CI95%).

The comparison of IPAS Subsection means of only those in the healthcare cohort pre and post- survey showed an increase in Likert scores in all five subsection; however, using a confidence interval of 95% and a p value of <0.05, none of these results showed a significant difference from pre to post-survey (Table 3). The comparison of IPAS Subsection means of only those in the non-healthcare cohort pre and post-survey showed an increase in mean Likert scores in the following subsection: Patient-Centeredness, interprofessional bias, and Diversity and Ethics. However, using a confidence interval of 95% and a p value of < 0.05, none of these results showed a significant difference from pre to post-survey (Table 3). Figure 1 provides the mean raw scores of IPAS Subsection by healthcare and non-healthcare sites pre and post-survey.

**Table 1: Demographics of Pharmacy Students Sampled**

	Pre-Survey Total Participants (n=110) (%)	Post-Survey Total Participants (n=78) (%)
Female (%)	66 (60.0)	52 (66.7)
Male (%)	43 (39.1)	25 (32.1)
Non-binary (%)	1 (0.9)	1 (1.3)
Mean Age (Standard Deviation)	20.6 (1.9)	21.6 (2.4)
Healthcare site (%)	44 (40.0)	28 (35.9)
Non-Healthcare site (%)	66 (60.0)	50 (64.1)
Previous Work Experience - None (%)	2 (1.8)	3 (3.8)
Previous Work Experience – Healthcare setting (%)	7 (6.4)	45 (57.7)
Previous Work Experience – Non- Healthcare setting (%)	32 (29.1)	30 (38.5)

Table 2: Overall Pre/Post Comparison of Student IPAS Responses

Subsection	Pre-Survey Score (n=110)	Post-Survey Score (n=78)	Mean Difference	p-value*
Teamwork, Roles, and Responsibilities (9 questions; max score 45)	39.52	39.96	0.38 ± 3.90	0.265
Patient- Centeredness (5 questions; max score 25)	23.40	23.92	0.55 ± 1.67	0.020
Interprofessional Bias (3 questions; max score 15)	9.71	10.41	1.09 ± 2.61	0.005
Diversity and Ethics (4 questions; max score 20)	19.12	19.32	0.05 ± 1.22	0.401
Community- Centeredness (6 questions; max score 30)	27.59	27.55	-0.45 ± 3.42	0.198

*One-tail p-value.

Figure 1. Mean Raw Scores of IPAS Subsection by Healthcare and Non-Healthcare Sites Pre and Post-Survey
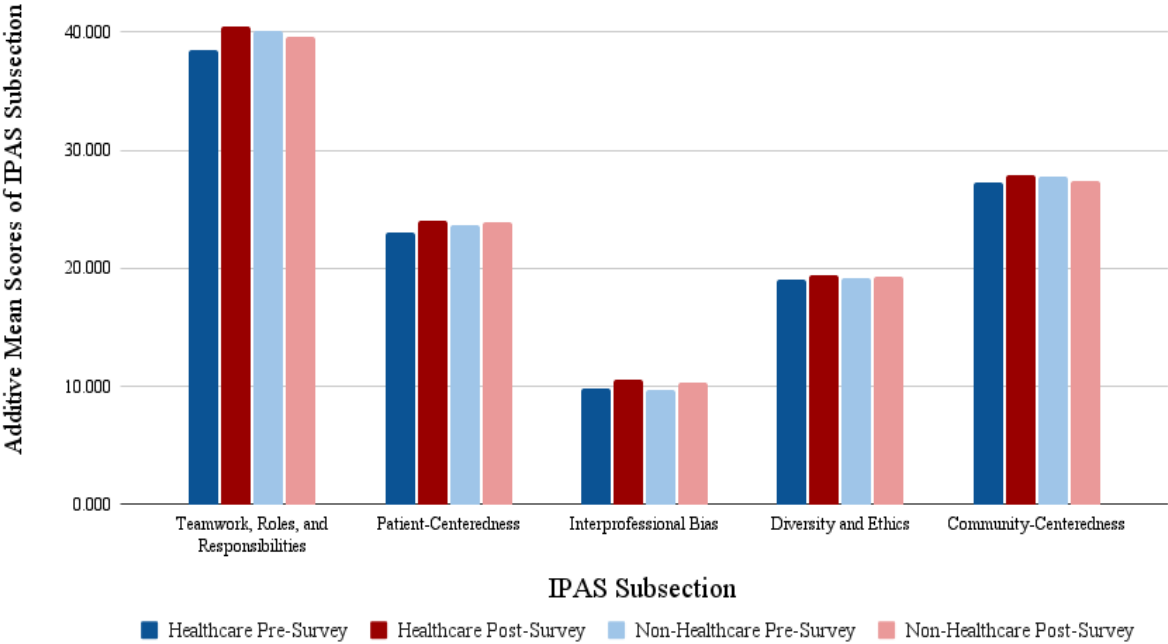
Table 3: Mean Scores of IPAS Subsection and Site Experience by Healthcare Sites Pre and post-survey and Non- Healthcare Sites Pre and Post-Survey

Healthcare Sites						
Subsection	Pre-Survey (n=44)	Standard Error Mean	Post-Survey (n=32)	Standard Error Mean	Mean difference	p-value†
Teamwork, Roles, and Responsibilities (9 questions; max score 45)	38.52 ± 6.59	0.99	40.47 ± 3.79	0.67	1.95	0.14
Patient-Centeredness (5 questions; max score 25)	23.07 ± 3.59	0.54	24.00 ± 1.69	0.30	0.93	0.18
Interprofessional Bias (3 questions; max score 15)	9.820 ± 1.50	0.23	10.61 ± 1.28	0.23	0.79	0.11
Diversity and Ethics (4 questions; max score 20)	19.02 ± 3.02	0.46	19.39 ± 2.93	0.53	0.37	0.27
Community-Centeredness (6 questions; max score 30)	27.27 ± 0.60	0.09	27.84 ± 0.99	0.18	0.57	0.42
Non-Healthcare Sites						
Subsection	Pre-Survey (n=66)	Standard Error Mean	Post-Survey (n=46)	Standard Error Mean	Mean difference	p-value†
Teamwork, Roles, and Responsibilities (9 questions; max score 45)	40.18 ± 3.68	0.45	39.62 ± 4.16	0.61	-0.56	0.45
Patient-Centeredness(5 questions; max score 25)	23.62 ± 1.89	0.23	23.87 ± 1.77	0.26	0.25	0.48
Interprofessional Bias (3 questions; max score 15)	9.64 ± 2.41	0.29	10.28 ± 2.32	0.34	0.64	0.16
Diversity and Ethics (4 questions; max score 20)	19.18 ± 1.30	0.16	19.28 ± 1.33	1.94	0.10	0.69
Community-Centeredness (6 questions; max score 30)	27.80 ± 2.48	0.30	27.35 ± 2.98	0.44	-0.45	0.39

†2 Tailed equal variances assumed for significance

Discussion

Our study was the first to include a survey-based pre/post comparison of the change in interprofessional learning attitudes during a service-learning course in first professional year student pharmacists. Our study also is the first to include a comparison of learning between two different categories of interprofessional practice sites. For our study, the IPAS survey was utilized because this validated instrument was designed to assess the Interprofessional Education Collaborative (IPEC) Core Competencies for interprofessional collaborative practice (Norris et al., 2015; Interprofessional Education Collaborative, 2016). Our research demonstrates a slight improvement in the overall IPAS scores from pre to post-survey. Healthcare and non-healthcare intra-cohort score differences were not significant.

The overall survey results reveal that students may develop various interprofessional skills through service-learning, whether the experience is a healthcare or non-healthcare environment. Specifically, students can see an impact in four of the five subsections: (1) Teamwork, Roles, and Responsibilities, (2) Patient-Centeredness, (3) Interprofessional Biases, (4) Diversity and Ethics. This indicates that a student may benefit from service-learning regardless of site placement.

For all five subsections, there was a positive increase in the mean Likert scores of students in the healthcare cohort. For the non-healthcare cohort, students saw an increase in mean Likert scores in only these three subsection: Patient-Centeredness, Interprofessional Bias, and Diversity and Ethics. While the non-healthcare cohort did not see statistically significant changes from pre-survey to post-survey in any of the subsection, this could be due to the responses reaching a ceiling effect on the pre-survey (Fusco et al., 2019).

Through partnering with community health and non-profit organizations across the city of Pittsburgh, expansion of service-learning from traditional healthcare sites to include the non-healthcare sites that offer support and outreach as part of service-learning opportunities mitigated challenges of site prevalence, preceptor availability, and other challenges that could be barriers preventing students from being integrated into early interprofessional learning experiences. The improvement in core IPEC competencies across all service-learning environments supports inclusion of both types of settings in IPE activities.

Overall, the results of this study support the concept that first year pharmacy students benefit in learning the many important aspects of interprofessional collaboration through service-learning, whether they are placed in healthcare settings or non-healthcare settings.

The results from this study parallel the findings revealed by Gillette et al. (2019), indicating that the interprofessional skills practiced at service-learning sites are vital to the success of the world's future healthcare professionals. Although Gillette et al. conducted research in a broader group of healthcare professional students beyond student pharmacists, this study successfully used the IPAS as a method of gathering student results.

Similarly, the findings of Thurston et al. (2017), reveal that the understanding of each student to another can lead to better interprofessional collaboration in the future. This is an important concept to apply to the research done in this study, for the ultimate

goal of our ongoing research is to understand student views on interprofessional interactions gained through experience at service-learning sites, with hopes to improve the system for future student pharmacists to come. This specific research did not use the IPAS to gather student information, rather it used the SSRQ, but the crux of the study yielded findings relevant to our ongoing IPE research.

There are some known limitations in our study. As with other IPE assessment scales such as the RIPLS (Readiness for Interprofessional Learning Scale), students seem to score on the high end of the scale at baseline leaving little room for improvement (Mahler et al., 2015; Fusco et al., 2019). In our study, students were surveyed at the beginning of the first professional year of pharmacy school and scored high at baseline. This finding is similar to other studies using the IPAS, therefore, it may be difficult to determine change from baseline to follow-up (Fusco et al., 2019; Torsvik et al., 2021). There also was a lower post-survey response rate, which could have skewed results as well. Another limitation is that not all participants could recall their unique identifier for the post-survey, so we were unable to match all pre/post surveys to assess individual results through a paired t-test. We were, however, we able to assess the samples overall in healthcare and non-healthcare sites. While the IPAS scale is a validated tool, it is not validated for pre and post-survey comparison, though the developers say it could potentially be used (Norris et al., 2015).

Conclusion

First professional year pharmacy students show overall improvement in the interprofessional domains of Patient-Centeredness, Interprofessional Bias, and Diversity and Ethics in a service-learning placement as part of an introductory pharmacy practice experience. There were no significant differences in mean Likert scores of each of the five subsections of the IPAS in first year pharmacy students, regardless of placement at a healthcare related or non-healthcare related site from the beginning to the end of their experience at the service-learning sites. These findings suggest that students may develop interprofessional skills regardless of service-learning site placement in most of the five IPAS subsections: (1) Teamwork, Roles, and Responsibilities, (2) Patient-Centeredness, (3) Interprofessional Biases, (4) Diversity and Ethics, and (5) Community-Centeredness.

Disclosure

There are no financial disclosures or conflicts of interest to disclose from any of the authors

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