Interprofessional Clinical Simulation of Neurological Rehabilitation and Self-Efficacy for Interprofessional Learning in Health Students

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Article

Interprofessional Clinical Simulation of Neurological Rehabilitation and Self-Efficacy for Interprofessional Learning in Health Students

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Abstract: Introduction: Fragmented practices need more interprofessional education. The development of interprofessional simulation in health careers has advanced undergraduate training in teamwork, roles, responsibilities, decision-making, and ethics. The study aims to analyze the effects of participating in a clinical simulation pilot on self-efficacy for interprofessional learning in health students. Methods: Final-year students from speech therapy, physical therapist, and occupational therapy programs participated in three consecutive interprofessional clinical simulation scenarios and were compared with a control group. All students completed the Self-Efficacy Scale for Interprofessional Experiential Learning. Scale scores were compared using the Mann-Whitney U test. This study was approved by the ethics committee (No. 149-22) of Universidad San Sebastián. Results: Twelve students participated in the study group and twelve in the control group. Significant differences were observed in the two dimensions of the self-efficacy scale: professional interaction ($p<0.001$) and interprofessional team assessment and feedback ($p<0.001$), with the study group scoring higher than the control group. Conclusions: Students participating in interprofessional simulation have higher self-efficacy for experiential learning than those not participating in the professional interaction and interprofessional team assessment and feedback dimensions. Confirms the effectiveness of interprofessional simulation as an educational strategy.

Keywords: Simulation; Interprofessional education; Self-efficacy; occupational therapy; speech therapy; physical therapist

Introduction

Health care has been taught in a segmented and fragmented way, affecting teamwork abilities [1]. Clinical simulation is a training method that enhances students' learning process [2] through hands-on experience, encouraging decision-making, problem-solving, goal-setting [3–5], and reflection regarding good practices, teamwork, and patient safety [6–12]. Thus, students analyze and improve their mental models and develop alternatives to replace habits that do not benefit patients [13–16]

Simulation-based education provides a safe, low-risk environment where students can effectively train clinical skills and interprofessional teams can practice critical teamwork skills. [17–20] In interprofessional education, students from two or more professions learn from each other to enable collaborative work and improve health outcomes [21]. Moreover, when clinical simulation training repeatedly occurs in an interprofessional setting, it improves performance and teamwork skills in various clinical areas [20,22,23].

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Individuals' self-efficacy becomes relevant in interprofessional education since it is a fundamental incentive for action, and subjects avoid activities they do not believe they can do and undertake those they judge themselves as capable [24]. Self-efficacy is influenced by three main sources: domain experiences, which refer to each subject's personal experiences; vicarious experiences, which are associated with modeling the actions performed by others; and social persuasion, which consists of convincing the subject of the abilities necessary to perform a certain activity [24].

In education, self-efficacy may improve the perception of who has the power to learn, thus boosting improvement in other outcomes such as academic achievement and self-esteem [25]. In addition, it is negatively correlated with anxiety [26].

Self-efficacy applied to interprofessional work varies when considering factors such as study program or year of study and is not influenced by the subject's gender [23,27]. According to recent graduates, interprofessional work during clinical practice is the main factor that improves self-efficacy [27]. Interprofessional communication and teamwork skills should be developed before starting clinical practice, and different strategies must be implemented to measure the impact of students' self-efficacy [28,29].

After participating in the clinical simulation of a trauma scenario, students significantly increased their perceived self-efficacy applied to interprofessional learning [30]. Therefore, low-cost scenarios and simulators are the basis for future program design [31]. In this line, interprofessional simulation should be used to work on different skills. This, in turn, will be reflected in students' self-efficacy [32] and will positively affect their motivation to perform a specific task, the efforts applied to their work, and their determination in the face of difficulty, which will also reduce stress [24,33–35].

METHOD

Study Design and Participants

This randomized controlled pilot study aimed to analyze the effects of participating in a clinical simulation pilot about self-efficacy for interprofessional learning among healthcare students. The study included 24 final-year students from different health disciplines, including three study programs: speech therapy (N = 8), physical therapist (N = 8), and occupational therapy (N = 8). Participants were selected based on their availability on the day the simulation scenarios would be implemented, and participation was voluntary. Participants were randomly assigned to the control and experimental groups using a simple lottery procedure, thus ensuring equal distribution of students from the three programs to maintain balance in terms of professional discipline.

Scenarios or Context

Meetings were held with neurorehabilitation experts from the three disciplines (physical therapist, speech therapy, and occupational therapy), and instructional designs were created. The core theme of the activity was the interdisciplinary rehabilitation of an adult with a subacute stroke injury who was awaiting their first assessment by the rehabilitation team.

The three scenarios were developed based on the same structure, starting with a briefing to deliver the initial information and prior instructions. Then, the scenario took place, followed by a final reflection and debriefing focused on emotions and analysis of the actions in the scenario. The students participated in three consecutive clinical simulation scenarios for 4 hours, led by three expert educators from each discipline involved.

The first scenario corresponded to an interprofessional clinical interview of a standardized patient. Three students participated as therapists and were given 10 minutes before starting the scenario to coordinate their roles. The scenario lasted 20 minutes, followed by a 50-minute debriefing emphasizing the role played by each professional in the assessment process.

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The second scenario was a technical meeting with the rehabilitation team, where 12 students participated. They were given 30 minutes to develop an interprofessional intervention plan, and the scenario began when an actor playing the role of a neurologist entered the meeting. Students had to present the patient's case and show their interdisciplinary intervention plan. The scenario lasted 20 minutes and ended with a 25-minute debriefing.

The third scenario educated the patient and his/her main caregiver and involved two standardized patients, the user and his/her daughter, and three students—one from each discipline. Before entering the scenario, students had 10 minutes to coordinate their work. This scenario lasted 25 minutes and was followed by a debriefing lasting approximately 50 minutes.

Procedure

All participants completed the Self-Efficacy Scale for Interprofessional Experiential Learning (SEIEL) designed by Mann et al., which was adapted and validated to Spanish through back-translation and subsequent expert judgment. The reliability analysis reported a Cronbach's alpha of 0.945. [36] (Villegas, 2017). This scale has two dimensions: professional interaction and interprofessional team assessment and feedback. The experimental group participated in the three interprofessional clinical simulation scenarios and, in the end, completed the SEIEL scale again. To preserve the principle of fairness, the control group also participated in the three scenarios and, at the end, completed the SEIEL scale again. This investigation was approved by the Scientific Ethical Committee of Universidad San Sebastian (approved by record 149-22), and informed consent was obtained from each participant.

Data Analysis

The reliability of the SEIEL scale was analyzed, obtaining a Cronbach's alpha of 0.963. To evaluate data distribution normality, the Shapiro–Wilk test was applied. The results indicated a non-normal distribution ($p < 0.05$), which justifies using non-parametric statistical methods for subsequent analyses. Consequently, the Mann–Whitney U test was used to compare the differences in self-efficacy levels between the control and experimental groups. This test is adequate for independent samples when data do not meet the assumptions of normality and offers robustness to deviations from the normal distribution. In addition, since a comparison was made before and after the intervention within each group, the Wilcoxon test for related samples was used, which is suitable for comparing two related conditions in the same sample when the data are ordinal in scale or are not normally distributed. This test ensures the validity of the results since it adjusts to the characteristics of the data. In addition, data were used to compare each item of the scale before and after the simulation. Finally, the Kruskal–Wallis test was used to identify differences in self-efficacy according to the study program of origin.

Results

A total of 24 healthcare students participated in this research. The demographic characteristics of the participants in the study and control group were similar (Table 1). The Mann–Whitney U test was used to compare the self-efficacy scores between both groups. Participation in the clinical simulation yielded statistically significant differences in the professional interaction dimension, where the scores of the study group (median = 79; range = 11) were higher than those of the control group (median = 54.05, range = 32; U= 1000, $p < .001$). This was also observed in the interprofessional team assessment dimension, where the study group had a higher score (median = 69.00, range = 15) than the control group (median = 54.00, range = 32; U= 6.000, $p < .001$). When comparing self-efficacy before and after the clinical simulation, statistically significant differences were observed with an increase in the scores of the professional interaction ($Z = -4.287$; $p < 0.001$) and interprofessional team assessment and feedback dimensions ($Z = -4.002$; $p < 0.001$).

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Statistically significant differences with a large effect size were found in all items of the self-efficacy scale, where pretest scores were lower than posttest scores (Table 4). The items that showed the greatest pretest and posttest differences were within the ranges of difference of 3.5–4 points. The items on the self-efficacy scale, with a difference of 3.5 points, included working with other students from different professions to form a team and understanding and discussing interprofessional learning objectives. The items on the self-efficacy scale, with a difference of 4 points, included working with other students from different professions to solve team problems and providing feedback individually to interprofessional team members on their roles and work.

The results of the Kruskal–Wallis test identified an effect of the study program on the professional interaction dimension prior to clinical simulation ($H(2) = 9.89$, $p < 0.01$). *Post-hoc* analyses performed with Games Howell statistic showed that physical therapist students had higher scores (median = 65.50) than speech therapy students (median = 42.00 $p < 0.05$) [3.69, 31.31] and occupational therapy students (median = 53.00, $p < 0.01$) [5.17, 25.58]. This effect was also identified in the interprofessional team assessment and feedback dimension before simulation ($H(2) = 8.75$, $p < 0.05$; *post-hoc* analyses performed with Games Howell statistic showed that physical therapist students had higher scores (median = 62.50) than speech therapy students. The study program had no any identified effect on both dimensions after simulation.

Discussion

Students of the last year of the speech therapy, physical therapist, and occupational therapy study programs who participated in interprofessional clinical simulation scenarios showed immediate effects on self-efficacy for interprofessional learning, confirming that interprofessional simulation improves self-efficacy in interprofessional learning skills, such as goal-setting, decision-making, and problem-solving [1,6,13].

Self-efficacy is influenced by three main sources: domain experiences, vicarious experiences, and social persuasion [24]. Clinical simulation helps to address two of these three sources, providing domain experiences to those participating in the scenarios and generating vicarious experiences for the observers. Therefore, self-efficacy is improved.

Participating in interprofessional simulation with undergraduate healthcare students—specifically students of the speech therapy, physical therapist, and occupational therapy programs during their last year—strengthens self-efficacy in interprofessional learning. This phenomenon consistently supports the existing literature, evidencing that interprofessional simulation positively impacts self-efficacy, emphasizing the fundamental role of this methodology in improving collaborative skills, and preparing students for interprofessional practice [1,6,13].

Our study findings indicate that participation in interprofessional simulation activities significantly improves self-efficacy in the professional interaction dimension, a fundamental component for effective interprofessional learning. These findings confirm the importance of simulation in enhancing communication and collaboration between professionals from different disciplines, thus highlighting its positive impact on the development of interprofessional skills [23,25,27].

In the team feedback dimension, improvements were observed between the initial and final assessments when comparing the three study programs, which confirms that providing feedback, particularly constructive feedback and essential skills in collaborative environments in interprofessional clinical simulation teaching processes, improves self-efficacy [27,30,36].

Incorporating high-fidelity clinical simulation scenarios that include standardized patients is shown as a key component to enhancing the self-efficacy of undergraduate health students. In addition, direct interaction with standardized patients provides students with more realistic and complex experiences, improving the efficacy of practical skills development, decision-making, and clinical situation management. The meta-analysis [37] shows the effectiveness of educational interventions in the interprofessional program and its positive impact on various healthcare disciplines.

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Exposure to high-fidelity scenarios facilitates interactions and discussions among students and may be a useful adjunct to interprofessional education in clinical settings, in addition to being an appropriate tool to prepare students for future teamwork [28,29] stated that students reported significant learning, understanding of other team members' roles, and practical experience, which substantially increased their competencies and confidence in working together as a team.

Participating in interprofessional simulation with undergraduate health students, specifically students of the speech therapy, physical therapist, and occupational therapy programs during their last year, directly affects interprofessional team assessment and feedback regarding self-efficacy for interprofessional learning. This is confirmed by the findings suggesting that interprofessional team assessment enhances interprofessional learning [27,30].

In the specific context of this clinical simulation pilot among physical therapist, speech therapy, and occupational therapy students, the implementation of high-fidelity scenarios stands out as a key element. The complexity and specificity of the skills required in these disciplines make simulation with standardized patients especially relevant. Interprofessional collaboration in highly complex clinical situations not only strengthens students' readiness for collaborative practice, but also positively influences self-efficacy by providing a learning environment that accurately reflects discipline interdependence in a comprehensive care setting. This is consistent with the findings of [23], who identified levels of self-efficacy regarding interprofessional learning skills among undergraduate healthcare students, where it was determined that it is crucial to recognize the influence of self-efficacy on interprofessional skill performance to ensure that healthcare students can adequately prepare for future interprofessional collaboration in real clinical settings [23].

The combination of interprofessional work and high-fidelity clinical simulation in this pilot study enriches the educational experience and substantially impacts students' self-efficacy. The ability to collaboratively address and solve complex clinical challenges strengthens students' confidence in their interprofessional skills, thus providing a more holistic perspective and preparing them for a diverse and dynamic clinical environment. This integrated approach supports the idea that self-efficacy is not only nurtured by technical skills and the ability to work effectively in interprofessional teams in demanding clinical settings. This has been studied by [22], and their results suggest that interprofessional education can help improve skill levels and is an important factor in communicating, collaborating, and learning from other medical professionals.

Conclusions

This study provides conclusions on the significant impact of participating in an interprofessional clinical simulation scenario on self-efficacy for interprofessional learning in the context of health professional training. Two important dimensions are professional interaction and interprofessional team assessment and feedback. These findings evidence that students who participated in interprofessional clinical simulations showed increased confidence in interprofessional collaboration and their ability to evaluate team performance and receive constructive feedback.

The professional interaction dimension reflects students' ability to communicate and collaborate effectively with professionals from different healthcare disciplines. Our results indicate that the study group participating in the interprofessional clinical simulation showed significantly higher scores in this dimension than the control group. This suggests that interprofessional clinical simulation provides a favorable environment for students to develop interprofessional communication skills, which are essential in today's healthcare environment.

The interprofessional team assessment and feedback dimension refers to students' ability to evaluate team performance objectively and provide valuable feedback to improve collaboration. Our results reveal that the study group scored higher in this dimension after participating in clinical simulation than the control group, suggesting that simulation improves interprofessional interaction and strengthens students' ability to contribute meaningfully to teamwork.

Limitations in our study, such as small sample size, incorporation of only three specific health study programs, and only including last-year students, may limit the extrapolation of results to other

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student populations. On the other hand, lack of long-term follow-up limits the possibility of determining whether the positive effects on self-efficacy are sustainable in clinical practice as students pursue their internships or future employment.

Our study results have significant implications for health professional education. Interprofessional clinical simulation is shown to be a powerful tool for improving self-efficacy in interprofessional learning, which can translate into more collaborative and higher-quality health care. Therefore, future research must explore these relationships in larger populations and conduct follow-ups to better understand the long-term effects.

In summary, the findings of our study highlight the importance of interprofessional simulation in the training of health students, specifically in the disciplines of speech therapy, physical therapist, and occupational therapy. The immediate improvement of the two self-efficacy dimensions, professional interaction and interprofessional team assessment and feedback, confirms the effectiveness of simulation as an educational strategy. These findings enrich the existing literature and offer practical guidelines for designing and implementing interprofessional simulation programs in educational and clinical settings.

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