Outcomes from a single-intervention trial to improve interprofessional practice behaviors at a student-led, free clinic

Steven R. Horbal (shorbal@indiana.edu)[a], Brian A. Grice (bgrice@iupui.edu)[b], Alexandra Evans (evans.allie57@gmail.com)[c], Kyle W. Kaplan (Kyle.Kaplan@cchmc.org)[a], Lauren Wright (lwright.iwu@gmail.com)[c], Aurelian Bidulescu (abidules@indiana.edu)[a], Andrea L. Pfeifle (apfeifle@iu.edu)[d]

[a]Indiana University School of Public Health—Bloomington, IN, USA
[b]Indiana University School of Medicine, Indianapolis, IN, USA
[c]Indiana University School of Nursing, Indianapolis, IN, USA
[d]Indiana University Center for Interprofessional Health Education and Practice, Indianapolis, IN, USA

Abstract

Background

Interprofessional collaboration (IPC) is the practice of two or more healthcare professionals working together and learning from one another to improve health outcomes. IPC is important for quality training, typically improving individual and group level outcomes. Students value the opportunity for leadership and teamwork development when IPC is offered in their curriculum. The Indiana University Student Outreach Clinic (IUSOC) is a student run clinic that provides free primary care services to underserved residents residing in Indianapolis, Indiana. The IUSOC partner leaders identified a need to enhance knowledge about partner roles, scope of practice, and professional training with the hopes of improving quality of care through IPC and utilization of clinic resources.

Methods

A cluster randomized design consisted of education session days and control days. Participants had an equal selection probability. Student partners from ten different

disciplines were involved. Two survey instruments were used for data collection: 1) The *Interprofessional Socialization and Valuing Scale* and 2) The *Professional Consciousness Raising Questionnaire*. The former measured the attitudes and beliefs that underlie interprofessional socialization, while the latter assessed pre/post student knowledge of the roles and responsibilities of each partner.

Results

The control arm of the study was composed of 167 student participants and the intervention arm had 170 participants. Participants in the intervention arm had greater scores for “ability to work with others”, “value in working with others”, and “comfort in working with others.” The intervention arm also had significantly increased odds of correctly identifying the roles responsibilities of the nursing, law, dental, and global health disciplines.

Conclusions

Results of this study demonstrate that administering a short interprofessional education exercise to healthcare professional students leads to improved IPC through increased interprofessional knowledge about other professions and change in beliefs and values toward the value of interprofessional collaboration among healthcare professionals.

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Declaration of Interest

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Corresponding Author

Steven Horbal

1025 E 7th St, PH C102

Bloomington, IN

47405

shorbal@indiana.edu

Introduction

Interprofessional collaboration (IPC) is increasingly important in a healthcare environment that is experiencing an increase in chronic diseases and a shortage in primary care physicians[1]. Professional groups typically have limited contact with one another thereby reducing collaboration opportunities, consultation time, and weakening patient-healthcare engagement[2]. Reduced collaboration among healthcare professions has been linked to inadequate focus on IPC in the educational curriculum of health professions[3]. This limitation may in turn diminish students' self-confidence and attention on their role in the healthcare team.[4] The Institute of Medicine and others suggest that one solution to this inherent deficit is to train students in an interprofessional framework to improve individual and group level outcomes[3]. Importantly, students typically favor IPC and appreciate the opportunity for leadership and teamwork development.[5]

The Indiana University Indianapolis Student Outreach Clinic (IUSOC) allows students to provide free healthcare, social, and legal services to more than 1500 underserved residents annually. These residents primarily reside in in Indianapolis, Indiana (ZIP code 46201). Students simultaneously apply their knowledge to better the community and gain professional work experience. Students volunteer from ten different disciplines (pharmacy, social work, occupational therapy, physical therapy, law, dentistry, global health, optometry, nursing and medicine) among three institutions (Indiana University, Butler University, and the University of Indianapolis). The clinic provides primary care to the community by providing pharmacy, specialized health clinic services, physical therapy and occupational therapy, and is a hub to address may socioeconomic issues important to advancing patients' health and well-being.

IUSOC partner leaders, both student and administrative, identified a need to enhance knowledge about partner roles, scope of practice, and training of professions. Leaders were concerned the lack of interprofessional knowledge within the clinic was inhibiting overall collaboration and contributing to inappropriate utilization of services. A common barrier to streamlined care flow at the IUSOC was the extensive number of services offered to patients seeking care. Patients regularly spent time waiting to see a specific partner when their wait time could have been spent consulting with another discipline. Students were often unaware of the services offered by other disciplines due to their own limited professional exposure as well as a lack of understanding of the non-traditional features within many of the services. Additionally, some students were not familiar with the screening methods already available at the clinic. The increased wait time, combined with a lack of knowledge, resulted in missed opportunities for consults with another partner and/or discipline.

The main objective of research team was thus to determine whether IPC can be modified by an intervention. We used a randomized trial design to test the effect of an educational intervention designed to increase knowledge about partner roles and scope of practice. The IUSOC leader-based focus group hypothesized that training and utilization of a screening protocol would increase knowledge of partner services.

Materials and Methods

Materials

An education session was utilized as the pre-clinic day intervention. The education session consisted of a brief morning meeting to emphasize the interprofessional structure of the IUSOC, describe the purpose of the screening tool, present key points

about partners, discuss examples for identifying possible consult candidates, and disclose the appropriate process for consults. One trained researcher led the education session at the end of the morning meeting before the clinic opened. During the 15-minute session, a scripted overview of each partner's responsibilities and a video recording detailing specific role was administered. Each participant also received a knowledge sheet to reference the roles and responsibilities of each of the partners.

Two survey instruments were utilized in this analysis: The *Interprofessional Socialization and Valuing Tool* (ISVS) and the *Professional Consciousness Raising Questionnaire* (PCRQ*)*. The *Interprofessional Socialization and Valuing Tool is* a 24-item questionnaire designed to help professionals explore what they have learned about working with professionals from other disciplines.[6] Participants completed the 24-item questionnaire for the *Interprofessional Socialization and Valuing Scale* (ISVS-24). All items were scored via a 7-point Likert scale ranging from: 1 = "not at all", to 7 = "to a very great extent." Three internal factors can be derived from the ISVS instrument: "the ability to work with others," "the value in working with others," and "comfort in working with others."[6] To measure respondents' beliefs, attitudes, and behaviors regarding interprofessional practice, answers were collapsed into each ISVS factor. Previous research has demonstrated moderate to excellent reliability among the three factors of the ISVS-24 (Cronbach's alpha 0.79-0.89), and excellent reliability among the entire 24-item scale (Cronbach's alpha 0.90).[6]

The *Professional Consciousness Raising Questionnaire* (PCRQ) was developed specifically for this study. It consists of a 13-item questionnaire designed to assess student knowledge of the roles and responsibilities of each partner, as gathered from

the knowledge sheet. Knowledge sheets were collected prior to survey distributions and students were instructed to fill out surveys individually. For the purposes of collapsibility in analysis of the ISVS, percent contributions were tabulated after being considered favorable or unfavorable. Unfavorable outcomes were “To a very small extent,” “To a small extent,” and “To a moderate extent,” while favorable outcomes were considered “To a fairly great extent,” “To a great extent”, and “To a very great extent.”

Participants

Participants were recruited from all IUSOC student volunteers who served in the clinic between February 2, 2017 and August 26, 2017. Participants with partially completed or incomplete surveys were removed from consideration. After informed consent, the final sample size was 337 participants. Cluster randomization was performed with the randomization unit represented by each clinical day. Each clinic day during the seven-month study period had an equal probability for selection as an intervention or control day. Intervention day participants were given the *Interprofessional Socialization and Valuing Tool* and the *Professional Consciousness Raising Questionnaire* after the education session, while control day participants were given the *Professional Consciousness Raising Questionnaire* at the end of each clinic day. For repeated participants, exposure was assigned to their initial cluster regardless of later cluster assignment (intent to treat exposure).

Experimental Design

The intervention targeted the education of providers and the overarching goal of analysis was to measure the effectiveness of our intervention. As the study population consisted of a large pool of transitory student providers (with varied knowledge and

backgrounds), the unit of randomization is limited to calendar days. Specific issues that occur with regard to allocation of subjects to groups in community health research is described elsewhere.[7] Briefly, given limitation of physical space and inability to observe adherence, it is not feasible to individually allocate partners to the intervention or control groups. Providing the intervention on clinic days allowed evaluation for the effectiveness of the intervention at the clinical level, while still preserving the integrity of the individual level secondary data for future analysis.

Randomization was important to this intervention as extensive residual confounding was expected. Randomized trials are the ideal study design for evaluative questions as they are very robust to unknown confounding factors.[8]. Block randomization by day eliminated any biases in favor of different effects of the intervention due to confounding by season.[9] The greatest downfall of clustered design is the heightened within-cluster variability compared to between-cluster variability. Randomization provided means for balance and limitation of the magnitude of individual level confounding. Another disadvantage to clustered design is the possibility of spillover contamination from individual discussion outside of the clinic regarding the intervention among partners. To limit contamination an intent-to-treat approach was utilized. Randomization to the group level has previously been demonstrated to alleviate individual level spillover contamination.[7]

Data Analysis

Descriptive data included demographic characteristics, clinical characteristics and number of days volunteering for the study. To assess the success of the randomization,

t-test and chi-squared tests were used to test the differences between the potential confounding factors among the control and intervention days for students. Participant responses to the *Professional Consciousness Raising Questionnaire* measured the effectiveness of the intervention, changes in intervention response over time, and participant rates of change in response to the intervention. Chi-squared tests evaluated the differences. Logistic regression was used to evaluate the odds ratios and 95% confidence intervals for correctly answering role assessment questions on the *Professional Consciousness Raising Questionnaire* at the participants' first visit.

Results

Table 1 reports descriptive statistics for the IUSOC student volunteers. The total sample size was 337 student volunteers, 167 were randomized to the control arm and 170 to the intervention arm. The average age (standard deviation) for the control arm was 24 (4) years and 25 (5) years for the intervention arm. The control arm was made up of 66% women, while the intervention arm was 67% women. In the intervention arm, 29 participants returned for a second volunteer day, while 30 participants in the control arm returned. Most participants reported established interprofessional practice in their profession/agency (74% control, 78% intervention). Most participants held a bachelor's degree (74% control, 72% treatment). Student's *t*-test and chi-squared tests show no significant differences between the control and intervention arms among potential confounders identified *a priori*, thus the randomization procedure was deemed successful.

Table 2 reports the percentage of correct answers on the *Professional Consciousness Raising Questionnaire* for volunteers after their first visit to the clinic. The results are

reported by frequency (%). Significantly higher frequencies of correct answers were found to favor the following intervention groups: nursing (intervention 71%, control 59%, $p = 0.04$), law (intervention 74%, control 59%, p-value 0.04), dental (intervention 92%, control 81%, $p = 0.04$) and global health (intervention 77%, control 54%, $p = 0.04$). No significantly higher frequencies for the control group were present in any category.

Table 3 reports participants' self-reported interprofessional favorability for the *Interprofessional Socialization and Valuing Scale.* All three composites, "ability to work with others," "value in working with others," and "comfort in working with others" showed noteworthy differences in control versus intervention days. Among the frequency of response, the percent loaded was much greater in the favorable values (fairly great extent, great extent, very great extent) versus unfavorable values (very small extent, to a small extent, to a moderate extent): ability to work with others (control favorable: 72%; intervention favorable 76%); value in working with others (control favorable: 91%; intervention favorable 92%); comfort in working with others (control favorable 72%; intervention favorable 76%).

Table 4 reports odds ratios regarding the percentage of correct answers on the *Professional Consciousness Raising Questionnaire*. The odds ratio reflects the odds of answering correctly for the intervention versus the control group and its respective 95% confidence interval. The odds of answering correctly were significantly higher for nursing [OR 1.64 (1.05-2.60)], law [1.96 (1.24-3.13)], dental [OR 2.75 (1.41-5.64)], and global health [OR 2.80 (1.76-4.52).

Discussion

This study collected and reported data assessing the ability of student partners in the IUSOC to discern professional roles within the scope of interprofessional health related practice, as well as improved attitudes and beliefs about the importance of IPC in the workplace through surveys distributed in a randomized cluster design. Results of this study indicate the administration of a short interprofessional education exercise to healthcare students may lead to increased interprofessional role knowledge and interprofessional value among healthcare students. Increased odds of correctly identifying roles among nursing, law, dental, and global health participants were observed. Additionally, more intervention day participants reported favorable measures of interprofessional value (ability to work with others, value in working with others, and comfort in working with others) than participants who were involved on control days.

A functional hospital or clinic relies on the expertise and teamwork of healthcare students from heterogeneous disciplines to provide the highest level of patient care and satisfaction. A systematic review of IPC found that a reoccurring barrier to effective healthcare was the “challenge of definition and awareness of one another’s roles and competencies.”[10] In this study, explaining the roles of each partner at the beginning of the volunteer day improves partners’ understanding of the services offered in the clinic and perhaps encourages the partners to claim ownership of their role. Understanding partners’ roles may improve the quality of patient care through knowledge and respect for these roles, leading to more effective teamwork. The perceived effectiveness of teamwork may be necessary for operative collaboration and depth of change to improve care.[11] Effective teamwork requires a willingness to understand and respect the work of

professionals, and to rethink and develop alternatives to traditional practices when working with complex cases.[12]

Knowledge of the professional role of others has been previously associated with successful interprofessional practices.[13,14] Role understanding and team functioning leads to better patient outcomes where “turf wars” or duplication of care decreases the same patient outcomes.[14,15] At the initial visit, a higher proportion of participants in the intervention group correctly identified the roles of nursing, law, dental and global health than participants in the control group. Anecdotally, the understanding of the roles may lead to an increase in appropriate referrals to other disciplines and a decrease in time spent by providers trying to fulfill the roles of other departments. This in turn may facilitate a more positive patient experience and improve quality outcomes.

Providing an early immersive experience to interprofessional care may be helpful and important to build respect for other disciplines, to develop a collaborative environment, and ensure high quality patient care.[16-19] A post-educational course evaluation focusing on interprofessional education core competencies and self-efficacy in interprofessional teamwork demonstrated that nurse practitioner students showed greater readiness for IPC through roles, responsibilities, and interprofessional communication when compared with dental students.[20] The authors of the study speculate the nurse practitioner students had more interprofessional exposure than dental students and were generally more open to these experiences.[20] In this study, higher odds of identifying the correct roles for partners were observed on intervention days for nursing, law, dental and global health disciplines. It is possible that the roles associated with these disciplines in this study were simply unknown to the rest of the participants due to

limited occupational and/or clinical exposure to these roles. Previous research demonstrates that the use of interprofessional education to improve understanding of others' professional roles improves the quality of interactions, process satisfaction for participants, and advances the competencies of students for team based roles.[21]

In a study of interprofessional education among health-science graduate students, interprofessional attitudes regarding teamwork, roles, and responsibility were found to be valued by the students after one education session.[22] In another study, training in interprofessional education for medical students showed post-training improvement in attitudes regarding "perceived autonomy competence within the profession" and "perception of actual co-operation between their profession and those of others". [23] In this study, the frequency of answering positively ("to a fairly great extent", "to a great extent", and "to a very great extent") on the *Interprofessional Socialization and Valuing Scale* was consistently higher in the intervention group versus the control group. This divide may demonstrate that those in the intervention group valued working with other healthcare students, were willing to work with other healthcare students and believed in their ability to work with those professionals.

Data gathered about knowledge of physical therapy, medicine (primary care physicians), and ophthalmology suggests that participants were more familiar with these professions and knowledge did not change significantly after the intervention. Hence, participants may have had more interaction with the physical therapy, medicine, and ophthalmology departments prior to the start of the study. The lowest frequency of correct answers on the knowledge questionnaire were provided by social work, occupational therapy, and pharmacy students. Despite the interventions, non-significant

change in the frequency of correct answers were observed among control and intervention groups. It is possible that these partners have a strong sense of understanding for their own personal roles and the ability to improve scores may be very difficult.

This study has a few limitations. A major limitation of this study is the incidence and frequency of participant repetition. Most of the participants had participated in some form of clinic experience before becoming involved with the study. Fortunately, there was no substantial difference in distribution of volunteer days or self-reported established interprofessional education in practice during the study among the intervention and control groups. To reduce “wash-over effect” from previous volunteer days, analysis was limited to the first reported volunteer day during the study period. Another limitation within the study is that the subjects were healthcare students rather than healthcare professionals. As this study was conducted in a student-run medical outreach clinic, these results may not be generalizable to other professional practices. Despite these limitations, this study contributes to the growing body of evidence supporting IPE practices in clinical and professional practices. This study involved a relatively large population, uses a randomized control trial design, and showed strong results. Study design obstacles in the social sciences make data interpretation and intervention evaluation difficult.[24] Many similar studies are done through the use of a pre-post design. Pre-post study designs are subject to biases such as regression to the mean or survey familiarity. Errors in pre-post tests are compounded and post-test although better, but do not provide a control group for comparision.[24] The cluster randomization of students in the study avoids these errors, is simple to implement, and

may be of value to the IPE research community. Finally, the PCRQ was developed for this study and has not been validated.

This study demonstrates that even a relatively brief educational intervention may significantly improve role understanding among healthcare students and expand their appreciation of IPC. The results also demonstrate the utility of a randomized cluster design of clinical days when individual randomization or randomization of multiple clinics is impractical. The study design employed is novel and practical for interprofessional education, and the results of this study provides supporting evidence for the usability of such a design in social sciences and education.[24] Future research should focus on the longitudinal effects of exposure to such educational programs, the validation of results in other cohorts, and the effect of such programs on patient care and patient perspectives. Follow-up evaluation and reliability testing the cluster randomization of clinical days would be valuable for understanding unknown confounding, biases, and limitations in clinical use.

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Appendix A: Tables

Table 1: Descriptive Statistics for First Measurement of Student Volunteers

	Control (n=167)	Intervention (n=170)	*P*-Value
Demographic Characteristics			
Age (n=332)	24.2 (3.9)	24.9 (5.13)	0.12
Women (n=334)	110 (66.0%)	112 (67.1%)	0.91
Clinical Characteristics			
Race/Ethnicity (n=335)			
African American/Black	11 (6.5%)	7 (4.2%)	0.28
American Indian/Alaskan Native	0 (0.0%)	1 (0.1%)	
Asian	23 (13.7%)	20 (12.0%)	
Hispanic	9 (5.3%)	5 (2.9%)	
Pacific Islander	3 (1.7%)	0 (0.0%)	
White (Non-Hispanic or Latino)	121 (72.0%)	131 (78.4%)	
Other	1 (0.1%)	3 (1.7%)	
Years of Experience (n=300)	2.78 (4.8)	2.70 (6.6)	0.90
Volunteer Days (n=337)			
0 Days	68 (41.4%)	48 (29.3%)	0.06
1-4 Days	52 (31.7%)	73 (44.5%)	
5-10 Days	20 (12.2%)	16 (10.0%)	
10+ Days	24 (14.6%)	25 (17.1%)	
Repeat Volunteer	29 (14.8)	30 (15.0)	0.99

Answer reported as frequency (%) for categorical variables and mean (SD) for continuous variables

Table 2: Correct Answer on Partner Role Assessment Questionnaires by Treatment Type

Question	Control (n=167)	Intervention (n=170)	*P*-Value
Completes patient navigation notes to keep the patient informed of their visit. (Nursing)	99 (59.3)	120 (70.6)	0.04
Works to improve patient mobility and alleviate pain. (Physical Therapy)	141 (84.4)	143 (84.1)	0.99
Conducts a "needs-assessment" to determine which resources a patient may benefit from. (Social Work)	93 (56.7)	107 (62.9)	0.21
Provides education on immigration and government agencies. (Law)	99 (59.3)	126 (74.1)	<0.01
Screens patients for oral cancer. (Dental)	136 (81.4)	157 (92.4)	<0.01
Works with patients on stress management and coping skills. (Occupation Therapy)	74 (44.3)	89 (52.4)	0.17
Provides a smoking cessation program with nicotine replacement and patient counseling. (Pharmacy)	90 (53.9)	109 (64.1)	0.07
Acts as a patient resource for clinic information and scheduling. (Global Health)	91 (54.5)	131 (77.1)	<0.01
Orders Hemoglobin A1C, blood sugar, and STI testing. (MD)	153 (91.6)	151 (88.8)	0.50
Performs glaucoma testing. (Ophthalmology)	137 (82.0)	146 (85.9)	0.42

Answer reported as frequency (%), p-values reports results from chi-squared test

Table 3: Condensed Favorability from ISVS			
Question	Control	Intervention	*P*-Value
Ability to Work with Others			
To a very small extent	34 (3.4%)	33 (3.3%)	0.03
To a small extent	91 (9.2%)	60 (6.0%)	
To a moderate extent	148 (15.0%)	150 (22.3%)	
To a fairly great extent	247 (25.1%)	222 (22.3%)	
To a great extent	248 (25.2%)	277 (27.8%)	
To a very great extent	214 (21.7%)	253 (25.4%)	
Value in Working with Others			
To a very small extent	7 (0.5%)	3 (0.2%)	<0.01
To a small extent	34 (2.5%)	18 (1.3%)	
To a moderate extent	77 (5.8%)	82 (15.9%)	
To a fairly great extent	246 (18.6%)	214 (15.9%)	
To a great extent	424 (32.0%)	383 (28.6%)	
To a very great extent	535 (40.4%)	638 (47.7%)	
Comfort in Working with Others			
To a very small extent	34 (3.4%)	33 (3.3%)	0.03
To a small extent	91 (10.0%)	60 (6.0%)	
To a moderate extent	148 (15.1%)	150 (15.1%)	
To a fairly great extent	247 (25.1%)	222 (22.3%)	
To a great extent	248 (25.2%)	277 (27.8%)	
To a very great extent	214 (21.8%)	253 (25.4%)	
Results presented as frequency (%), *-value reflects results of Chi-squared test*			

Table 4: Correct Answer on Partner Role Assessment, Logistic Regression

Question	OR	95% CI
Completes patient navigation notes to keep the patient informed of their visit. (Nursing)	1.64	(1.05 – 2.60)
Works to improve patient mobility and alleviate pain. (Physical Therapy)	0.97	(0.54 - 1.76)
Conducts a "needs-assessment" to determine which resources a patient may benefit from. (Social Work)	1.35	(0.87 – 2.09)
Provides education on immigration and government agencies. (Law)	1.96	(1.24 – 3.13)
Screens patients for oral cancer. (Dental)	2.75	(1.41 - 5.64)
Works with patients on stress management and coping skills. (Occupation Therapy)	1.71	(0.85 - 3.52)
Provides a smoking cessation program with nicotine replacement and patient counseling. (Pharmacy)	1.53	(0.99 - 2.37)
Acts as a patient resource for clinic information and scheduling. (Global Health)	2.80	(1.76 - 4.52)
Orders Hemoglobin A1C, blood sugar, and STI testing. (MD)	0.72	(0.35 - 1.50)
Performs glaucoma testing. (Ophthalmology)	1.33	(0.74 – 2.41)

OR denotes odds ratio, CI denotes confidence interval

Conflict of Interest and Authorship Conformation Form

Please check the following as appropriate:

- o All authors have participated in (a) conception and design, or analysis and interpretation of the data; (b) drafting the article or revising it critically for important intellectual content; and (c) approval of the final version.
- o This manuscript has not been submitted to, nor is under review at, another journal or other publishing venue.
- o The authors have no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in the manuscript
- o The following authors have affiliations with organizations with direct or indirect financial interest in the subject matter discussed in the manuscript:

Author's name	Affiliation
Steven R. Horbal	Indiana University School of Public Health
Brian A. Grice	Indiana University School of Medicine
Alexandra Evans	Indiana University School of Nursing
Kyle W. Kaplan	Indiana University School of Public Health
Lauren Wright	Indiana University School of Nursing
Aurelian Bidulescu	Indiana University School of Public Health
Andrea L. Pfeifle	Indiana University Center for Interprofessional Health Education and Practice