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Academic to Clinical: Nursing and Physical Therapy Collaborative Attitudes Following Interprofessional Simulation

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Abstract

Background: *Many healthcare organizations have recognized the need for interprofessional collaboration in practice, as well as in the academic setting. A plethora of literature exists on the importance of interprofessional collaboration in both the academic and clinical settings. However, there is a dearth of literature focused on longitudinal effects of interprofessional education across both settings.* ***Purpose:*** *This study seeks to fulfill that gap and begin the investigative look at the longitudinal effects of interprofessional collaboration using a simulation approach. This study addressed the following research questions: What is the impact of an interprofessional simulation experience on senior nursing and second year Doctor of Physical Therapy students' attitudes of teamwork and collaboration with other health professions in the acute care practice setting immediately after simulation and six months after simulation? Is there a difference in attitudes of teamwork and collaboration between the two professions?*

Methods: *This quasi-experimental study focuses on changes in attitudes of interprofessional collaboration using students from nursing and physical therapy before, immediately after, and 6 months following participation in an interprofessional simulation. Statistical analysis was done to compare scores over time, between professions, and within professions.* ***Results:*** *Results showed statistical significance overall in subscales of both tools (Interprofessional Attitudes Scale and TeamSTEPPS: Teamwork Attitudes Questionnaire) across all three times. Within professions, differences were noted among the subscales of Leadership (T-TAQ), Patient-Centeredness and Community-Centeredness (IPAS). Between professions, DPT scores were higher in all areas to start compared to BSN students.* ***Conclusion:*** *This simulation did improve students' attitudes toward interprofessional collaboration, which infers interprofessional simulation can be an effective strategy for interprofessional collaboration.* ***Recommendations:*** *This interprofessional simulation will continue to take place to help with the cultural shift out of silos within the healthcare setting. Consideration in the future will be given to the students to address the differences in levels of programs to make sure that all students are being challenged within this IPE simulation.*

Keywords: interprofessional collaboration, education, practice

INTRODUCTION

Healthcare costs continue to grow at an annual rate of approximately 6%, while quality of care related to safety, coordination, patient-centeredness, and effectiveness of care is lacking (National Quality Forum, 2017). Improving the quality of care, while controlling costs, presents a number of ongoing challenges to healthcare professionals. The fact,70% of adverse events can be connected to the lack of communication and collaboration within health-care teams, makes this a pertinent problem to all organizations in healthcare and one that must be addressed (Laschinger & Smith, 2013).

When reviewing these issues of healthcare cost and quality, it is important to keep in mind that nurses are the forefront of patient care and must act as the communicator in many situations. However, nurses may feel intimidated to communicate information to other healthcare professions because of the ranked power structure that exists. This hierarchical ranking fosters working in silos within each profession (Hay, Collin, & Koruth, 2014). Interprofessional collaboration (IPC) and communication is a way of practice that can tear down the silos to allow all professions to work together to enhance patient care. Interprofessional collaboration is defined as "when multiple health workers from different professional backgrounds work together with patients, families, carers (caregivers), and communities to deliver the highest quality of care" (World Health Organization, 2010, p. 7). Practicing within silos has been shown to negatively impact patient satisfaction in relation to the quality of care decreasing, along with an increase in preventable errors (Sullivan, Kiovsky, Mason, Hill, & Dukes, 2015).

One way to change the culture and integrate IPC and communication into healthcare is to prepare health professions' students to engage in these skills prior to entering clinical practice. Although research describing recommendations and benefits for IPC exists, the concept is still not consistently implemented into undergraduate nursing curriculum (Sullivan et al., 2015). Newly graduated baccalaureate nurses must learn their nursing role and effectively collaborate and communicate with a healthcare team in an interprofessional environment. Since nurses are often given the leadership roles within interprofessional teams, additional education needs to be included in undergraduate nursing programs that highlight communication and collaboration with other health professionals (Hay, Collin, & Koruth, 2014).

The Institute of Medicine (IOM, 2010) initiated the focus of IPC in healthcare by recognizing the need for this integration to optimize patient care. It has since recommended that nursing programs incorporate more IPC activities throughout the curriculum. Exposing nursing students to the health professions they will be collaborating with in the acute care setting allows them to appreciate the roles of

each profession (Illingworth & Chelvanayagm, 2017).

PURPOSE

Interprofessional collaboration is a concept that has gained acceptance in healthcare because of the benefits that incur when it is implemented. These benefits include improved patient outcomes and satisfaction, increased sufficiency and staff productivity within the organizations, and improved job satisfaction for healthcare professionals (Hearth et al., 2017). Gilbert, Yan, and Hoffman (2010) stated that IPC happens when "interprofessional health care teams understand how to optimize the skills of their members, share case management, and provide better health services to patients and the community" (p. 196). Expanding beyond definitions, the Interprofessional Education Collaborative (IPEC) Expert Panel (2011) established competencies for IPC to further highlight the importance of integrating this concept into healthcare, with an emphasis on interprofessional communication.

Interprofessional collaboration and communication are beneficial throughout healthcare and may be utilized for many issues that continue to be problematic for providers and systems. An interprofessional simulation that focuses on collaboration between students from different health profession programs is one strategy to address the need for more interprofessional education (IPE) in the curriculum. Simulations that are scenario specific have been shown to help with a number of important skills such as teamwork, communication, leadership, and delegation (Schearer, Myers, O'Connor, & Haskins, 2013). The World Health Organization (2010) also recognizes simulation as a strategy to help prepare students for interprofessional communication and collaboration in practice and as a way to dispel the silos within healthcare. Incorporating students from two or more health professions enriches the experience for students and prepares them for the healthcare team role they will undertake following graduation. The use of simulation as an interprofessional communication and collaboration teaching strategy has shown improvements in the attitudes, perceptions of other professions, and performance of students working within healthcare teams (Paige, Garbee, Brown, & Rojas, 2015).

The two professions included in this interprofessional simulation were senior Bachelor of Science of Nursing (BSN) students and students from the Doctor of Physical Therapy (DPT) program. These two professions were included in the educational simulation experience, as they are often required to work together in the clinical setting and could benefit from gaining a better understanding of each other's roles and responsibilities. Currently, there is a dearth of evidence examining IPC between these two professions in healthcare. The twofold aims of this study were to assess students' attitudes toward IPC and the impact of the collaborative simulation experience on clinical practice.

This study addressed the following research questions:
1. What is the impact of an interprofessional simulation experience on senior BSN and second year DPT students' attitudes of teamwork and collaboration with other health professions in the acute care practice setting immediately after simulation and six months after simulation?
2. Is there a difference in attitudes of teamwork and collaboration between the two professions?

Project Framework

The study framework was designed by the IPEC Expert Panel (2016) in the updated Core Competencies for Interprofessional Collaborative Practice Report and is entitled *Interprofessional Collaboration Competency Domain*. This model was chosen because its competencies begin in the academic setting and continues into clinical practice. It was updated to ensure that competencies addressed the current healthcare issues of cost, patient satisfaction, and population health by including a focus on population and the community while practicing patient and family centered care (IPEC, 2016). The four core competencies in this model include communication, teamwork, values and ethics, and roles/responsibilities (IPEC, 2016). This model has been utilized in a variety of IPE studies as a framework for developing IPE activities that include a wide array of health professions (Pharmacy students, Nursing students, Medical students, Advanced Practice Nurses, etc.) and measuring perceptions, attitudes, and/or knowledge of participants (Cropp, Beall, Buckner, Wallis, & Brown, 2018; Monohan, Sparbel, Heinschel, Rugen, &

Rosenberger, 2018; Woltenberg & Taylor, 2018).

METHODS

Study Design

A quasi-experimental study using a single group, pretest-posttest design was used to capture physical therapy and nursing students' attitudes of IPE with a collaborative learning experience involving an acute care patient simulation. The acute care patient case simulation was developed collaboratively by the physical therapy and nursing faculty members of the research team to ensure the educational content was relevant to the clinical practice of both professions. The scenario focused on a patient who had undergone a total hip arthroplasty in the morning and had recently been transferred to the nursing unit. The simulation took place in the simulation center of a Midwestern university in October 2017, after approval by the university's Human Research Protections Program (HRPP). A reliance agreement was signed between the university and the primary investigator's place of employment. All study participants signed the approved informed consent document prior to the start of the study.

Participants

A convenience sample was recruited from required courses of each profession, BSN students in their last year of study, and second year DPT students. These cohorts were chosen because they had received education on managing patients with total joint replacements and were preparing to enter full-time clinical practice. This sample allowed data to be collected during academia preparation and following clinical practice. All students in the two cohorts were required to complete the simulation; however, participation in the research study was voluntary and explicitly stated as such for the participants. To be included in the study, individuals had to be registered for one of the two selected courses and had to either be in the last year of the undergraduate nursing program or be in the second year of the DPT program at the university. There were no explicit exclusion criteria.

Simulation Procedures

For the simulation experience, a random pairing of a DPT student with a BSN student was conducted and each pair had a scheduled simulation time and 25 minutes to complete the scenario. The nursing student entered the simulation center and was given an overview of the patient's status by the exiting nurse (played by the lead faculty member). During the overview, the student nurse received all of the information essential to care for a post-operative patient; afterwards the nurse began the simulation. The DPT student entered the simulation center and was led to a room where the student was given pertinent patient information and a copy of the written orders. Five minutes after the nursing student started the simulation, the physical therapy student entered the scenario to perform an initial examination. Upon completion, the individual pairs had a 25 minute debriefing session to discuss the simulation. Volunteer faculty members, who were familiar with the scenario and observed the simulation, led the debriefings. All debrief leaders used a discussion guide that included aspects of TEAMSTEPPS including leadership, roles, and communication. The debriefing sessions were not a part of the study, but were essential for the learning process.

Data Collection and Tools

Data were collected at three time points, 14 days prior to the simulation experience (pre-simulation), immediately following the simulation (immediate), and again 6 months after the simulation (post-simulation) using a secure online survey platform Qualtrics™. The link to access the survey on Qualtrics was emailed to all eligible students to allow them to decide whether to participate in the study and to complete at their convenience. The 6 month post-simulation measure was chosen because at 6 months all participants would have practiced full-time in the clinical setting (36-40 hours a week), similar to practice upon completing their programs. Capturing data at this point allowed comparisons between the students' perceptions of the academic and clinical setting.

Participants created a unique study identification number that consisted of the first three letters of their mother's maiden name and the last four digits of their cell phone number. The unique study identification number was used to collate pre-survey and post-survey results. This allowed confidentiality and anonymity, as well as de-identified data. The survey included 57 items and was the compilation of

two interprofessional education tools.

Instruments

TEAMSTEPPS Teamwork Attitudes Questionnaire. The T-TAQ tool was developed by the Agency for Healthcare Research and Quality and the Department of Defense (Baker, Krokos, & Amodeo, 2008). It consists of 30 five-point Likert-like scale questions. It is different from IPAS in that it focuses more on the clinical/practice setting and includes a total score. The T-TAQ tool has five sections with six questions and each section has been shown to have strong internal consistency with the following Cronbach's alpha (α) values: Team Structure α = .70, Leadership α = .81, Situation Monitoring α = .83, Mutual Support α = .70, and Communication α = .74 (Baker, Krokos, & Amodeo, 2008). Internal reliability was established with a population consisting largely of physicians and dentists, with a smaller percentage of nurses and advanced practice nurses (Baker, Krokos, & Amodeo, 2008).

Interprofessional Attitudes Scale. The IPAS was created using the 2011 Core Competencies for Interprofessional Collaborative Practice (Norris et al., 2015). It consists of 27 five-point Likert-like scale questions that are geared toward the educational setting. The IPAS has five subscales that have been shown to have strong internal reliability with the following Cronbach's alpha (α) reported: Teamwork, Roles and Responsibilities (9 questions) α .91; Patient Centeredness (5 questions) α .90; Interprofessional Biases (3 questions) α .62; Diversity and Ethics (4 questions) α .87; and Community Centeredness (6 questions) α .92 (Norris et al., 2015). Internal reliability for the tool was established using four schools at the University of Utah Health Sciences that included physical therapy, graduate and undergraduate nursing, pharmacy and school of medicine (Norris et al., 2015).

Data Analysis

Data were analyzed using the IBM SPSS Statistics for Windows, Version 23 (IBM Corp., Armonk, NY). Descriptive statistics were conducted to describe the total sample and sample by profession. Scores for the IPAS subscales and the T-TAQ subscales as well as overall scale are reported as medians and interquartile ranges since the data were not normally distributed. The Friedman test was used to compare IPAS and T-TAQ scores over time (pre-simulation, immediate post-simulation, and 6 months post-simulation scores) for the total sample and within professions. For results that were found to be statistically significant pair-wise post hoc comparisons using the Wilcoxon signed-ranks test was conducted and the Bonferroni correction, using an adjusted alpha level of .017, was applied. Since data were not normally distributed, a change score (post-score minus pre-score) was calculated to assess if there was a significant difference in the amount of change between professions. The change scores were not normally distributed; therefore, they were compared using a Mann-Whitney *U* test. Normality of data was determined using the Shapiro-Wilk test. All comparisons were two-tailed and a significance level of less than .05 was considered statistically significant.

RESULTS

A sample of 106 students were eligible to participate, 104 (98.11%) agreed to participate, and 97 (91.51%) completed all three surveys. Of the 97 participants, 35 (36.08%) were DPT students and 62 (63.92%) were BSN students. Scores from all three time periods (pre-simulation, immediate and post-simulation) were compared within the entire sample. The results can be found in Table 1. All targeted outcome scores for each tool and subscale were found to have changed significantly over time ($p < .001$). The pair-wise post-hoc analyses showed a significant difference in the overall score and all subscale scores of the T-TAQ between pre-simulation scores and immediate scores ($p < .001$), as well as pre-simulation scores and post-simulation scores ($p \leq .001$). For the IPAS, pair-wise post-hoc analyses showed a significance between pre-simulation scores and immediate scores, as well as pre-simulation scores and post-simulation scores in the Teamwork, Roles and Responsibilities and Community Centeredness subscales ($p < .001$). Statistical significance was also found between pre-simulation and immediate scores, and immediate and post-simulation scores for the IPAS subscale of Interprofessional Biases ($p < .001$). Lastly, statistical significance was identified between pre-simulation and immediate scores in IPAS subscales of Patient Centeredness and Diversity and Ethics ($p < .001$).

Comparisons within student profession group. Pre-simulation, immediate, and post-simulation scores were also compared within both student profession groups (DPT and BSN). These results can be found in Table 2. Significant differences were found in both groups for the T-TAQ subscales of Team Structure, Situation Monitoring, Mutual Support, Communication and Overall scores and in IPAS subscales of Teamwork, Roles and Responsibilities and Interprofessional Biases. For the IPAS subscales of Patient-Centeredness and Community-Centeredness, BSN students showed significance increase in scores over time; however, DPT students did not. To identify the differences, post-hoc tests were conducted. The results for both groups showed that the majority of differences occurred between pre-simulation and immediate, as well as between pre-simulation and post-simulation scores ($p < .017$) with scores increasing over time. The exception to this finding was the IPAS subscale of Interprofessional Biases. For both BSN and DPT students, there was a significant increase in scores from immediate to post-simulation ($p < .001$). However, BSN student scores also increased significantly from pre-simulation and immediate ($p < .001$), while DPT student scores increased significantly from pre-simulation and post-simulation ($p < .001$).

Comparisons between student profession group. Pre-simulation, immediate, and post-simulation scores were compared between student profession groups. In general, DPT students had higher scores at all three data collection points, starting at pre-simulation. At pre-simulation there was a statistical significance in BSN and DPT student scores for T-TAQ subscales of Team Structure ($p = .004$), Leadership ($p = .002$), Mutual Support ($p = .019$) and Overall score ($p = .006$) and IPAS subscales of Teamwork, Roles and Responsibilities ($p = .005$), Leadership ($p < .001$), Interprofessional Biases ($p = .014$), Diversity and Ethics ($p = .039$), and Community-Centeredness ($p = .004$).

At the immediate time period, statistically significant differences between BSN and DPT student scores were found for T-TAQ subscales of Situation Monitoring ($p = .011$); Mutual Support ($p = .029$) and Overall score ($p = .010$). For the IPAS, statistically significance was found at subscales of Teamwork, Roles, and Responsibilities ($p = .045$), Leadership ($p = .001$), Interprofessional Biases, and Diversity and Ethics ($p = .012$).

At post-simulation, the T-TAQ scores that were found to be statistically significantly different between student profession groups include Team Structure ($p = .004$) and Communication post-simulation ($p = .034$). While post-simulation scores that were statistically significant with the IPAS subscales include Teamwork, Roles, and Responsibilities ($p = .014$), Leadership ($p = .039$), Diversity and Ethics ($p = .005$), and Community-Centeredness ($p = .023$).

Because DPT students scored statistically significantly higher than BSN students before they participated in the simulation (pre-simulation) for several of the T-TAQ and IPAS scores, change scores were computed and compared to see if one student profession group had greater change after the simulation (immediate and post-simulation) than the other group. Change scores from pre-simulation to immediate, pre-simulation to post-simulation, and immediate to post-simulation were compared between the DPT and BSN groups. These results can be found in Table 3. Significance was noted between change scores in IPAS subscale Community-Centeredness between times of pre-simulation and immediate ($p = .031$) and between times of immediate and post-simulation ($p = .030$).

DISCUSSION

Statistically significant differences found in scores over time (pre-simulation to immediate and pre-simulation to post-simulation) suggest that students improved in their attitudes on IPC after being involved in the simulation intervention. Although, there was no statistical significance between the times of immediate to post-simulation, it is important to note that there was no decline, and the improvement in scores that occurred immediately after the simulation remained constant over the 6 months. This insinuates that the positive change in student attitudes toward IPC was retained when working with other health professions in the acute care setting. This finding is similar to a study done by Miller, Rambeck, and Snyder (2014) who also used simulation as their IPE intervention. They found that scores at 6-12 months post-

simulation declined slightly, but were still higher than the pre-survey results (Miller, Rambeck, & Snyder, 2014).

Specific to T-TAQ, the statistical improvement in scores for all the subscales after participating in the simulation is similar to results reported by Motycka et al. (2018). In their study they also found a statistically significant improvement in scores for all the T-TAQ subscales after nursing, medical, pharmacy, and physician assistant students participated in a simulation experience (Motycka et al., 2018). Comparing these results to a study that utilized the IPAS scale using a population of DPT, Master of Science in Occupational Therapy, and Master of Science in Physician Assistant students, significance was noted pre to post in only one subscale of teamwork, roles and responsibilities (Kim, Radloff, Stokes, & Lysaght, 2018).

In scores over time within profession group, there were both similarities and differences. Of the T-TAQ subscale scores and overall score, the DPT students changed significantly in all but one subscale (Leadership), while the BSN students had significant change in all subscales and the overall score. This same trend was seen in the IPAS subscales with the DPT students only having significant change in two of the five subscales while the BSN students had significant change in four of the five. Neither group had significant change in Diversity and Ethics score over time, and the DPT students also did not have significant change in Patient-Centeredness and Community-Centeredness scores.

The three areas in which the DPT students' attitudes did not change were in areas they may have had more clinical practice as doctoral students compared to the BSN students. For Leadership and Community-Centeredness, the DPT students came into the simulation experience with significantly more favorable attitudes than the BSN students. This could be because the difference in undergraduate and graduate students, taking into consideration age and length of time spent in school. In undergraduate programs, they are still very much siloed within their profession and focused on learning the basic skills within their roles. This brings to light the importance of including more IPE activities in the undergraduate level curriculum. BSN students are just being exposed to the concepts of leadership, community and patient-centeredness, while the DPT students have been practicing in the community and are at the graduate level where there is an intentional focus on leadership. The higher scores of the DPT students could also be related to the amount of service learning that these students have been exposed to throughout their program. Service learning has been shown to increase knowledge and skills of collaboration for students (Krumwiede et al., 2015). While DPT students experience service learning early on in their program, undergraduate nursing students do not get much exposure until their senior year.

The lack of change in Diversity and Ethics for both professions could be related to the lack of this concept within the simulation scenario. However, the goal of the simulation was not focused on this concept, but rather teamwork on completing ambulation of a post-operative hip replacement patient.

Comparing scores between professions at pre-simulation showed that DPT students had higher scores overall and for all but one of the T-TAQ subscales, Communication, and all but one of the IPAS subscales, Interprofessional Biases. Scores on T-TAQ subscale of communication started out similar and improved for both professions post- simulation, which shows that this interprofessional simulation was beneficial on collaboration and communication for all participants. For the IPAS subscale of Interprofessional Biases, the DPT students started out lower, meaning that they felt more biases toward their role as physical therapists from other professions. However, with the DPT students, Interprofessional Biases improved in the 6 months post-simulation scores while BSN students had a decline immediate post-simulation then rebounded 6 months post-simulation. In this, the simulation may have acted as a reminder that these professions tend to overlap and working with one another to define roles in patient care is important to ensure optimal patient outcomes. In a study that included medical students and first year physical therapy students, findings were contradictory in that they found physical therapy students did not feel that IPE would help them with improved communication in the healthcare setting (Systma et al., 2015).

The comparison of change scores showed that the only area in which DPT and BSN students significantly differed in how much their scores changed over time, was for the IPAS subscale of Community-Centeredness. From pre-simulation to immediate and immediate to post-simulation the improvement the BSN students had in their scores was significantly greater than that by the DPT students. Although this simulation did not focus on community-centeredness, the idea of IPC and working with other professions within this simulation could have made the students see the importance of working with others in the community, such as policy makers and non-clinicians, to further improve patient care. Again, this finding could be explained by the differences in programs between the DPT and BSN students concerning the amount of exposure to service learning in the community. The DPT students could have experienced a ceiling effect on this subscale because of their exposure to service learning throughout their program.

Overall, change scores were consistent between both groups. Although the DPT students started out higher and the BSN were lower in scores, both groups were able to learn from the experience and improve attitudes towards collaboration similar to other studies of IPE (Corbridge, Tiffen, Carlucci, & Zar, 2013; Gustafsson et al., 2016). In looking at the results and comparing to the enablers of IPE according to Homeyer, Hoffman, Hingst, Opperman & Drier-Wolfgramm (2018), this simulation was successful at evolving patient-centered care using interprofessional thinking, engaged knowledge sharing and exchange, and mutual respect.

Limitations

This study is unique because it measured outcomes at three time periods, spans two different settings, and includes two measure-ment tools, making it difficult to compare to other studies. This study did have a good response rate (91.5%) resulting in a decent sample size of 97. However, there was not an equal number of students representing each profession, with more nursing student respondents than physical therapy students. This could also have affected the results and may be an explanation for the increased significant findings among the nursing students. This study utilized a convenience sample and was done at a small private, Midwestern university with very little sociocultural diversity, so the results may not be generalizable to students attending larger public universities outside of the Midwest region. Demographic information such as age, gender, previous experience with IPE, were not collected as part of the study, but could have been helpful when analyzing data to understand the representation of the sample to the target population of DPT and BSN students.

CONCLUSIONS

With the findings of significance in all subscales of both tools when looking at all times, it shows that this interprofessional simulation can be useful in breaking-down silos that occur within professions by helping students increase understanding of other professions. It also shows that this interprofessional simulation was successful at addressing both of the research questions within this study. The lack of improvement in scores between the immediate to post-simulation time period was disappointing since it was hoped that students would continue to improve attitudes toward interprofessional collaboration. However, these results did provide evidence that the interprofessional concepts gained from this experience were retained 6 months after it without decline. Reviewing scores between professions, the BSN students started with lower scores when compared to the DPT students. This provides evidence of the need to incorporate more IPE activities within the nursing undergraduate curriculum to help foster the concepts of IPE. However, the DPT students benefited from this activity with many statistically significant findings as well. If student attitudes translate into practice, what they learned in the simulation may be used to prevent healthcare errors related to communication issues among professions.

RECOMMENDATIONS

Consideration for future simulations will focus on addressing differences in the level of IPE experience in the various professional programs to make sure all students are being challenged within the IPE simulation. The simulation scenarios should be further developed to include aspects of diversity and ethics since this subscale of the IPAS tool did not show improvement for either profession. Also, given that DPT students did not show an improvement

in the community-centeredness subscale of the IPAS, revisions should be made to the scenario to include more of a community focus. The scenario could do more to improve students' attitudes toward working with non-clinical professions like public health administrators and policy makers. This is an important concept in patient care as more clinicians are called to not only advocate for the health of patients and communities, but also to work with legislators to create laws, regulations, and policies for the delivery of more effective health care. More professions could be involved in the simulation to enhance the interprofessional concepts included in both tools. This would also help participants understand the roles of other health care and non-clinical professions that they are likely to encounter in practice. Various simulation scenarios could be created so that not every pairing experiences the exact same scenario. It would be interesting to see how the results would change. This interprofessional simulation will continue to take place yearly and be a part of the curriculum for both DPT and BSN students, with the hope of adding more professions in the future. Demographic data will be taken into consideration in the future for better understanding of how these factors could affect the results. This may allow those who create IPE simulation activities to design more customized scenarios to better meet the needs of all students.

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Table 1: Overall Comparison of Pre-simulation, Immediate, and Post-Simulation Scores (N = 97)

	Pre-Simulation	**Immediate**	**Post-Simulation**	
	Mdn (IQR)	*Mdn* (IQR)	*Mdn* (IQR)	*p*
T-TAQ Tool				
Team Structure	26 (3)	27 (4)	27 (3)	<.001
Leadership	26 (4)	28 (4)	28 (5)	.001
Situation Monitoring	25 (3)	27 (5)	27 (9)	<.001
Mutual Support	25 (3)	27 (5)	27 (4)	<.001
Communication	24 (3)	26 (4)	26 (3)	<.001
Overall Total	126 (15)	133 (18)	133 (15)	<.001
IPAS Tool				
Teamwork	36 (6)	40 (9)	39 (7)	<.001
Patient-Centeredness	23 (3)	25 (6)	25 (3)	.004
Interprofessional Biases	8 (3)	7 (2)	8 (3)	<.001
Diversity & Ethics	19 (3)	20 (2)	19 (3)	.016
Community-Centeredness	25 (4)	26 (6)	26 (6)	<.001

Note. IQR = interquartile range; T-TAQ = TEAMSTEPPS Teamwork Attitudes Questionnaire; IPAS = Interprofessional Attitudes Scale

Table 2: Overall Comparison of Pre-simulation, Immediate, and Post-Simulation Scores Within Student Profession Group

	DPT (*n*= 35)				BSN (*n* = 62)			
	Pre-Sim	Immed	Post-Sim		Pre-Sim	Immed	Post-Sim	
	Mdn (IQR)	*Mdn* (IQR)	*Mdn* (IQR)	*p*	*Mdn* (IQR)	*Mdn* (IQR)	*Mdn* (IQR)	*p*
T-TAQ Tool								
Team Structure	26 (2)	27 (4)	27 (3)	<.001	25 (4)	25 (4)	26 (3)	<.001
Leadership	27 (3)	29 (3)	28 (4)	.175	25 (4)	27 (4)	27.5 (4)	.004
Situation Monitoring	26 (4)	28 (4)	27 (5)	<.001	25 (4)	26 (5)	26 (4)	<.001
Mutual Support	26 (3)	28 (4)	27 (3)	<.001	25 (2)	26 (5)	27 (3)	<.001
Communication	24 (4)	27 (5)	26 (3)	.003	24 (3)	25 (4)	25 (4)	.001
Overall Total	129 (14)	139 (15)	135 (14)	<.001	125 (13)	130 (17)	132 (16)	<.001
IPAS Tool								
Teamwork	39 (6)	42 (8)	42 (6)	<.001	36 (3)	39 (8)	37 (7)	<.001
Patient-Centeredness	25 (2)	25 (1)	25 (2)	.116	23 (3)	24 (3)	24 (4)	.011
Interprofessional Biases	7 (2)	7 (2)	8 (2)	<.001	8.5 (3)	7 (2)	8.5 (3)	<.001
Diversity & Ethics	19 (3)	20 (1)	20 (1)	.069	18 (4)	19 (3)	18 (4)	.143
Community-Centeredness	26 (5)	27 (5)	27 (5)	.076	24 (3)	26 (6)	25 (5)	<.001

Note. DPT = Doctor of Physical Therapy; BSN = Bachelor of Science in Nursing; IQR = interquartile range; T-TAQ = TEAMSTEPPS Teamwork Attitudes Questionnaire; IPAS = Interprofessional Attitudes Scale

Table 3: ***Comparison of Change Scores by Student Profession Group, DPT (N = 35), BSN (N = 62)***

	Pre-Simulation to Immediate			Pre-Simulation to Post-Simulation			Immediate to Post-Simulation		
	DPT	**BSN**		**DPT**	**BSN**		**DPT**	**BSN**	
	Mdn (IQR)	*Mdn* (IQR)	*p*	*Mdn* (IQR)	*Mdn* (IQR)	*p*	*Mdn* (IQR)	*Mdn* (IQR)	*p*
T-TAQ Tool									
Team Structure	1.0 (3.0)	1.0 (3.0)	.673	1.0 (3.0)	1.0 (3.0)	.385	-1.0 (3.0)	0 (3.0)	.071
Leadership	0 (2.0)	1.0 (3.5)	.223	0 (3.0)	0 (3.0)	.142	0 (2.0)	0 (3.0)	.860
Situation Monitoring	2.0 (4.0)	1.0 (2.0)	.199	1.0 (3.0)	1.0 (4.0)	.964	0 (2.0)	0 (3.0)	.335
Mutual Support	1.0 (2.0)	1.0 (3.0)	.955	1.0 (3.0)	1.5 (3.0)	.355	0 (2.0)	0 (2.3)	.227
Communication	1.0 (3.0)	1.0 (3.0)	.879	1.0 (3.0)	1.0 (4.0)	.638	0 (3.0)	0 (3.0)	.643
Overall Total	6.0 (9.0)	6.0 (8.5)	.644	5.0 (8.0)	5.5 (9.5)	.620	-1.0 (8.0)	-0.5 (8.3)	.336
IPAS Tool									
Teamwork	3.0 (5.0)	3.0 (6.3)	.592	3.0 (5.0)	1.0 (7.0)	.681	0 (5.0)	0 (3.0)	.519
Patient-Centeredness	0 (1.0)	1.0 (2.0)	.145	0 (1.0)	0 (3.0)	.086	0 (1.0)	0 (2.3)	.383
Interprofessional Biases	0 (1.0)	-1.0 (2.0)	.075	1.0 (2.0)	0 (3.0)	.054	2.0 (2.0)	1.0 (2.0)	.446
Diversity & Ethics	0 (2.0)	0 (1.3)	.620	0 (1.0)	0 (2.0)	.429	0 (0)	0 (1.0)	.415
Community-Centeredness	0 (3.0)	1.0 (4.0)	.031	0 (2.0)	1.0 (3.0)	.272	0 (2.0)	0 (3.0)	.030

Note. DPT = Doctor of Physical Therapy; BSN = Bachelor of Science in Nursing; IQR = interquartile range; T-TAQ = TEAMSTEPPS Teamwork Attitudes Questionnaire; IPAS = Interprofessional Attitudes Scale