Journal of Community Medicine & Public Health
Kopka R, et al. J Community Med Public Health 8: 472
www.doi.org/10.29011/2577-2228.100472
www.gavinpublishers.com

OPEN ACCESS

GAVIN PUBLISHERS

Research Article

The Use of Simulation in Combination with a Multimodal Teaching Style in the Physical Therapy Acute Care Curriculum at a Rural Midwestern University

Rochelle Kopka[1*], Makayla Merony[1], Anna Zaremba[1], Jamie Haines[1], Chin-I Cheng[2]

[1]Department of Physical Therapy, Central Michigan University, Mt. Pleasant, MI, USA

[2]Department of Statistics, Actuarial and Data Science, Central Michigan University, Mt. Pleasant, MI, USA

[*]**Corresponding author:** Rochelle Kopka, Department of Physical Therapy, Central Michigan University, Mt. Pleasant, MI, USA

Citation: Kopka R, Merony M, Zaremba A, Haines J, Cheng C-I (2024) The Use of Simulation in Combination with a Multimodal Teaching Style in the Physical Therapy Acute Care Curriculum at a Rural Midwestern University. J Community Med Public Health 8: 472. DOI: https://doi.org/10.29011/2577-2228.100472

Received Date: 07 September, 2024; **Accepted Date:** 16 September, 2024; **Published Date:** 20 September, 2024

Abstract

Purpose: This study aims to identify the combined effects of lecture, laboratory, and simulation in an acute care setting on doctoral students' confidence levels in a representative physical therapy program in the US. **Methods:** The mixed methods approach includes a qualitative research survey and quantitative analysis based upon pre and post confidence survey and the IPE experience survey responses to identify any statistically significant differences. The surveys were given to each participant following the lecture and laboratory and before the acute care simulation in the IPE center. Fourty-two students completed pre/post confidence surveys and only 38 students completed the post IPE experience survey, quantitative analysis was done using statistical software, following data collection after completion of the pre/post confidence surveys. **Results:** Students reported increased levels of confidence following the multimodal intervention including an interprofessional education simulation experience. There was a statistically significant difference in the confidence level of Doctor of Physical Therapy Students pre-and-post survey following acute care simulation experience in the IPE center. Overall, this IPE experience decreased their stress level and removed some uncertainty they had going into the acute care environment. **Discussion:** The results of this study show that IPE simulation experience results in a positive outcome in students' perception of their learning. Results demonstrate how patient simulation may facilitate physical therapy education and improve student confidence in various clinical skills. Future research could focus on identifying whether increased confidence translates to improved competency in skills such as interprofessional communication, clinical decision-making, and improved interpersonal skills with patients.

Keywords: Patient simulation; Multimodal education; Acute care; Physical therapy

Introduction

In order to maximize patients' functional outcomes, adequate communication skills are required in a health professional setting to interact with patients as well as in interprofessional relationships [1]. Fundamental skills, such as communication, are developed during clinical experience which is a part of all health professional curricula. Although, the number of hours of true clinical experience is limited. Simulation-based education and simulated patients are becoming more prevalent in curriculum and have shown to be an effective teaching method and provides an additional setting to implement and develop communication skills [2]. Simulation provides an opportunity to implement didactic information, improve critical thinking, and enhance clinical skills and judgment in a safe scenario, and improvements in these areas aid in raising perceived confidence [3]. While several health professions currently incorporate simulation into their curriculum, research is less prevalent regarding simulation within Doctoral of Physical Therapy (DPT) programs. In recent years, the need has increased for knowledge regarding how effective simulation-based education is for graduate professional students, specifically in DPT programs, and how it should be incorporated into the curriculum. Evidence regarding the effects of simulation and standardized patients is scarce in the realm of physical therapy, but the research that currently exists is beginning to reveal a positive impact on students' level of confidence.

Confidence is an integral part of being a health professional. Higher levels of confidence can lead to better patient evaluation and assessment, and therefore better potential patient outcomes [4]. Communication skills and confidence in patient interactions are built through clinical experiences [5]. However, there are only so many opportunities within the graduate curriculum to develop the skills during clinical experiences. Therefore, simulation is another option to implement further practice and skill development to build confidence with their communication skills and therefore interprofessional relationships. Because there are only so many opportunities throughout university education and only so many clinical hours are implemented into the curriculum, simulation is another option to enhance skills such as confidence. Simulation based education, and simulated patients have been found to play a role in perceived confidence in a variety of medical occupations such medical, nursing, occupational therapy, and physical therapy students [6-9]. Research regarding simulation has been expanding over the last few years, showing positive results around perceived confidence with students in or approaching clinical practice [10]. One study looked at traditional methods of education versus a high-fidelity simulation in nursing students. Results of this study illustrated simulation to be more effective in increasing knowledge, as well as decreasing anxiety [11]. Studies have illustrated positive effects on student perceived confidence with high-fidelity simulation looking more closely at patients in the ICU with occupational therapy students [12]. Research has also been done regarding undergraduate physiotherapy students' perceived confidence, showing simulation having a positive outcome [10].

The acute care environment is a fast-paced, potentially intimidating environment that involves communication skills with multiple disciplines [13]. Interprofessional collaboration is a necessary component to physical therapy evaluation, intervention, as well as discharge in an acute care setting. Interprofessional education (IPE) simulation is an additional avenue to developing communication skills and confidence in a non-threatening environment, which could help ensure patient safety in a clinical setting. IPE has shown to elicit positive outcomes in self-efficacy in health professional students such as nursing and medical students [14]. However, more extensive research is needed regarding IPE with physical therapy students in an acute care setting.

While some literature exists regarding positive effects of simulation-based education in acute care, research is also lacking around multimodal effects on graduate student confidence. This multimodal approach involves a lecture, laboratory, as well as a simulation component. Lecture provides a foundation of knowledge of fundamental skills, while laboratory and simulation experiences allow for more clinical application. This study will evaluate student perceived confidence regarding physical therapy intervention in an acute care setting with a pre and post confidence survey and a post IPE experience survey. According to the literature that exists, little is known about the effects of a multimodal approach of lecture, laboratory, and standardized patients on DPT student confidence in an acute care setting. The purpose of this study is to examine the effects of a multimodal approach of lecture, laboratory, and IPE simulation adding to the body of knowledge on perceived DPT student confidence in an acute care setting.

Materials and Methods

Participants

In this study there were 42 participants from a rural, Midwestern Doctor of Physical Therapy (DPT) program. The participants were students from a single cohort, and were recruited from their Exam and Diagnosis IV course. Participation was voluntary. There were a total of 17 males and 25 females that filled out the pre-confidence survey. The participants needed to meet the following criteria: (1) all students must not have previously been in the interprofessional education (IPE) center in relation to an acute care simulation; (2) all students must have been present for the lecture and lab before the simulation; (3) all students must have been enrolled in

the Exam and Diagnosis IV course. Each of the participants was present during lecture of the material for the entirety of the course. Additionally, they participated in the laboratory portion of the course where they were able to put the knowledge gained from lecture to practical application by working with their classmates. The sample size initially was 55 students, but only 42 students completed both the pre/post confidence surveys and only 38 students completed the post IPE experience survey.

Experimental Procedure

This study consisted of a mixed methods approach to examine the use of a multimodal teaching environment using lecture, laboratory, and a patient simulation in an acute care setting via an Interprofessional Education Center (IPE). The IPE center is the interprofessional education center where students can work with other disciplines to solve problems and participate in high-fidelity simulations. The difference between laboratory education and the simulated patient experience in the IPE center is that a laboratory experience does provide the students with a less authentic approach to a problem. Students perform physical therapy examination and intervention skills on their classmates as patients, which could potentially lead to a hindrance to their learning, as their partner is not as authentic as a true patient. On the other hand, patient simulations in the IPE center involve paid community partners that study the role of the given patient case and do not break the role, which gives the physical therapy students more of a real-life experience in an acute care setting. The simulation promotes a more realistic acute care setting compared to the laboratory setting, which lacks the authenticity of an acute care setting, due to several factors including the predictability and knowledge prior to receiving a case study or certain type of patient.

The mixed methods approach includes a qualitative research survey and quantitative analysis that is based upon the pre and post confidence survey and the IPE experience survey responses to identify any statistically significant differences. The surveys were completed using Microsoft Forms and were given to each participant following the lecture and laboratory and before the acute care simulation in the IPE center. Students received a pre-confidence survey following lecture and laboratory intervention. Following completion of the acute care simulation in the IPE center, students then received a post confidence survey as well as a post IPE experience survey. The quantitative analysis was done using statistical software, SPSS, following data collection after the completion of the pre/post confidence surveys. Common responses and trends from the post IPE experience survey were analyzed to determine similar experiences amongst students.

Data Collection & Analysis

The confidence of DPT students regarding treating and working with patients in an acute care setting was evaluated by pre-confidence surveys given after lecture and lab, and before the IPE simulation experience. They were then given a post-confidence survey after the IPE simulation experience. The students were asked 8 questions about their perceived confidence and were given a Likert scale from 1-4 to choose from and select: “1” meaning not confident; “2” meaning somewhat confident; “3” meaning confident; and “4” meaning very confident. The ratings from the two pre and post confidence surveys were used to determine if the confidence levels of the physical therapy students have increased, decreased, or remained the same following quantitative analysis of the results. To determine the significance of the survey results, SPSS software was used to find if there is any outstanding statistical significance based on a paired t-test analysis for each question that was asked in the survey. Assuming alpha is 0.05, and there was a post-hoc analysis of power. With a sample size greater than 30 and the outcome measure is a continuous variable, data meets the assumptions of parametric t-test.

Furthermore, qualitative analysis was done on how the students perceived the experience of the IPE simulation, and if they believed that it was beneficial to their learning, through a post-IPE experience survey. They were given a post-IPE survey with 5 questions asking about their perception of their experience in the IPE center. The 5 questions were (1) if they think that the IPE center increased their ability to care for patients; (2) if the IPE center increased their learning experience; (3) if the IPE center should be more widely used in the physical therapy curriculum; (4) if the IPE center increased confidence; and (5) what they personally found most valuable about the IPE center. For the first 4 questions they were given a scale from 1-4 to select: “1” meaning strongly disagree; “2” meaning disagree; “3” meaning agree: and “4” meaning strongly agree. The last question was an open-ended question, so students could subjectively portray aspects of the acute care scenario that they thought to be the most valuable in the IPE center simulation to them. We will use those ratings and the short answer question to assess if the IPE center is something to incorporate into physical therapy curriculum based on its relative costs and benefits. Similarity in student responses may illustrate the significant benefits IPE simulation may have.

Results

Forty-two physical therapy students completed both pre/post questionnaires reviewing their confidence levels before and after a lecture, lab and acute care IPE center simulation. Upon the analysis of the results of the qualitative and quantitative reviews there was a statistical significance between students’ confidence rates after lecture, lab, and the acute care IPE center simulation (Table 1). When looking at the results from the pre/post questionnaire, the confidence rating of each student changed from 1–2-point grade to

a 3–4-point grade in confidence in the acute care setting. The results of the paired t-test show sufficient evidence that each score from the post questionnaire was significantly higher than the pre-questionnaire scores since the mean of each pre/post survey is higher than 0.05 for Q1-Q8 (Table 2). Reviewing the standard error mean of the paired t-test, the results were less than 1 for Q1-Q8 meaning that this sample will be a good representation for the overall population (Table 2). Results from the post IPE survey indicate that students have an increase in confidence. Another theme that emerged was that students felt there was still more that they needed to learn in the acute care setting. Furthermore, students reported that through their clinical rotations they were confident that their confidence would reach 100%, and that overall, this IPE experience decreased their stress level and removed some uncertainty they had going into the acute care environment.

		Mean	N	Std Deviation	Std Error Mean
Pair 1	Q1 Post	2.88	42	0.593	0.091
	Q1 Pre	1.83	42	0.621	0.096
Pair 2	Q2 Post	2.86	42	0.647	0.100
	Q2 Pre	1.86	42	0.647	0.100
Pair 3	Q3 Post	2.86	42	0.683	0.105
	Q3 Pre	1.83	42	0.660	0.102
Pair 4	Q4 Post	2.93	42	0.677	0.104
	Q4 Pre	1.95	42	0.661	0.102
Pair 5	Q5 Post	2.93	42	0.745	0.115
	Q5 Pre	2.00	42	0.663	0.102
Pair 6	Q6 Post	3.17	42	0.581	0.090
	Q6 Pre	2.10	42	0.759	0.117
Pair 7	Q7 Post	2.90	42	0.656	0.101
	Q7 Pre	1.93	42	0.745	0.115
Pair 8	Q8 Post	2.88	42	0.705	0.109
	Q8 Pre	2.02	42	0.811	0.125

Table 1: Paired Sample Statistics.

			Paired Differences		95% Confidence Interval of the Difference				Significance	
		Mean	Std Deviation	Std Error Mean	Lower	Upper	t	df	One-Sided P	Two-Sided p
Pair 1	Q1 Post Q1 Pre	1.048	0.697	0.108	0.830	1.265	9.744	41	<0.001	<0.001
Pair 2	Q2 Post Q2 Pre	1.000	0.765	0.118	0.762	1.238	8.471	41	<0.001	<0.001
Pair 3	Q3 Post Q3 Pre	1.024	0.841	0.130	0.762	1.286	7.893	41	<0.001	<0.001
Pair 4	Q4 Post Q4 Pre	0.976	0.950	0.147	0.680	1.272	6.662	41	<0.001	<0.001
Pair 5	Q5 Post Q5 Pre	0.929	0.838	0.129	0.667	1.190	7.182	41	<0.001	<0.001
Pair 6	Q6 Post Q6 Pre	1.071	0.778	0.120	0.829	1.314	8.931	41	<0.001	<0.001
Pair 7	Q7 Post Q7 Pre	0.976	0.841	0.130	0.714	1.238	7.525	41	<0.001	<0.001
Pair 8	Q8 Post Q8 Pre	0.857	0.718	0.111	0.633	1.081	7.735	41	<0.001	<0.001

Table 2: Paired Sample t-test.

Discussion & Conclusion

This qualitative study was designed to identify the effect of multimodal education introducing simulation-based education combined with traditional lecture and laboratory participation. Outcomes were measured using a self-reported survey pre and post lecture, preparatory lab experience, and simulation experience. A quantitative analysis of the results was performed following the conclusion of the study, which found an overall increase in perceived levels of confidence in students.

Findings of this study were that students subjectively reported increased levels of confidence following the multimodal intervention including an interprofessional education simulation experience. Following data analysis, there was a statistically significant difference in the confidence level of Doctor of Physical Therapy Students pre-and-post survey following acute care simulation experience in the IPE center. Other research has found positive outcomes of simulation in an acute care setting that increases student's confidence as well as their satisfaction.9 When it came to research focusing on Doctor of Physical Therapy Students, one study attempted using two different approaches to patient care experience and they found that the simulated experience was much more helpful in improving confidence levels within the students [15]. There have been many positive results that have come out of simulation-based learning for physical therapy students preparing to go out as entry-level therapists [16]. Although current literature is limited in this area specifically, results from studies that do exist as well have shown positive outcomes regarding confidence levels in students. The multimodal study conducted at this rural midwestern university, found results consistent with similar research, indicating the benefits of simulation incorporated into traditional methods of education. Three methods of intervention in education may be more beneficial in addressing and improving student confidence level compared to lecture and laboratory alone.

The results of this study show that IPE simulation experience results in a positive outcome in students' perception of their learning. Analysing the post IPE survey themes, students found

that having the IPE simulation was a good experience for their learning and it helped build their confidence in providing patient care in an acute care setting. Many individuals stated that they will have to continue to observe and continue to grow in the acute care setting to gain 100% confidence as a clinician. Many authors have found that a simulation experience can increase a student's confidence and their learning experience [1,9,16]. They have looked at multiple disciplines including medical students, nurses, occupational therapists, and physical therapists [6-9]. Substantial research does not currently exist on the student's perception of an IPE center experience. One study stated that students found their IPE center was a good way to introduce interprofessional learning strategies to prepare them for patient care in the clinic/hospital [17]. Another study found that physiotherapy students felt that their simulation experience was perceived by them as a valuable resource to prepare them for their clinical experience to come [18]. The statistically significant results of a positive outcome in confidence rates and learning experience could influence the teaching strategies of the faculty members for the Central Michigan University DPT program as well as to help their students build confidence before going out and starting their clinical rotations.

Limitations to the study include a small sample size, results depended on individual's subjective experience following simulation, and lack of generalizability. As the study was conducted with only one cohort of students at one DPT program, there may be a lack of generalizability to future cohorts or other programs. Results could be influenced by the content or presentation of information regarding physical therapy in acute care prior to the simulation. Additionally, there was no control group to compare the effect on confidence following lecture and laboratory without an IPE acute care simulation experience.

Further consideration and future research could focus on identifying whether increased confidence translates to improved competency in skills such as interprofessional communication, clinical decision making, and improved interpersonal skills with patients. For future research opportunities, this study may support that the students' confidence can carry over and last into their clinical careers as physical therapists via a longitudinal study working with physical therapy students from DPT programs. Researchers could collect data pertaining to whether the students thought that the strategies that they were given in their DPT program helped them in their career right out of graduation and a couple of years after graduation. In addition to our study, research could be done to see if the multimodal interventional approach at this university was beneficial to students' following graduation and not just prior to the clinical rotation setting. The results from this future study could help implement teaching strategies for many physical therapy programs to help increase confidence and knowledge for their students before they go into their careers. Furthermore, the increased confidence and knowledge of the students could result in better clinical outcomes for patients, which could lead education leaders in DPT programs to improve the teaching methods that are implemented in classrooms.

Disclosure

Author Contributions

Conceptualization, R.K. and J. H.; methodology, R. K. and J. H.; software, R.K.; formal analysis, R. K. and C.C.; resources, M.M and A.Z.; data curation, R.K., M.M, A.Z., and C.C; writing—original draft preparation, M.M and A.Z.; writing—review and editing, R.K.

Funding

This research received a grant from the Central Michigan University College of Health Professions.

Institutional Review Board Statement

This study was found to be exempt on May 1st of 2023 from federal requirements for IRB review according to section 45 CFR 46.104(d) 2 (i) Surveys, Interviews and Observations recorded in a manner that identity cannot readily be ascertained of the revised Common Rule, which the CMU IRB has adopted for reviewing research not supported or sponsored by a Common Rule agency. IRB Number: 2022-1410. Verbal consent was obtained from participating subjects.

Data Availability Statement

Data supporting the study results can be provided followed by request sent to the corresponding author's e-mail.

Acknowledgments: None.

Conflicts of Interest: None.

References

1. Quail M, Brundage SB, Spitalnick J, Allen PJ, Beilby J (2016) Student self-reported communication skills, knowledge and confidence across standardised patient, virtual and traditional clinical learning environments. BMC Med Educ 16: 73.
2. Herbstreit F, Merse S, Schnell R, Noack M, Dirkmann D, et al. (2017) Impact of standardized patients on the training of medical students to manage emergencies. Medicine (Baltimore) 96: e5933.
3. Levett-Jones T, McCoy M, Lapkin S, Noble D, Hoffman K, et al. (2011) The development and psychometric testing of the satisfaction with simulation experience scale. Nurse Educ Today 31: 705710.
4. Hecimovich MD, Volet SE (2009) Importance of building confidence in patient communication and clinical skills among chiropractic students. J Chiropr Educ 23: 151-164.

5. Lai NM, Sivalingam N, Ramesh JC (2007) Medical students in their final six months of training: progress in self-perceived clinical competence, and relationship between experience and confidence in practical skills. Singapore Med J 48: 1018-1027.

6. Mather C, McCarthy R (2021) Exploring the effects of a high-fidelity environment on nursing students' confidence and performance of CPR. Nurs Stand 36: 76-82.

7. Alamrani MH, Alammar KA, Alqahtani SS, Salem OA (2018) Comparing the Effects of Simulation-Based and Traditional Teaching Methods on the Critical Thinking Abilities and Self-Confidence of Nursing Students. J Nurs Res 26: 152-157.

8. Ohtake PJ, Lazarus M, Schillo R, Rosen M (2013) Simulation experience enhances physical therapist student confidence in managing a patient in the critical care environment. Phys Ther 93: 216-228.

9. Thomas EM, Rybski MF, Apke TL, Kegelmeyer DA, Kloos AD (2017) An acute interprofessional simulation experience for occupational and physical therapy students: Key findings from a survey study. J Interprof Care 31: 317-324.

10. Pritchard SA, Blackstock FC, Nestel D, Keating JL (2016) Simulated Patients in Physical Therapy Education: Systematic Review and Meta-Analysis. Phys Ther 96: 1342-1353.

11. Dogru BV, Aydin LZ (2020) The effects of training with simulation on knowledge, skill and anxiety levels of the nursing students in terms of cardiac auscultation: A randomized controlled study. Nurse Educ Today 84: 104216.

12. Gibbs DM, Dietrich M, Dagnan E (2017) Using high fidelity simulation to impact occupational therapy student knowledge, comfort, and confidence in acute care. The Open Journal of Occupational Therapy 5: 10.

13. Alruwaili A, Mumenah N, Alharthy N, Othman F (2020) Students' readiness for and perception of Interprofessional learning: a cross-sectional study. BMC Med Educ 20: 390.

14. Jung H, Park KH, Min YH, Ji E (2020) The effectiveness of interprofessional education programs for medical, nursing, and pharmacy students. Korean J Med Educ 32: 131-142.

15. Smith N, Prybylo S, Conner-Kerr T (2012) Using simulation and patient role play to teach electrocardiographic rhythms to physical therapy students. Cardiopulm Phys Ther J 23: 36-42.

16. Mori B, Carnahan H, Herold J (2015) Use of Simulation Learning Experiences in Physical Therapy Entry-to-Practice Curricula: A Systematic Review. Physiother Can 67: 194-202.

17. Stockert B, Ohtake PJ (2017) A National Survey on the Use of Immersive Simulation for Interprofessional Education in Physical Therapist Education Programs. Simul Healthc 12: 298-303.

18. Dalwood N, Maloney S, Cox N, Morgan P (2018) Preparing Physiotherapy Students for Clinical Placement: Student Perceptions of Low-Cost Peer Simulation. A Mixed-Methods Study. Simul Healthc 13: 181-187.