Simulation Strategies to Teach Patient Transfers: Self-Efficacy by Strategy

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OBJECTIVE. We evaluated the effects of transfer training—after training in the classroom and in the high-technology simulation laboratory (WISER Center)—on students’ perceptions of their self-efficacy for knowledge, skill, and safety in executing dependent transfers.

METHOD. After classroom training, occupational therapy students were randomized to three teaching groups on the basis of the amount of participation and observation opportunities provided at the WISER Center—observation dominant, participation dominant, and participation only.

RESULTS. The participation-dominant group reported an increase in knowledge self-efficacy over time compared with the observation-dominant and participation-only groups. Over time, self-efficacy ratings increased for all students, regardless of group.

CONCLUSION. Simulation scenarios implemented at the WISER Center provided a useful adjunct to classroom training in transfer skills. Both participatory and observational experiences contributed to the development of students’ perceptions of their ability to manage acutely ill and medically complex patients.

A primary goal of occupational therapy education is to teach students to apply knowledge and skills learned in the classroom to actual patient care situations. Opportunities for students to practice problem solving and decision making while developing their manual clinical skills are especially valuable (Nehring, Lashley, & Ellis, 2002; Rothgeb, 2008). Simulation supports this combination of cognitive reasoning and physical motor skill learning by immersing students in situations that mimic clinical reality without placing patients at risk (Issenberg, McGaghie, Petrusa, Lee Gordon, & Scalese, 2005; Resnick & Sanchez, 2009). Simulation has been defined as an interactive method to mirror actual clinical situations with guided experiences (Nishisaki, Keren, & Nadkarni, 2007). It allows for repeated practice, which helps students to develop competence and confidence (Grierson, 2014).

Simulation has many advantages for learning and practicing new clinical tasks. It allows students to be active learners as both participants and observers (Rodgers, 2007). As participants, for example, students can perform a bed-to-wheelchair transfer of a mock patient in a realistic setting. They can then directly and immediately examine the results of their procedures and decisions—important considerations in learning (Bandura, 1997; Lasater, 2007). As observers, students can also learn by observing a peer perform a bed-to-wheelchair transfer with a mock patient in a realistic setting. Observation has been cited as an important and effective learning method, especially with tasks involving motor components (Lasater, 2007), because it provides learners with the chance...
to examine the results of others’ behaviors. In many cases, the outcomes of observation rival the motor learning gained with unguided hands-on practice (Grealish & Ranse, 2009; Vogt & Thomaschke, 2007). The opportunity for learners to self-assess performance over time, coupled with the external feedback provided by simulation’s realistic environment, offers students exposed to simulation a unique opportunity to make changes in their performance (Bandura, 1997; Hatala, Cook, Zendejas, Hamstra, & Brydges, 2014). Thus, simulation affords multiple learning opportunities before patient encounters.

The ability to influence performance on the basis of both internal feedback (e.g., self-assessment) and external feedback (e.g., instructor, environment) is associated with the construct of self-efficacy, namely one’s beliefs about one’s ability to perform a defined task in a specific situation (Bandura, 1997). Self-efficacy, considered the basis for future learning in Cognitive Learning Theory, is a dynamic concept based on three factors: the learner’s self-assessment, the learning environment, and the feedback obtained from participation and observation (Anderson, Aylor, & Leonard, 2008; Bandura, 1997; Docherty, Hoy, Topp, & Trinder, 2005; Mann, 2002). Simulation uses these constructs—self-assessment, the environment, and feedback—to influence learning (Bandura, 1993; Kneebone, Nestel, Vincent, & Darzi, 2007).

This study examined whether the effects of different learning environments (classroom, high-technology laboratory setting) and different simulation-based teaching methods (participation, observation, both participation and observation) influenced students’ self-efficacy ratings of three constructs over time: knowledge, skills, and safety. Because students with higher self-efficacy tend to demonstrate higher level skill attainment, fostering increased self-efficacy in student practitioners should result in stronger procedural skills and clinical reasoning (Bandura, 1986; Kneebone et al., 2007; Schunk, 1989) and improved patient care outcomes (Lorenz, Gregory, & Davis, 2000).

To meet study aims, we selected the task of manually transferring a patient who is lying supine in bed to sitting in a wheelchair. This patient transfer task is common, yet complex, and occurs in both acute and chronic care settings. Students first transferred peers in a classroom laboratory setting after didactic lectures and demonstrations. They were then randomly divided into teaching groups that varied in participation and observation opportunities before completing additional transfers on two separate occasions at the Peter M. Winter Institute for Simulation, Education, and Research (WISER) Center. Students rated their knowledge, skills, and safety self-efficacy after each simulation-based experience.

We hypothesized that (1) students’ knowledge, skills, and safety self-efficacy ratings would differ on the basis of teaching group and (2) students’ knowledge, skills, and safety self-efficacy ratings would change over time. We expected that the self-efficacy ratings of the students in the teaching group with a combination of participation and observation opportunities would increase the most because they would have the advantage of the dual methods of feedback—internal feedback through hands-on participation and external feedback through peer observation. We also expected that all students’ self-efficacy ratings would increase over time because repeated practice and exposure to transfers would provide greater opportunities for self-assessment.

**Method**

**Research Design**

Self-efficacy beliefs after exposures to bed-to-wheelchair transfer scenarios were examined in a randomized clinical trial. Self-efficacy was assessed after each phase of the study (Figure 1): a classroom laboratory simulation experience (Time 1), a first acute care simulated experience (Time 2), and a second acute care simulated experience (Time 3). Each of these experiences (Times 1, 2, and 3) occurred approximately 2 wk apart, and students’ knowledge, skills, and safety self-efficacy ratings were collected at each time.

**Participants**

Students were enrolled in occupational therapy programs at a research-intensive university. The sample \(N = 108\) consisted primarily of women (86%). Students ranged in age from 21 to 47 yr, with an average age of 25 yr (standard deviation = 5). Two students were unexpectedly unable to participate in the scheduled simulation experiences because of illness and injury unrelated to the simulation experience.

**Procedures**

Phase 1 consisted of traditional learning methods, including classroom didactic presentations followed by peer-practice training in the classroom laboratory. Lectures addressed types of patient transfers; the amount and level of assistance patients may require; body mechanics; information about acute care settings; management of lines, drains, tubes, and respiratory equipment; and assessment of vital signs and recognition of medical instability. Students practiced transfers by repeatedly transferring their peers in the classroom laboratory. They were then tested with peers
simulating health conditions. Students were graded on a 10-point checklist assessing patient safety and body mechanics. Students completed self-efficacy ratings on the basis of internal feedback and then received external feedback through an academic grade, written recommendations, and access to digital recordings of their performance.

Phase 2 occurred at the interprofessional, high-technology, fully accredited (by the Society for Simulation in Healthcare) WISER simulation center. The study environments were single-patient rooms mimicking acute care settings. Environmental props included monitors with programmed vital signs, a full-size simulator (SimMan®; Laerdal Medical Corporation, Wappingers Falls, NY), intravenous and monitoring lines, drains, and tubes. Each patient transfer was embedded in a context-specific scenario involving a unique medical condition.

Students were randomly assigned to one of three teaching groups. Each group was exposed to three simulated acute care scenarios (Baird, Raina, Rogers, O’Donnell, & Holm, 2015). Students in the observation-dominant group participated in one hands-on transfer and observed peers complete transfers during two additional scenarios. Students in the participation-dominant group participated in two hands-on transfers and observed a peer complete one transfer. To foster active observation, students in the observation-dominant and participant-dominant groups rated peer performance in real time using a standardized checklist. Students in the participation-only group participated in three hands-on transfers and performed no observations.

During each scenario, students were exposed to an unexpected critical event that required a response based on clinical judgment, such as an episode of bradycardia or postural hypotension. Transfer scenarios were limited to 10 min. Identical medical theater rooms were monitored and set or reset between students to ensure a consistent environment.

Performance was assessed using an 18-point scenario checklist that rated adherence to safety behaviors, body mechanics during procedures, and responses to unexpected critical events. Before receiving external feedback, students completed Time 2 self-efficacy ratings on the basis of internal feedback from their performance, observation, or both. External written feedback from instructors, using the scenario checklist, was then provided for every transfer performed. Verbal feedback addressing common problems, strengths, and participant questions was provided by the instructors in small-group settings. Interested students could also make an appointment with an instructor to review their own digitally recorded transfers on the Laerdal proprietary software.

In Phase 3, students were randomly assigned to complete two transfers at the WISER Center with two new critical events. The scenario checklist was used to rate the performance assessments. Before receiving external feedback, students completed Time 3 self-efficacy ratings on the basis of internal feedback. External feedback was given as in Phase 2.

**Outcome Measures**

Assessments were specifically designed for this study to measure knowledge, skills, and safety self-efficacy. These
assessments used rating scales based on existing self-efficacy measures that ranged from 1 to 10 (1 = very uncertain and 10 = very certain; Lorig & Holman, 1998). Questions included “How certain are you that you have the knowledge to transfer medically fragile and clinically complex patients?” “How certain are you that you have the skills to transfer medically fragile and clinically complex patients?” and “How certain are you that you can safely transfer medically fragile and clinically complex patients?”

Data Analysis

Data were analyzed using IBM SPSS for Windows (Version 22.0., IBM Corp., Armonk, NY), with the significance level set to .05. Separate two-way repeated-measures analyses of variance (ANOVs) were conducted using a 3 (group) × 3 (time) model to compare self-efficacy ratings for each of the three self-efficacy constructs. For each model, the Group × Time interactions and main effects of group and time were examined. One-way ANOVAs were conducted to examine each group over the three time points or to examine each time point for the three groups. Dunnett’s t tests were used post hoc to examine pairwise differences in self-efficacy.

Results

Description of Data

With the exception of safety self-efficacy at Time 1, all self-efficacy ratings spanned the full range of ratings from 1 to 10. Safety self-efficacy scores had the lowest ratings across time, and knowledge self-efficacy scores had the highest ratings across time (Table 1).

Knowledge Self-Efficacy

The two-way repeated-measures ANOVA (Table 2) indicated that there was a significant Group × Time interaction for knowledge self-efficacy. Because of the significant result, post hoc tests were completed to determine the effect that teaching group had on knowledge self-efficacy. Three one-way repeated-measures ANOVAs for each teaching group over time indicated that the participation-dominant group had significant changes in knowledge self-efficacy over time, $F(2, 110) = 5.95, p = .004$. Dunnett’s t test was used to examine pairwise differences among the three time points. Students in the participation-dominant group rated knowledge self-efficacy significantly higher at Time 3 (Time 1 vs. Time 3, $p = .004$; Time 2 vs. Time 3, $p = .008$; Figure 2).

Skills Self-Efficacy

The two-way repeated-measures analysis of skills self-efficacy revealed a significant main effect for time (see Table 2). Three one-way ANOVAs for each time identified a significant improvement in skills self-efficacy (see Figure 2) from Time 1 to Time 3 ($p = .005$) and from Time 2 to Time 3 ($p = .033$).

Safety Self-Efficacy

The two-way repeated-measures ANOVA of safety self-efficacy identified a main effect for time (see Table 2), but subsequent testing using one-way ANOVAs at each time did not reveal significance (see Figure 2).

Discussion

Self-Efficacy by Teaching Group

Cognitive Learning Theory proposes that vicarious experiences (observation) and enactive experiences (participation) contribute to learning (Anderson et al., 2008). The self-efficacy ratings in this study supported this theory. Learning occurs with observation as students attend to the consequences of intended actions. Learning occurs with participation as students retain actions
that are successful and alter or abandon actions that lead to failure (Bandura, 1997).

We hypothesized that self-efficacy ratings for students in the teaching group with a combination of participation and observation would increase the most. An analysis of self-efficacy by teaching group indicated that students assigned to the participation-dominant group rated their knowledge self-efficacy significantly higher than did students in the other groups. However, skills and safety self-efficacy ratings did not significantly differ by teaching group.

One explanation for the higher knowledge self-efficacy in the participation-dominant group may be that this group had the most effective combination of participation and observation. The observation-dominant group had less opportunity for enactive involvement (participation), and the participation-only group lacked any opportunity to observe peers. Learning actively by participation and vicariously through observation is a distinct advantage of simulation and is supported by our data. It appears that this 2:1 titration of participation and observation had a positive influence on knowledge self-efficacy.

Students may have rated skills and safety self-efficacy constructs similarly across teaching groups because they closely associated these constructs as a direct result of their actions. Although knowledge, skills, and safety were equally important considerations for a successful transfer, the knowledge component was arguably the most difficult to quantify because it is not directly observable. The transfer task required manual skills (hand placement, body mechanics) and safety techniques (ability to manage the equipment), which are easily noted. These tasks and techniques were perhaps most strongly associated with skills and safety self-efficacy rather than knowledge self-efficacy, which students could have differentiated as the purely cognitive, nonobservable component of their actions. Students from all teaching groups may have attributed any observable errors to skills and safety self-efficacy, regardless of participation or observation exposures.

**Self-Efficacy by Time**

Self-efficacy was examined as it changed over time. We hypothesized that students’ self-efficacy ratings would increase over time. No significant differences were found between Time 1 (classroom) and Time 2 (WISE Center) for any self-efficacy construct, which may have happened because students at baseline were not confident of their abilities. Moreover, the initial transfers performed with inanimate simulators in an unfamiliar environment and with multiple distractions, both visual and auditory (monitors, colleague observers) may have resulted in a similar rating. It is likely that this experience was so different from students’ first experience that it was, in effect, interpreted as another initial experience, unrelated to the prior classroom laboratory training. Hence, ratings at Time 2 closely reflected ratings at Time 1.

At Time 3, students returned to the WISE Center to complete a new set of transfer scenarios, which were different but parallel those they had experienced at Time 2. There was a significant increase in knowledge and skills self-efficacy ratings after this training. Although the critical clinical events and medical diagnoses of the scenarios were different, other aspects of the procedures and environment were the same, such as the transfer task, the room setup, the basic equipment used (hospital beds and monitors), and the amount of time allowed to complete the task. Because neither the task nor the environment was new to the students, the level of knowledge and skills self-efficacy

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**Figure 2.** Self-efficacy ratings, by (A) knowledge, (B) skills, and (C) safety teaching group, at Time 1, Time 2, and Time 3.

*Note.* Ratings ranged from 1 (*very uncertain*) to 10 (*very certain*).
reflected the gains associated with previous exposure to the learning tasks (Lorenz et al., 2000). It is interesting that although safety self-efficacy ratings originally appeared significantly different over time ($p = .027$), post hoc one-way ANOVAs for each time point demonstrated no group differences. Thus, the original significance may have been due to the group comparisons within a combination of time points rather than to the comparison of data at discrete time points.

Over time, self-efficacy ratings increased, which may have been the result of the practice opportunities offered to students in the simulation setting. Although transferring a peer in a classroom may approximate a dependent transfer in an acute care environment, transferring a simulator in the simulation center is a more realistic representation of this event and caused a dip in self-confidence in some groups. Students were equally challenged by the change in environment and the fidelity of the task. Repeated practice in the simulation center resulted in an overall increase in self-efficacy for all constructs in comparison with initial ratings.

**Study Limitations**

Students comprised a convenience sample although they were randomized to teaching groups. Because this study was part of an existing academic curriculum, it was not possible to include a teaching group that had only observation experiences before the final performance assessment, which may limit the conclusions drawn about the effects of participation and observation.

**Additional Study**

To provide information about the long-term utility of simulation within a curriculum, further study is needed to determine whether this type of intervention can have a positive impact on the fieldwork assessments of students exposed to simulation training. Because the consequences of the learner’s action were immediately observable and provided valuable information to the learner and the instructor, development of additional scenarios that focus on safety, clinical reasoning, and other common medical conditions should be explored. Future study is needed to explore how this information could be used to plan curricula for the best learning outcomes. Simulation can be an additional expense and takes time away from lecture and traditional laboratory experiences, so it is important to determine the long-term utility of simulation in comparison with traditional methods for transfer training. Finally, the influence of learning through simulation needs to be explored for its potential to improve patient outcomes.

**Implications for Occupational Therapy Education**

Manually moving, handling, and transferring patients are complex clinical skills that can result in injury to the patient or occupational therapy practitioner when they are done incorrectly. Teaching these skills is particularly challenging when patients have complex medical conditions and students need to manage changing physiological conditions and medical equipment.

- Simulation that includes a fully equipped patient room, a full-size simulator (SimMan), and case scenarios provides a realistic environment for transfer training that facilitates practicing clinical skills while simultaneously being risk free for patients.
- Simulation can be an expensive addition to a curriculum in both time and money. Data from our pilot study suggest that students benefit from active observation as well as participation. Thus, exposing students to simulation in groups can limit costs without loss of the learning advantages of simulation.
- Self-efficacy ratings are a viable method for assessing a student’s confidence in managing clinical situations that involve the integrated use of physical (hands-on) and mental (decision-making) skills under real-life stress.

**Conclusion**

Evaluation of students’ self-efficacy for performing hands-on skills and making clinical decisions can indicate whether the time allocated for practicing physical and mental skills is adequate for building student self-confidence. Moreover, self-efficacy evaluations can provide educators with feedback about the effectiveness of their teaching methods.

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**References**


