Shaping Student Attitudes Toward Healthcare Teams Through a Hybrid and an Online Interprofessional Education Course: Results from a Pilot Study

Patricia C. Sanchez-Diaz, PhD, DVM, FAAO, Ramona Ann Parker, PhD, EdM, RN, Matt S. Valdes, OD, FAAO, Monica N. Ramirez, PhD, RN, Srihari Narayanan, OD, PhD, FAAO, Daniel G. Dominguez, PhD, MHA, Mary Elaine Jones, MA, PhD

Abstract

Introduction: This study compares the impact of two content delivery modalities, used in an interprofessional education (IPE) project, on student attitudes toward interprofessional healthcare teams.

Methods: Student attitudes were assessed before and after an IPE course to compare the impact of an online vs. a hybrid content delivery method.

Results: Though the hybrid and online groups had similar pre-IPE attitudes, “shared leadership” and “team efficiency” scores were improved post-IPE in the hybrid and online cohorts respectively as were the online group’s perceptions toward “team efficiency” compared with the hybrid group’s perceptions.

Conclusion: Online IPE may offer a valid alternative to hybrid education.

Key Words: interprofessional education, attitudes toward healthcare teams, hybrid and online education, optometry

Introduction

Interprofessional education (IPE) occurs when students from two or more professions learn about, from and with each other in a collaborative environment: “all together for better health.”[1] The ultimate goal of IPE is to prepare healthcare professionals who can practice collaboratively as a member of a team to improve patient outcomes by providing integrated and holistic patient-centered care and by promoting a collaborative teamwork environment.[2,3]

Patient safety and issues of quality health care are driving forces in the transformation of health professions education and the need for redesigned systems of care.[3,4] In 2011, six professions came together to develop a set of core competencies considered essential for preparing healthcare professionals and to address policy and accreditation issues. Representatives from the six accrediting organizations — American Association of Colleges of Nursing, American Association of Colleges of Osteopathic Medicine, American Association of Colleges of Pharmacy, American Dental Education Association, Association of American Medical Colleges, and the Association of Schools of Public Health — served as the Interprofessional Education Collaborative Expert Panel.[5] Since the publication of the essential competencies document, a number of the professions have developed curriculum guidelines containing evidence of the principles and practice of interprofessional collaboration.

Although the 2011 report from the Association of Schools and Colleges of Optometry states that an

attribute of students graduating from schools and colleges of optometry is “the commitment to work as an integral member of the larger interprofessional healthcare team to improve patient care outcomes,”[6] interprofessional initiatives in the field of optometry are in their infancy.

Interprofessional education and collaborative practice (IPECP) initiatives are expanding, and their positive outcomes both from the student and patient perspective are encouraging. For instance, using a three-year longitudinal study, Curran et al. reported positive attitude changes in professional students who participated in IPE.[7] Further, Reeves et al., in their systematic review of the effectiveness of IPE interventions, found improvements in diabetes care, collaborative team behavior and patient satisfaction as well as reduction in the number of clinical errors.[8] Still, IPECP initiatives may face some resistance within the community of healthcare providers that have not been trained in interprofessional programs. Resistant behaviors, which may reflect a lack of understanding, pre-existing rivalries and negative stereotypes, hinder the benefits of working collaboratively within a team of healthcare professionals, which implies the sharing of knowledge and skills among members of the team.[9,10] Consequently, training of the post-licensure professional becomes an essential aspect under the scope of IPECP plans.[11] One of the main challenges when designing IPE curricula is class scheduling.[12] Creating an IPE calendar that accommodates student schedules from several specific healthcare programs is difficult. This can be even more problematic if the involved professional programs are located on different campuses. Little is known about the effectiveness of online education in meeting the goal of preparing students to function effectively in interprofessional teams, but it seems that online education might offer an effective alternative to conventional face-to-face courses.[13-15] An online IPE course may enable students and faculty with busy schedules and from distant campuses to participate and sustain IPE initiatives. In this regard, the effectiveness of face-to-face, hybrid and online courses needs to be further evaluated.

The purpose of this study was to determine the effect of a hybrid IPE course vs. an online IPE course on student attitudes toward healthcare teams using the Attitudes Toward Health Care Teams Scale (ATHCTS)[16] as a pre- and post-test measurement.

Methods

This study was part of an IPECP grant funded by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services in which faculty and students from the following five health professional schools of the University of the Incarnate Word participated: nursing, pharmacy, health administration (MHA), physical therapy and optometry.

Sample

Twenty students enrolled in the fall 2012 IPE activities using hybrid teaching strategies. Thirty-one students enrolled in the summer 2013 activities using online-only teaching strategies. All 20 students enrolled in the hybrid course completed the pre- and post-participation measurements. Of the 31 students who enrolled in the online-only course, 14 completed pre- and post-participation measurements. Seven students did not complete the online course, and 10 did not return the post-participation measurement for a participation rate of 45% among online students. Physical therapy students participated in the summer online course but not in the fall hybrid. Because the physical therapy program was new and only included first-year students, the IPE faculty from the school of physical therapy thought it would be more beneficial to select students who had already completed their first professional year, which is why they only participated in the (summer) online cohort. **(Table 1)**

Student and faculty recruitment

TABLE 1
Demographic Characteristics of IPE Students (N=34)

	Hybrid (n=20)	Online (n=14)	Total (N=34)
Age (*)	X=29 yrs SD=8 Range= 22-46	X=26 yrs SD=5 Range=22-38	X=28.18 yrs SD=7.130 Range=22-46
Sex			
Male	5 (25%)	--	5 (14.7%)
Female	15 (75%)	14 (100%)	29 (85.3%)
Race/Ethnicity			
African American	3 (15%)	2 (14%)	5 (14.7%)
Asian/Pacific Islander	6 (30%)	2 (14%)	8 (23.5%)
Caucasian	6 (30%)	4 (29%)	10 (29.4%)
Hispanic	4 (20%)	5 (36%)	9 (26.5)
Other	1 (5%)	1 (7%)	2 (5.9%)
Degree Program			
Healthcare Administration	5 (25%)	4 (29%)	9 (26%)
Nursing	5 (25%)	1 (7%)	6 (17.6)
Optometry	5 (25%)	2 (14%)	7 (20.6)
Pharmacy	5 (25%)	4 (29%)	9 (26.5%)
Physical Therapy	--	3 (21%)	3 (8.8%)

(*) X=average; SD=standard deviation

Click image to enlarge

IPE faculty members were selected by the Deans of each school. Faculty development in IPE and collaborative practice was supported through a combination of intramural and extramural funding. Completed coursework and clinical experience were two main factors taken into consideration for student recruitment. A proposal with the process of student recruitment along with the IPE course content was sent for approval to The Health Professions Deans Council at our university. The IPE activities were not part of the official Doctor of Optometry and Master of Healthcare Administration curricula; however, since the IPE course was part of the nursing, pharmacy and physical therapy curricula, this proposal was also approved by the curriculum committees at these schools. Once the IPE course was approved, a series of recruitment visits was organized by IPE faculty to address the target classes at each school (i.e., students already in clinic or in the semester just before entering the clinic) and to inform the students about IPE and the IPE course. At each school, one faculty of the IPE team was assigned as the liaison for student recruitment purposes. Volunteer students were recruited for participation in the study as follows: Optometry students from the third- and fourth-year classes; pharmacy students from the third-year class; undergraduate nursing students from their fourth semester of a five-semester nursing program; physical therapy students from the second-year class; and healthcare administration students from both first- and second-year classes. The IPE activities were completely voluntary and no incentives were provided to either the students who consented to participate in this study or those students who were ultimately enrolled in the IPE.

Educational environment and intervention

The didactic component of the interprofessional course focused on the four core competencies of IPE: values and ethics, roles and responsibilities, communication, and teams and team work.[2, 5] A general statement of each IPE core competency and the learning outcomes of the IPE course were developed. (**Appendix A**) Both the hybrid and online courses were completed within a mini-semester (eight-week period) and both combined teacher-centered (e.g., mini-lectures) and student-centered (e.g., case-based exercises, group discussions and assignments) approaches. Also, to minimize schedule conflicts affecting students or faculty, face-to-face meetings and synchronous online sessions were held during weekday evenings or on Saturday mornings. The specifics of the hybrid and online courses are described below.

Hybrid course design

The fall 2012 IPE didactic course was offered in a hybrid format with four face-to-face sessions and two online sessions. **(Appendix D)** The last face-to-face session consisted of a simulation with professional actors as patients. The two online modules contained open access course materials developed by the Institute for Healthcare Improvement (IHI).[17] A team of IPE faculty members also developed two complex

clinical scenarios representative of the type of patients encountered at the university IPECP clinic: “Mrs. Jones’” and “Mrs. Johnson.” These clinical cases were used as vehicles to foster team discussions around the four core competencies of IPE. **(Appendices B and C)** Briefly, at the beginning of the first IPE face-to-face session, an activity was used to break the ice and to help the 20 students form five interprofessional teams. Each of the IPE teams formed had to have one student from each healthcare profession (health administration, nursing, pharmacy and optometry). An IPE faculty member was assigned to each student IPE team to act as facilitator during the face-to-face activities.

Online course design

Using the hybrid IPE course as an initial template and with the assistance of the university instructional designer, the faculty team developed a completely online IPE course that was offered during the summer semester of 2013. **(Appendix E)** The online IPE course was accessible through the Blackboard learning management system and contained the following sections: (1) course information interface with a welcome message, an overview of the course learning objectives, the course outline with the schedule, and an electronic version of the consent form to participate in this study; (2) the five course modules; and (3) group discussion boards. Limited computer skills were not identified to be an issue for the participating students. All students were very familiar with Blackboard and all students received e-mail reminders with deadlines and step-by-step instructions for completing the assignments in each module.

Similar to the hybrid course, IPE student teams were formed at the beginning of the course but, this time, the 31 students (five healthcare administration, five physical therapy, six optometry, five pharmacy and 10 nursing) were randomly distributed into six IPE teams consisting of at least one student from each healthcare profession. However, seven students (six from nursing and one from optometry) did not complete the online course and 10 did not return the ATHCTS surveys or consent forms; therefore, the total number of students participating in the online IPE portion of the study was reduced to 14 by the end of the course **(Table 1).** As in the hybrid course, an IPE faculty member was assigned to each student team as facilitator for the team discussion boards and for the two synchronous Blackboard Collaborate sessions. The face-to-face simulation from the hybrid course was replaced by a faculty-facilitated synchronous group discussion based on an IPE home visit simulation video.

Data collection

This study was approved by the University of the Incarnate Word Institutional Review Board for Protection of Human Subjects prior to data collection. Two instruments were used to collect data. A researcher-designed demographic inventory collected information on age, race/ethnicity and program participation. Perceptions regarding attitudes toward interprofessional teams were obtained through the use of the ATHCTS. The ATHCTS is a validated psychometric tool that measures healthcare team members’ perceptions regarding the quality and the efficiency of care delivered by a team of healthcare professionals.[18] The ATHCTS tool used in this study is a six-point Likert-type scale that consists of 21 items divided into three subscales: “team value” (11 items, maximum possible score 66 points), “team efficiency” and “shared leadership” (five items each, maximum possible score 30 points each).[16] Team value and team efficiency subscales can be combined into a single “quality/cost of care” subscale. A higher score corresponds to a more positive attitude toward healthcare teams. Using SurveyMonkey we created an electronic version of the ATHCTS[18] to measure student attitudes before and after completion of the hybrid and online IPE courses.

ATHCTS alpha reliability test

A Cronbach’s alpha reliability analysis was performed with our data using the SPSS statistical software (IBM). The alpha reliability test evaluates the stability (i.e., internal consistency) of the measure and indicates how robust the measure is. The larger the alpha value, the more reliable the internal

consistency of the instrument. An alpha value larger than 0.6 (? > 0.6) was used as the cutoff to determine acceptable reliability.[19] Internal consistency reliability for the total score of the ATHCTS ranged from 0.71 to 0.87 for pre- and post-measurement for each cohort. Subscale analyses of pre- and post-measurements by cohort revealed that internal consistency reliability ranged from 0.50 to 0.82 for the team efficiency subscale, from 0.82 to 0.94 for the team value subscale, and from 0.31 to 0.56 for the shared leadership subscale.

Statistical analyses

Descriptive statistics were used to describe demographic characteristics of the sample. Changes in student attitudes were evaluated post-intervention using paired t-tests. Differences in student attitudes between the hybrid and the online course and across the different professions were measured using one-way ANOVA tests. All statistical analyses were performed with the SPSS software. Results were considered statistically significant when the p-value was less than or equal to 0.05 (p ? 0.05).

Results

Demographic data and baseline attitudes in hybrid and online cohorts

Table 1 describes the demographic characteristics of the sample. There were no significant differences in age and ethnicity between cohorts. Participants in the hybrid course were ethnically diverse, averaged 29 years in age, and had a 3:1 female to male ratio. Average age for the online course participants was 26 years and, like the hybrid cohort, the group was ethnically diverse. All fourteen of the participants who completed the requirements of the online course were female.

TABLE 2
Pre-Post Mean ATHCTS Student Subscale Scores for Hybrid and Online Strategies

	Hybrid (n=20)	Online (n=14)	Total (N=34)
Baseline	*x (SD)*	*x (SD)*	*x (SD)*
Team Value†	59.15 (5.6)	60.79 (4.4)	59.82 (5.1)
Team Efficiency†	22.3 (4)	23.2 (3.8)	22.7 (3.9)
Shared Leadership†	14.45 (4.1)	15.1 (2.8)	14.71 (3.6)
Quality/Cost of Care†	81.45 (7.2)	84 (7.4)	82.5 (7.3)
Total ATHCTS Score	95.9 (7.9)	99.07 (8)	97.21 (8)
Post-Didactic			
Team Value	58.8 (6.8)	60.71 (7.6)	59.6 (7.1)
Team Efficiency*	22 (5.3)	**25.93 (3.2)***	23.6 (4.9)
Shared Leadership	**16.6 (4.3)***	15.57 (3.4)	16.2 (3.9)
Quality/Cost of Care	80.8 (10.9)	86.6 (10.1)	83.2 (10.8)
Total ATHCTS Score	97.4 (12.1)	102.21 (10.5)	99.4 (11.5)

ATHCTS = Attitudes Toward Health Care Teams Scale
X = average; SD = standard deviation

Click image to enlarge

No statistically significant pre-didactic differences were found between the hybrid and online groups in any of the three subscales (ANOVA test results; F(1,32), p>0.05 for all three subscales). Post-intervention, students in the online-only course scored statistically higher on the team efficiency subscale compared with students in the hybrid course (“a” in the table). After course completion, students in the hybrid course scored significantly higher in “shared leadership” (“b” in the table); whereas, online-only students scored significantly higher on the “team efficiency” subscale (“c” in the table).

†Subscale maximum scores. Team Value: 66 points; Team Efficiency and Shared Leadership: 30 points each. Quality/Cost of Care = Team Value + Team Efficiency.
a F=6.135; df=1,32; p=0.019; one-way ANOVA test
b t(19 =-3.209, p=0.05; paired t-test
c t(13)=-2.801, p=0.015; paired t-test

A one-way ANOVA was conducted to determine whether attitudes of students at baseline were comparable for the online and hybrid cohorts. There were no statistically significant pre-didactic differences between groups in any of the three subscales {F(1,32)}: team value (F=0.845, p=0.365), team efficiency (F =0.451, p=0.507) and shared leadership (F=0.240, p=0.627). The baseline test showed that, in general, all students had a positive attitude toward team value (mean 59.15±5.547 in the hybrid cohort and 60.79±4.388 in the online cohort; maximum possible score is 66). However, team efficiency and shared leadership showed relatively low pre-didactic scores in the two cohorts (hybrid cohort means were 22.30±4 and 14.45±4.097, and means for the online cohort were 23.21±3.766 and 15.07±2.841 respectively; maximum possible score in both subscales is 30). There were no significant differences between professions in baseline ATHCTS total scores (F(4,29)=1.899, p=0.137) or post-test scores (F(4,29)=0.373, p=0.826).

Effect of hybrid vs. online IPE course on student attitudes toward healthcare teams

Table 2 presents pre- and post-didactic means for the ATHCTS scores. Students in the online course had significantly higher scores on the team efficiency subscale compared with students in the hybrid course (F(1,32)=6.135, p=0.019). No other significant differences between groups were found.

Within-group differences for hybrid and online IPE course on student attitudes toward healthcare teams

Students participating in the hybrid course had significantly higher shared leadership post-didactic subscale scores (t(19)=-3.209, p=0.05), while students participating in the online course had significantly higher scores on the team efficiency subscale at the end of the program (t(13)=-2.801, p=0.015).

Discussion

In this study we used the ATHCTS as both the pre- and post-intervention survey to assess the attitude changes of health administration, nursing, pharmacy, physical therapy and optometry students toward healthcare teams depending on whether the students participated in a hybrid or an online IPE course. All students in the hybrid cohort completed the IPE, consented to participate in this study, and completed the ATHCTS survey. However, more than half of the 31 students in the online cohort either failed to complete the IPE or failed to return the ATHCTS survey or consent form. Seven of the 31 online students did not complete the IPE course. Ten of the online students completed all course assignments but did not return the ATHCTS surveys or consent forms. Six of the online students were registered nurses who had come back to school to obtain their Bachelor's in Nursing degree. They were thus non-traditional students with possible work-related time constraints that might have prevented them from completing the IPE assignments. The reason why one optometry student dropped out is unknown. Adequate Cronbach's alpha reliability values (? > 0.7) were obtained for the total ATHCTS score, team value and team efficiency subscales. The reliability for shared leadership was below 0.60. This low reliability may be due to the combination of different factors, such as a small sample size, a small

number of items in the subscale and wide distribution of the student responses. Nevertheless, low reliabilities can be acceptable in pilot measures.[19]

Students participating in the two courses had a positive attitude toward healthcare teams at baseline, and though there was a modest increase in the total ATHCTS score at the end of the course, it was not statistically significant. **(Table 2)** Although there were some differences in the effects of the IPE course among professions, they were not statistically significant either (data not shown). Failure to reach statistical significance could be due to our relatively small sample size.

The statistically significant higher post-IPE score in the team efficiency subscale for those students in the online cohort was intriguing. Also intriguing was the statistically significant higher score in this subscale when comparing the attitudes of the online participants with those in the hybrid course, again post-IPE. These findings may be due to the fact that online students had more flexibility with respect to time in order to complete their course assignments. They may also have had more time to reflect on the comments other team members shared through the online discussion boards. These hypotheses require further investigation.

As anticipated, our main challenge was coordinating the face-to-face meetings in the hybrid course. In contrast, scheduling of the synchronous Blackboard Collaborate sessions did not seem to be an issue in the case of the online course.

According to the Center for the Advancement of Interprofessional Education and the Institute of Medicine recommendations, all students in every healthcare professional program should be trained to practice as part of an interprofessional collaborative team.[2,3] Online education can potentially overcome scheduling conflicts, a major barrier to interprofessional education in academic settings. Evidence from qualitative and quantitative studies demonstrates that online, face-to-face and hybrid IPE courses can improve attitudes toward healthcare teams in students and practitioners.[11-15,20] To our knowledge, this is the first study that compares the effects of a hybrid and an online IPE course on attitudes toward healthcare teams that involves optometry students.

From this experience, we hypothesize that an online interprofessional education course might have similar effects on student attitudes toward collaborative teamwork when compared to a hybrid course offering similar content. The relatively low shared leadership attitudes at baseline might suggest an association with a culture of “siloism” where healthcare providers work in isolation[21] and could be triggered by trust issues within the team. The statistically significant increase in shared leadership post-didactic scores among the students in the hybrid course suggests the need for further study of how IPE experiences may assist students to identify their roles and responsibilities within their team and to develop a culture of trust. A small sample size with a relatively low survey return rate in the online cohort, the limited reliability of the shared leadership subscale, gender bias and the fact that physical therapy students were not part of the hybrid cohort were some of the limitations of this study. Also, this study described volunteer students who likely were already interested in learning about interprofessional collaboration. As such, the results may not be generalizable to all healthcare professional students or to post-licensure professionals who might not have been trained in an IPE curriculum.

Conclusions

Though the hybrid and online groups had statistically similar pre-IPE attitudes toward interprofessional health teams, shared leadership and team efficiency subscale attitude scores were significantly improved in the hybrid and online cohorts respectively upon completion of the IPE. Further, the online group’s perceptions toward team efficiency were statistically more favorable than those of the hybrid group after the IPE experience. The findings of our pilot study provide preliminary evidence that online education may become a valid approach in the didactic component of IPE as it can ease scheduling

conflicts, a significant challenge in interprofessional education.

For the next phase of this study, we plan to conduct a longitudinal study that includes more subjects and professional students who have not been previously exposed to IPE (i.e., acting as negative controls). Additionally, we plan to collect information about conflict management style from each student pre- and post-IPE intervention to evaluate whether IPE may change the way they approach conflict. An increase in assertive and/or collaborative styles along with a decrease in avoiding styles would suggest positive outcomes regarding teamwork and communication, which are two of the core competencies of IPE. We hope such data would allow a more accurate determination of the effects an online IPE course has on student attitudes toward healthcare teams in comparison to a hybrid course format.

Acknowledgements

We thank all members of the Interprofessional Education and Collaborative Practice faculty team for their support and the students for participating in this study. Jessica Martinez, MEd, University of the Incarnate Word Instructional Designer, assisted with the preparation of the online course.

Portions of this work were funded through a Starter Grant for Educational Research from the Association of Schools and Colleges of Optometry (Funding for the grant was provided by The Vision Care Institute, LLC, an affiliate of Johnson & Johnson Vision Care.) and by a cooperative agreement from the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number UD7HP25055-02-01 Division of Nursing, Health Resources and Human Services Health Profession, Nurse Education, Practice, Quality and Retention (NEPQR) Program – Interprofessional Collaborative Practice – Award; $1.3 million over 3 years. This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.

References

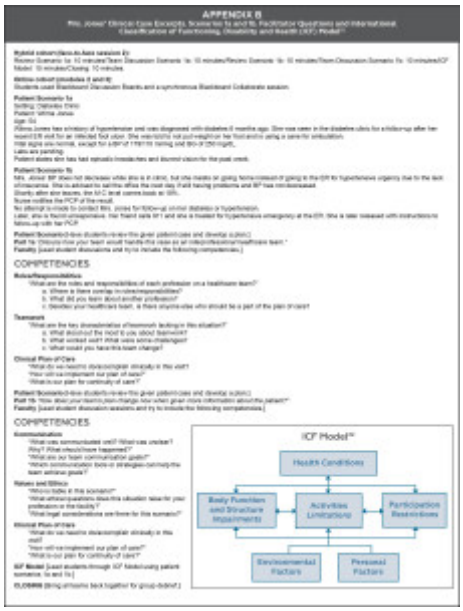
1. World Health Organization. Framework for Action on Interprofessional Education and Collaborative Practice. Geneva: World Health Organization 2010. Available from: https://www.who.int/hrh/nursing_midwifery/en/. (Retrieved August 4, 2013).
2. Center for the Advancement of IPE (CAIPE): Principles of IPE 2011. Available from: https://www.caipe.org.uk/resources/principles-of-interprofessional-education/. (Retrieved August 4, 2013).
3. Institute of Medicine Committee on Health Professions Education Summit: Health Professions Education: A Bridge to Quality. In Greiner AC, Knebel D, eds. Washington, DC: National Academy Press; 2003.
4. Institute of Medicine: The Future of Nursing: Leading Change, Advancing Health. Consensus Report, 2010. Available from: https://www.iom.edu/~/media/Files/Report%20Files/2010/The-Future-of-Nursing/Future%20of%20Nursing%202010%20Recommendations.pdf. (Retrieved August 4, 2013).
5. Interprofessional Education Collaborative Expert Panel (2011). Core Competencies for Interprofessional Collaborative Practice. Washington, D.C.: Interprofessional Education Collaborative. Available from: https://www.aacn.nche.edu/education-resources/ipecreport.pdf. (Retrieved August 4, 2013.)
6. Attributes of Students Graduating from Schools and Colleges of Optometry: A 2011 Report from the Association of Schools and Colleges of Optometry 2011. Available from: https://www.opted.org/files/2011_AttributesReport.pdf. (Retrieved August 4, 2013).
7. Curran VR, Sharpe D, Flynn K, Button P. A longitudinal study of the effect of an interprofessional education curriculum on student satisfaction and attitudes towards interprofessional teamwork and education. J Interprof Care. 2010;24(1):41-52.

8. Reeves S, Perrier L, Goldman J, Freeth D, Zwarenstein M. Interprofessional education: effects on professional practice and health care outcomes. Cochrane Database Syst Rev. 2013;3:CD002213. doi: 10.1002/14651858.
9. San Martin-Rodriguez L, Beaulieu MD, D'Amour D, Ferrada-Videla M. The determinants of successful collaboration: a review of theoretical and empirical studies. J Interprof Care. 2005;19 Suppl 1:132-147.
10. Suter E, Arndt J, Arthur N, Parboosingh J, Taylor E, Deutschlander S. Role understanding and effective communication as core competencies for collaborative practice. J Interprof Care. 2009;23:41-51.
11. Robben S, Perry M, van Nieuwenhuijzen L, van Achterberg T, Rikkert MO, Schers H, Heinen M, Melis R. Impact of interprofessional education on collaboration attitudes, skills, and behavior among primary care professionals. J Contin Educ Health Prof. 2012;32(3):196-204.
12. Bridges DR, Davidson RA, Odegard PS, Maki IV, Tomkowiak J. Interprofessional collaboration: three best practice models of interprofessional education. Med Educ Online. 2011;16:6035-DOI:10.3402/meo.v16i0.6035.
13. Miers ME, Clarke BA, Pollard KC, Rickaby CE, Thomas J, Turtle A. Online interprofessional learning: the student experience. J Interprof Care. 2007;21:529-542.
14. Blue AV, Charles L, Howell D, Koutalos Y, Mitcham M, Nappi J, Zoller J. Introducing students to patient safety through an online interprofessional course. Adv Med Educ Pract. 2010;1:107-114.
15. Solomon P, Baptiste S, Hall P, Luke R, Orchard C, Rukholm E, Carter L, King S, Damiani-Taraba G. Students' perceptions of interprofessional learning through facilitated online learning modules. Med Teach. 2010;32:e391-398.
16. Heinemann GD, Schmitt MH, Farrell MP, Brallier SA. Development of an Attitudes Toward Health Care Teams Scale. Eval Health Prof. 1999;22:123-142.
17. Courses & Certificates. Institute for Healthcare Improvement (IHI). Available from: https://www.ihi.org/offerings/IHIOpenSchool/Courses/Pages/default.aspx. (Retrieved Oct 10, 2012).
18. Assessing Team Attitudes & Functions: A Set of Pre & Post Questionnaires. Sun Country Health Region, IPCP & LE Initiative. Available from: https://apntoolkit.mcmaster.ca/index.php?option=com_content&view=article&id=322:attitudes-toward-health-care-teams-scale&catid=49:communication&Itemid=67. (Retrieved Sep 23, 2012).
19. Tolmie A, Muijs D, McAteer E. Quantitative Methods in Educational and Social Research Using SPSS. Open University Press: McGraw-Hill; 2011.
20. Shrader S, Thompson A, Gonsalves W. Assessing student attitudes as a result of participating in an interprofessional healthcare elective associated with a student-run free clinic. J Res Interprof Pract Educ. 2013;1(3):218-230.
21. Cronenwett L, Dzau V. In: Culliton B, Russell S, editors. Who Will Provide Primary Care and How Will They Be Trained? Proceedings of a Conference Sponsored by the Josiah Macy, Jr. Foundation; 2010; Durham, N.C. Available from: www.josiahmacyfoundation.org. (Retrieved August 4, 2013).
22. International Classification of Functioning, Disability and Health: ICF. Geneva, Switzerland: World Health Organization; 2001.

APPENDIX A
IPE Core Competencies[3] and IPE Course Outcomes

Core Competency	General Statement
Values and Ethics (VE)	*Work with individuals of other professions to maintain a climate of mutual respect and shared value*
Roles and Responsibilities (RR)	*Use the knowledge of one's own role and those of other professions to appropriately assess and address the healthcare needs of the patients and populations served*
Communication (CC)	*Communicate with patients, families, communities and other health professionals in a responsive and responsible manner that supports a team approach to the maintenance of health and the treatment of disease*
Teams and Teamwork (TT)	*Apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan and deliver patient-/population-centered care that is safe, timely, efficient, effective and equitable*
	IPE Course Outcome
TT, CC	*Effectively collaborate with other healthcare professionals in clinical settings*
RR, TT, VE	*Demonstrate receptiveness for the ambiguity and unpredictability of the world and its effect on healthcare systems*
RR, TT, VE	*Understand, respect and support the roles of other professionals involved in assessing and addressing the healthcare needs of patients and populations served*
RR, TT, CC, VE	*Demonstrate knowledge, skills and abilities that are common to all healthcare professions and that underpin the delivery of quality patient and population services*

Click image to enlarge


APPENDIX B

Click image to enlarge


APPENDIX C
Mrs. Johnson's Case and Facilitator Questions

Hybrid cohort (face-to-face session 2):
Review Scenario 2a: 10 minutes/Team Discussion Scenario 2a: 10 minutes/Review Scenario 2b: 10 minutes/Team Discussion Scenario 2b: 10 minutes/ICF Model™: 15 minutes/Closing: 10 minutes.

Online cohort (module 4): Students used Blackboard Discussion Boards.

Patient Scenario 2a:
Mrs. Johnson, a 78-year-old Caucasian female with macular degeneration is presenting for an eye exam because she failed her vision test when renewing her driver's license. Upon examination you find that she DOES meet the vision requirements for a restricted driver's license but you are concerned with her inability to follow simple commands. You then perform a mini mental status questionnaire to evaluate her mental state and find she has a severe cognitive impairment.

Patient Scenario 2b:
State law does not require the clinician to report patients who may be a danger to themselves or those around them. Mrs. Johnson is widowed and lives alone. Driving is her only way to get to and from church, the grocery store and her hair salon.
Mrs. Johnson's daughter is outside and did not observe the test. Mrs. Johnson already feels her daughter is trying to keep her from driving and has asked that you not share this information with her daughter.
You inform Mrs. Johnson that based on today's findings you will sign off on her papers but are also recommending she follow up with her primary care doctor regarding her cognitive state. She nods her head as if she understands.

Patient Scenario [Have students review the given patient case and develop a plan.]
Faculty [Lead student discussions and try to include the following competencies.]

COMPETENCIES

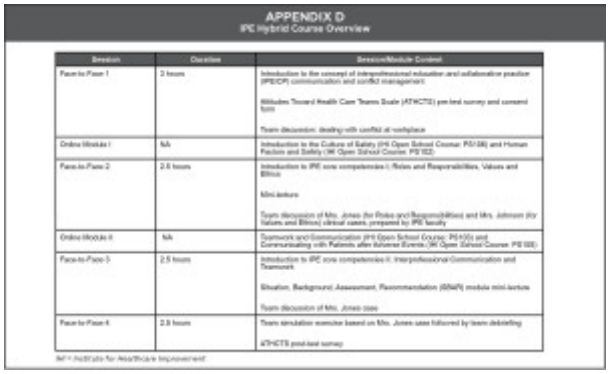
Values and Ethics
- "Who is liable in this scenario?"
- "What ethical questions does this situation raise for your profession or the facility?"
- "What legal considerations are there for this scenario?"
- "What would be the appropriate actions in this situation?"
- "How would an IPE approach improve this patient's outcome?"

Clinical Plan of Care
- "What do we need to do/accomplish clinically in this visit?
- "How will we implement our plan of care?"
- "What is our plan for continuity of care?"

ICF Model [Lead students through ICF Model using patient scenarios 2a and 2b.]

CLOSING [Bring all teams back together for group debriefing.]

Click image to enlarge

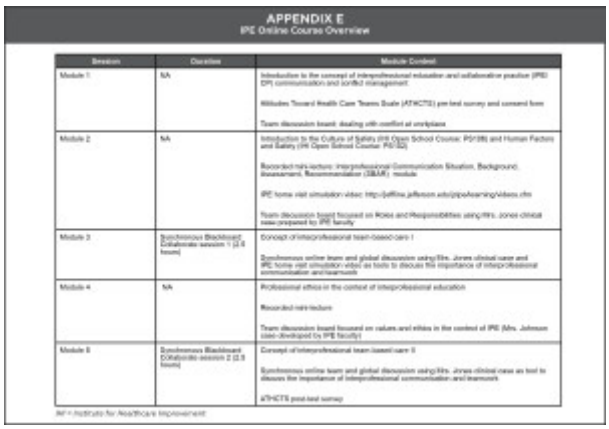


APPENDIX D
IPE Hybrid Course Overview

Session	Duration	Session/Module Content
Face-to-Face 1	2 hours	Introduction to the concept of interprofessional education and collaborative practice (IPECP), communication and conflict management Attitudes Toward Health Care Teams Scale (ATHCTS) pre-test survey and consent form Team discussion: dealing with conflict at workplace
Online Module I	NA	Introduction to the Culture of Safety (HI Open School Course: PS108) and Human Factors and Safety (HI Open School Course: PS102)
Face-to-Face 2	2.5 hours	Introduction to IPE core competencies I: Roles and Responsibilities, Values and Ethics Mini-lecture Team discussion of Mrs. Jones (for Roles and Responsibilities) and Mrs. Johnson (for Values and Ethics) clinical cases, prepared by IPE faculty
Online Module II	NA	Teamwork and Communication (HI Open School Course: PS103) and Communicating with Patients after Adverse Events (HI Open School Course: PS105)
Face-to-Face 3	2.5 hours	Introduction to IPE core competencies II: Interprofessional Communication and Teamwork Situation, Background, Assessment, Recommendation (SBAR) module mini-lecture Team discussion of Mrs. Jones case
Face-to-Face 4	2.5 hours	Team simulation exercise based on Mrs. Jones case followed by team debriefing ATHCTS post-test survey

Ref = Institute for Healthcare Improvement

Click image to enlarge



APPENDIX E
IPE Online Course Overview

Session	Duration	Module Content
Module 1	NA	Introduction to the concept of interprofessional education and collaborative practice (IPECP), communication and conflict management Attitudes Toward Health Care Teams Scale (ATHCTS) pre-test survey and consent form Team discussion board: dealing with conflict at workplace
Module 2	NA	Introduction to the Culture of Safety (HI Open School Course: PS108) and Human Factors and Safety (HI Open School Course: PS102) Recorded mini-lecture: Interprofessional Communication Situation, Background, Assessment, Recommendation (SBAR) module IPE home visit simulation video: http://pillfire.jefferson.edu/pipp/learning/videos.cfm Team discussion board focused on Roles and Responsibilities using Mrs. Jones clinical case prepared by IPE faculty
Module 3	Synchronous Blackboard Collaborate session 1 (2.5 hours)	Concept of interprofessional team-based care I Synchronous online team and global discussion using Mrs. Jones clinical case and IPE home visit simulation video as tools to discuss the importance of interprofessional communication and teamwork
Module 4	NA	Professional ethics in the context of interprofessional education Recorded mini-lecture Team discussion board focused on values and ethics in the context of IPE (Mrs. Johnson case developed by IPE faculty)
Module 5	Synchronous Blackboard Collaborate session 2 (2.5 hours)	Concept of interprofessional team-based care II Synchronous online team and global discussion using Mrs. Jones clinical case as tool to discuss the importance of interprofessional communication and teamwork ATHCTS post-test survey

Ref = Institute for Healthcare Improvement

Click image to enlarge

Dr. Sanchez-Diaz is an Associate Professor at the University of the Incarnate Word Rosenberg School of Optometry. Her background is in pediatric cancer gene expression. She teaches anatomy, biochemistry and molecular biology. Her research interests include tumor biology and the scholarship of teaching and learning.

Dr. Parker is an Associate Professor at the University of the Incarnate Word Ila Faye Miller School of Nursing and Health Professions. Her experience includes working with children and their families in the pediatric and neonatal environment. She currently serves as Director of the Simulation Center and teaches in the graduate program.

Dr. Valdes is a Clinical Assistant Professor at the University of the Incarnate Word Rosenberg School of Optometry. His responsibilities include didactic teaching in a variety of courses such as Ophthalmic Optics and Geometric Optics. He is also a Clinical Preceptor at the San Antonio Lighthouse for the Blind. His research interests include low vision driving rehabilitation and optometry's role in Interprofessional Education to improve health care.

Dr. Ramirez is an Assistant Professor at the University of the Incarnate Word Ila Faye Miller School of Nursing and Health Professions. Her background is in Adult Medical Surgical Nursing. Her responsibilities include Clinical Instructor for Nursing Internship, Leadership and Management, and Facilitator for students within the Interprofessional Education and Collaborative Practice (IPECP) project. Her research interests include IPECP and aspects associated with the health status of Hispanic Women.

Dr. Narayanan is a Professor and the Director of Cornea and Dry Eye Service at the University of the Incarnate Word Rosenberg School of Optometry. His responsibilities include didactic and clinical instruction in a variety of courses such as Basic Optometry (Clinical Skills), Anterior Segment Disease and Neuro-Ophthalmology. His research interests include tear film and dry eye disease as well as

anterior uveitis.

Dr. Dominguez is a Professor of Health Administration in the HEB School of Business and Administration at University of the Incarnate Word and the Director of the Master of Health Administration Program. His current research interests center on program development, leadership/management competency development and assessment, continuous quality improvement in healthcare delivery and interprofessional education and practice.

Dr. Jones is the Brig. Gen. Lillian Dunlap Professor Emerita of Nursing at University of the Incarnate Word. Her experience includes working with children and families with developmental disabilities as a member of an interdisciplinary team and over 35 years as university faculty.