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Abstract
The goal of this mixed methods pilot study was to determine the effectiveness of a hybrid pedagogy to develop safe patient handling knowledge, self-efficacy, and skills in occupational therapy students. Developing safety judgment is integral to occupational therapy education programs, which requires the deepening of knowledge associations. As evidence suggests, patient handling is taught in academic programs with traditional pedagogy. Safe patient handling requires teaching the breadth of the most relevant and contemporary theory and techniques. A growing body of evidence demonstrates the effectiveness of online education. The project author developed an evidence-based hybrid pedagogical approach that included four narrated online modules with video, photos, and asynchronous threaded discussions and a fifth hands-on lab and a case-based competency assessment module. Sixteen occupational therapy students participated in the study. Paired *t*-test results validated the effectiveness of the hybrid model with statistically significant pre- to post-test improvements in knowledge and self-efficacy. Content analysis of asynchronous threaded discussions and open-ended pre- and post-test responses provided evidence of improved knowledge and self-efficacy. Synthesis of the quantitative and qualitative data provided evidence to suggest improvements in judgment. The case-based competency assessment results demonstrated 75% of the students achieved the level of accomplished performance on their first attempt. Results indicated the desire for additional hands-on practice with instructor feedback to promote further skill development. Students learned safe patient handling when curriculum reflected the complexities of patient handling with adequate opportunities for problem-solving and hands-on experiences coupled with instructor feedback.

Keywords
Occupational therapy education, online education, transfers, mixed methods

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Hybrid Learning to Develop Safe Patient Handling Judgment in Occupational Therapy Students

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ABSTRACT

The goal of this mixed methods pilot study was to determine the effectiveness of a hybrid pedagogy to develop safe patient handling knowledge, self-efficacy, and skills in occupational therapy students. Developing safety judgment is integral to occupational therapy education programs, which requires the deepening of knowledge associations. As evidence suggests, patient handling is taught in academic programs with traditional pedagogy. Safe patient handling requires teaching the breadth of the most relevant and contemporary theory and techniques. A growing body of evidence demonstrates the effectiveness of online education. The project author developed an evidence-based hybrid pedagogical approach that included four narrated online modules with video, photos, and asynchronous threaded discussions and a fifth hands-on lab and a case-based competency assessment module. Sixteen occupational therapy students participated in the study. Paired *t*-test results validated the effectiveness of the hybrid model with statistically significant pre- to post-test improvements in knowledge and self-efficacy. Content analysis of asynchronous threaded discussions and open-ended pre- and post-test responses provided evidence of improved knowledge and self-efficacy. Synthesis of the quantitative and qualitative data provided evidence to suggest improvements in judgment. The case-based competency assessment results demonstrated 75% of the students achieved the level of accomplished performance on their first attempt. Results indicated the desire for additional hands-on practice with instructor feedback to promote further skill development. Students learned safe patient handling when curriculum reflected the complexities of patient handling with adequate opportunities for problem-solving and hands-on experiences coupled with instructor feedback.

INTRODUCTION

Occupational therapy students learn traditional patient handling skills such as transfers through typical pedagogical approaches in the classroom and lab during their academic program. In doing so, there may be unintended limitations to the content by the knowledge and expertise of the instructor, the course frequency and duration, competing topics within the course, and the course design. In the first author's experience of teaching occupational therapy assistant students, adherence to policy and procedure was easier for them to understand than demonstrating safety judgment. Upon recognizing this, two questions about teaching safe patient handling skills emerged: 1) What is the breadth of knowledge students need to acquire to develop the self-efficacy and skills for sound judgment; and 2) What is the most effective and efficient pedagogical experience to engage students and promote skill carryover? The literature revealed an extensive amount of evidence regarding hazards related to patient handling (Gagnon, Sicard, & Sirois, 1986; Galinsky, Hudock, & Streit, 2010; Garg & Owen, 1992; Garg, Owen, Beller, & Banaag, 1991a, 1991b; Hignett & Griffiths, 2009; Marras, Davis, Kirking, & Bertsche, 1999; Owen & Garg, 1991; Waters, Putz-Anderson, Garg, & Fine, 1993; Zelenka, Floren, & Jorden, 1996; Zhuang, Strobbe, Hsiao, Collins, & Hobbs, 1999), as well as recommendations to reduce the risk of injury (Centers for Disease Control [CDC], 2015; Collins, Wolf, & Evanoff, 2004; Darragh et al., 2013; Darragh, Shiyko, Margulis, & Campo, 2014; Galinsky et al., 2010; Hignett & Griffiths, 2009; Mu et al., 2011; Scheirton, Mu, & Lohman, 2003; Slusser, Rice, & Kopp-Miller 2012; Yassi et al., 2001). However, less is known about the best way to teach safe patient handling. Students need to discover all of the essential information, and integrate it to make associations, before attempting to apply that knowledge. A hybrid of online and hands-on learning may be one way to address this need as it allows for continued access to content to provide repeated self-paced exposure and may be well suited to help students to develop safety judgment during patient handling.

LITERATURE REVIEW

Performing physical transfers by lifting or assisting another person from one surface to another is a complex task that is fraught with many hazards to both the caregiver and the patient. The National Institute for Occupational Safety and Health Revised Lifting Equation (NIOSH; Waters et al., 1993) omitted patient handling and instead focused on the human interaction with objects due to the reduced number of variables. Humans are awkward to grasp and move, and they can suddenly lose their balance, become weak, or change their mind during a transfer. The potential for the caregiver to lose their grasp, lose their balance, become weak, or change their mind during a transfer that is not going well is also a possibility. Any combination of these circumstances can cause an unexpected adverse outcome or a practice error to occur. Mu, Lohman, and Scheirton (2005) defined a practice error as a mistake that occurs during practice, and further indicated that some of the more severe practice errors are the result of a patient "falling during a transfer and being injured" (p. 13). In a national survey, Mu, Lohman, and Scheirton (2006) found that 88.6% of occupational therapy practice errors occurred during the intervention phase primarily due to "*misjudgment*, overload, or time restraint, inexperience or [lack of] knowledge, insufficient communication and patient-related" (p. 290) causes, respectively. In a survey by Scheirton et al. (2003), participating

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therapists reported that errors were due to a “lack of attention to the patient responses, incorrect judgment, not listening to patients, hesitancy to question orders, and being too rushed” (p. 312). According to the Bureau of Labor Statistics (BLS, 2010), 99% of the musculoskeletal injuries related to patient handling were the result of overexertion, which is a corollary of misjudgment. Data from the BLS (2014) demonstrated overexertion injuries to workers averaged across all industries was 33 per 10,000, with hospital workers at 68 per 10,000, and nursing home workers at 174 per 10,000 full-time workers. Evidence also suggests that regardless of the number of patient handlers, transfers are hazardous and exceed the safety limits for back compression forces (Gagnon et al., 1986; Garg & Owen, 1992; Garg et al., 1991a, 1991b; Marras et al., 1999; Owen & Garg, 1991; Waters et al., 1993; Zelenka et al., 1996; Zhuang et al., 1999).

The majority of evidence suggests that occupational therapy education programs teach traditional manual patient handling methods rather than safe patient handling methods. Using survey research methods, Frost and Barkley (2012) and Slusser et al. (2012) discovered evidence of traditional manual patient handling approaches being used in occupational therapy and occupational therapy assistant academic programs. These approaches included lecture and lab instruction regarding the use of gait belts, floor sling lifts, transfer boards, and teaching body mechanics and positioning. Frost and Barkley (2012) and Slusser et al. (2012) found that curricular content demonstrated a bias toward "traditional content at the expense of the evidence-based content" (p. 390). Frost and Barkley (2012) found that 100% (*n* = 110) of respondents used manual transfers and 99% (*n* = 109) used sliding boards as the most frequent method for student evaluation. By contrast, this same author found that 99% (*n* = 109) of survey respondents believed safe patient handling was taught in “nearly all of the occupational therapy and occupational therapy assistant educational programs” (p. 388). In a similar survey study, Slusser et al. (2012) found that 96% of the total respondents (*n* = 111) indicated their students learned how to use safe patient handling equipment in the lab, however, 57% (*n* = 63) of the respondents indicated they did not include content regarding bariatric patient handling in their curriculum. A simple majority, 55% (*n* = 61) indicated their students learned how to use safe patient handling equipment during fieldwork. Slusser et al. (2012) also found that 53% (*n* = 59) of the respondents did not know if their state had safe patient handling legislation and a Chi-Square analysis demonstrated this knowledge influenced instructional content. A low number of respondents (15%; *n* = 17) indicated their content included NIOSH Patient Handling Algorithms (CDC, 2015), which is a guide for safe patient handling that can support the development of safety judgment to prevent practice errors. Frost and Barkley (2012) sought to “determine what educators teach and the behavioral constructs that best predict intention to change curriculum content” (p. 463) regarding safe patient handling methods. They found that educators may not be aware that traditional patient handling methods are unsafe or may not have access to needed technology or both to help them understand safe patient handling methods. They identified that previously held instructor beliefs and attitudes were the best predictors of the patient handling methods taught. Frost and Barkley (2012) identified the intention to teach safe patient handling

was predicted by external factors that guide practice such as evidence on the safest methods.

Safe patient handling methods include a wide array of lift equipment, guidelines and methods, assessment skills, communication methods, and competency training that goes well beyond that of traditional methods. Today, there is a variety of lift equipment available for the unique needs of the caregiver and the patient. According to Yassi et al. (2001), to promote safe patient handling it is necessary to ensure appropriate equipment is available to address patient changing acuity levels. The NIOSH Patient Handling Algorithms (CDC, 2015) provide algorithms to guide decision-making regarding the use of transfer methods, lifting guidelines, lifting equipment, and bariatric transfers. Slusser et al. (2012) identified the need for students to learn bariatric transfers to prepare them to work with an increasing population that requires unique skills and equipment. The lifting and moving of bariatric patients requires extended amounts of time that increase the risk of injury to caregivers, and as a result, also require specialized equipment and techniques to ensure safety (Galinsky et al. 2010; Hignett & Griffiths, 2009). Darragh et al. (2013) found that safe patient handling equipment increased treatment options for therapists and participation of patients. The study highlighted the multiple factors to consider when selecting equipment to use in a rehabilitation setting such as the physical status, medical treatments, patient behaviors, and the activity for which the patient will engage. Darragh et al. (2014) found the application of safe patient handling lift equipment neither improved nor impeded patient outcomes. Regardless of the type of patient, effective communication skills are required to understand the patient motivation (Scheirton et al., 2003). Effective communication is an essential component of patient assessment skills and necessary for the development of sound clinical reasoning skills that are evidence-based and include patient preferences (Scheirton et al., 2003). Safe patient handling includes teaching effective self-advocacy and time management skills to work efficiently in dynamic and fast-paced healthcare environments (Mu et al., 2011) as a means to protect themselves and their patients. Finally, students should learn the benefit of demonstrating competency to ensure they understand the rationale for lift equipment, and the use of low-lift or no-lift guidelines (CDC, 2015; Collins et al., 2004; Mu et al., 2011; Yassi et al. 2001).

Online learning is increasingly popular in academic and healthcare settings to deliver new knowledge, promote continuing education, and demonstrate competency. Since the 1990s, online learning has shown real application as an instructional tool for the delivery of new knowledge like that of other instructional approaches (Cook et al., 2008; Gagnon, Gagnon, Desmartis, & Njoya, 2013). In particular, online learning combined with hands-on learning shows potential for teaching patient handling. Physical therapy students developed problem-solving skills regarding safe patient handling through a hybrid learning experience that included video scenarios and engaging face-to-face experiences, which prepared them for the clinic environment (Johnston, Nitz, Isles, Chipchase, & Gustafsson, 2013). Hayden (2013) demonstrated the potential to improve cognitive knowledge and psychomotor skills with online media, but students continued to need a hands-on lab to obtain instructor feedback regarding safe patient handling. An additional pedagogical approach to teaching patient handling may be the use of case

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studies. Scheirton et al. (2003) and Mu et al. (2006) advocated for the use of case studies in the classroom to simulate many common practice errors to increase judgment and prevent adverse outcomes. The case study method facilitates collaborative classroom learning through the application of concepts and principles to develop clinical reasoning and judgment used during fieldwork and in practice. Case studies can also facilitate student discussions regarding their beliefs concerning the use of lift equipment during practice and their effects on outcomes.

Mu et al. (2006) stated that fieldwork educators also have a role in the education of students during fieldwork to identify existing hazards proactively, so they are better prepared to make adjustments for situational dynamics. While students are on fieldwork, they participate in a separate and distinct phase of their education where they are to demonstrate success in the fundamentals of practice. Fieldwork provides an opportunity to apply learned theory and the techniques acquired in the classroom (American Occupational Therapy Association [AOTA], 2012). According to the Fieldwork Performance Evaluation for the Occupational Therapy Student (AOTA, 2002), Section One specifies the Fundamentals of Practice which includes "adheres to ethics," "adheres to safety regulations," and "uses judgment in safety." This section is critical and students must meet standards on the final evaluation to pass the fieldwork experience (AOTA, 2002). It is essential that students learn the most relevant and contemporary theory and techniques regarding patient handling before their fieldwork experience. Students face unique hazards in environments with various types of equipment and different policies/practices and they need the skills to respond to rapidly changing situational dynamics. Consequently, the hypothesis of this mixed methods pilot research study asked if a hybrid pedagogy could effectively teach the knowledge, self-efficacy, and skills needed to develop safety judgment regarding safe patient handling in occupational therapy students.

METHODS

Design

This study was a mixed method pilot study that used a pre- and post-test design to explain the relationship between students participating in a hybrid pedagogy to develop knowledge, self-efficacy, and the carryover of skills. The first four weekly online modules provided self-paced content delivered by narrated PowerPoint presentations. After each of the four modules, students were to participate in an online asynchronous threaded discussion that assessed knowledge development. The fifth module included a two-hour hands-on lab and two days later a case-based competency assessment (see Table 1).

Participants

All sixteen occupational therapy students enrolled in the fall Occupational Analysis and Adaptation course during their third semester of their entry-level master's program volunteered to participate and comprised the convenience sample. All students were given the option to receive the usual course content with no penalty if they chose not to participate. The usual course content consisted of a selected reading from the assigned

textbook, a practice lab, and a pass/fail competency assessment. No student chose to receive the usual course content, and no one declined to participate or withdrew during the study.

Procedures

Before the start of the first module, all students completed the pre-test (see Appendix A: Patient Handling Pre and Post-Test). After completion of the competency assessment, all students completed the post-test. Integration of the project content occurred seamlessly at the beginning of the semester and according to the schedule set by the course instructor, so this would not disrupt the natural progression of the course. All enrolled students had access to the online content via a streaming video link located in the electronic learning management system used by the participating university. Completion of the content in the modules occurred outside of the scheduled class period at the student's pace. All students received the email address of the lead author and the syllabus which provided the course instructor contact information so they could ask questions as needed. Students were able to communicate with one another within the electronic learning management system and were able to read peer responses to the threaded discussions.

Instruments

For this pilot project, the lead author developed a twenty question pre- and post-test traditional assessment instrument (see Appendix A: Patient Handling Pre- and Post-Test), and a summative performance-based competency assessment rubric (see Appendix B: Patient Handling Performance Task Rubric) as suitable instruments did not exist. A pilot of the self-developed instruments for this project did not occur; however, both were peer-reviewed. The pre- and post-test instrument presented students with twenty questions to assess knowledge, self-efficacy, and demographic questions. The first five questions were multiple choice to assess knowledge and self-efficacy (quantitative), the next five were Likert scale to assess knowledge and self-efficacy (quantitative), the next set of five questions were open-ended to assess knowledge development (qualitative), and the last five questions were demographic to determine the homogeneity and transferability of the sample results. The competency rubric assessed skill carryover with a one to four rating scale similar to that of the AOTA Fieldwork Performance Evaluation for the Occupational Therapy Student (AOTA, 2002). The rubric components included prepare the environment, prepare the patient, perform the transfer, and restore the environment.

Curricular Content

The online module content met the student learning outcomes identified in the course syllabus that stated learners would "understand and use sound judgment concerning the safety of self and others throughout the occupational therapy process while demonstrating the principles of body mechanics, body positioning, transfer techniques, and the use of alternative lifting techniques and equipment" (Institution Blinded, 2015). Before the start of the pilot project, the lead author developed and organized all content into modules to address all required topic areas. As the project unfolded, the narration of modules occurred to build on student learning experienced and demonstrated in the

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threaded discussions. Each presentation provided a brief review of the previous module providing an opportunity to highlight and clarify points noted in their discussion responses. The modules provided ongoing learning opportunities to engage in videos and sequenced photos to develop critical and practical thinking skills. Threaded discussions coupled with ongoing and targeted feedback from the author supported learning. Monitoring threaded discussions while in progress offered a reflexive opportunity to make necessary adjustments in the next module and analyze categories of responses.

The first module provided an overview of the project and a recommendation to download and review the Patient Handling Performance Task Rubric (see Appendix B) before proceeding with the presentation. It was essential that the students understood the end goal of the project and to set learning expectations. This module also included relevant data and contextual information designed to improve their understanding the patient handling issues. The traditional patient-handling module provided information related to typically content taught in academic programs and the importance of proper body mechanics that included photos of force, weight, gravity, and balance principles, sequential transfer steps, and a video demonstrating a minimal assistance one-person transfer. The safe patient handling modules included information regarding special transfer considerations and lifting equipment, which included photos of various lifts, and video links to access online technical and instructional content produced by the Invacare ® Company. Due to the volume of content regarding safe patient handling, it comprised the third and fourth modules in the series. Each of the four online modules required 60 to 90 minutes to review and interact with the content, explore the links to learning, and respond to the asynchronous threaded discussions.

The lead author and course instructor conducted the practice lab, which occurred during the fifth module. The lab environment provided a variety of seating surfaces such as a standard bed, hospital bed, therapy mat, wheelchairs, and standard chairs with arms. Items available to the students included slide boards, gait belts, a hydraulic lift with a full body sling, and an Invacare Reliant 350 Stand-Up ® lift. This two-hour lab provided opportunities for students to pose questions to clarify what they had learned from the online content and practice a variety of transfer techniques. During this experience, students performed transfers and received targeted performance feedback to improve their skill. Two days later, the students completed the case-based competency assessment with the lead author and the course instructor.

Upon arrival, the students self-paired into teams of two. To improve interrater reliability, the assessors jointly reviewed the performance expectations outlined in the rubric. The lead author assessed one team at a time using the Patient Handling Performance Task Rubric, as did the course instructor until all teams had completed the assessment. Each student team upon entering the lab had the same opportunity to select at random from one of three scenarios which included conditions of an older adult with mild cognitive impairment, or total hip arthroplasty, or a cerebrovascular accident. The student/therapist randomly drew one condition card and shared the information with the student/patient. The student/patient drew a realistic, yet challenging patient behavior

card designed to challenge the critical thinking and communication skills of the student/therapist as they appraised the transfer dynamics and selected an appropriate method of transfer. After each competency assessment, the student therapist received performance feedback from their assessor, using the Patient Handling Performance Task Rubric. After completion of each assessment, the students reset the environment. Immediately following the completion of the competency assessment, students completed the post-test to assess the development of knowledge and self-efficacy.

Table 1

Weekly Module Course Content and Sequence

Module/Week 1: Causes of Injuries • **Online Content:** The prevalence of work-related injuries for therapists; the distribution of risk and age-related factors; solutions to prevent musculoskeletal injuries require comprehensive approaches; and the common reasons for client injuries according to therapists, and their effect on practitioners.
Module/Week 2: Traditional Manual Patient Handling • **Online Content:** The prevalence of traditional manual patient handling content taught in occupational therapy and occupational therapy assistant curricula. Students learned instructor beliefs and attitudes regarding patient handling might support curriculum content regarding the proper use of gait belts, manual transfers, and a focus on body mechanics. They learned body mechanics training is a necessary component of a comprehensive safe patient-handling program, as body mechanics are required when moving patient lift equipment. They also learned body mechanics have limits due to unsafe low back loading forces.
Module/Week 3: Safe Patient Handling – Assessment and Communication • **Online Content:** Assessment and communication skills to prepare the environment, prepare the patient, and perform the transfer. Students learned the need to review patient hip and knee precautions, the importance of ongoing assessment, and the need to educate patients and verify their learning.
Modules/Weeks 4: Safe Patient Handling – Methods and Lifts • **Online Content:** Students learned no-lift rationale and guidelines, lift teams and equipment for bariatric needs, moving of patient lifts to prevent injuries, lift selection rationale, and the use of a variety of patient lifts.
Module/Week 5: Practice Lab and Competency Assessment • **Hands-On Lab:** Demonstration of lift techniques discussed the rationale for the selection of lifts and received opportunities for practice and performance feedback. • **Case-Based Competency Assessment**: Students demonstrated the ability to appraise, formulate, and apply safe patient handling for one of three patient transfer scenarios. The student therapist selected at random one of three case-based patient scenarios then shared this information with the student patient. The student patient selected a patient behavior card for the scenario.

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Data Analysis

Quantitative data analysis used a paired samples *t*-test to determine changes in participant knowledge and self-efficacy scores on pre- and post-test multiple choice and Likert scale questions. Safe patient handling performance for the competency assessment utilized a one to four scale, which objectively measured student skill carryover and the demonstration of judgment. Analysis of scores after each assessment identified the level of competency. Student scores of less than three on this instrument reflected the student did not demonstrate competence. The frequency of student pass scores determined the class pass rate.

Qualitative data analysis of the asynchronous threaded discussions and the pre- and post-test responses used content analysis with prior research to quantify the frequency of words related to knowledge as a means of understanding their contextual use (Hsiu-Fang & Shannon, 2005). The first and second authors participated in the analysis of the student responses. The lead author monitored the threaded discussions of each module in real time to capture student responses without coding to increase trustworthiness. The first author identified categories associated with safe patient handling and provided those to the second author who coded and analyzed the responses. The authors individually quantified the number of times keywords appeared in student responses and performed latent content analysis that included interpretation of the underlying meaning (Holsti, 1969) related to the categories. Tabulation of the keyword frequency count occurred by hand and included the student sources of the responses. The count of keywords identified categories within the data associated with the context of the question posed in the pre- or post-test and the threaded discussion responses. A comparison of frequency tabulation and analysis of the underlying meaning of responses validated the categories.

Ethics

The Chatham University Human Subjects Institutional Review Board of the lead author's post-professional doctoral program approved this study, and all participants received and signed an approved informed consent.

RESULTS

Participant Characteristics

All participating students were female between 18 and 25 years of age. Nine of the sixteen student participants (56%) had limited volunteer or work-related healthcare experience that ranged from less than one year up to three years. Examples of volunteer and work experiences included job shadowing, assisting in medical records, work as a pharmacy technician, work in an adult foster care home, and work as a home health aide. Of the nine students, only one had any work experience with patient handling and the title "Patient Safety Assistant." Overall, the sample population was a homogenous group with limited patient handling experience, which may improve the transferability of the results.

Quantitative Results

Two quantitative sections of the pre- and post-test with a paired *t*-test determined a change in knowledge and self-efficacy with an alpha level of (p = .05) set for all statistical tests. Question responses, and cross-sectional analysis of the pre- and post-tests provided insights regarding content relationships. The competency assessment during the fifth week demonstrated skill carryover from online and lab components of the course.

The pre- and post-test student response rate was 100% (n = 16). The quantitative pre- and post-test results from the five multiple-choice questions (see Table 2) and five Likert scales (see Table 3) are in numerical order. Section one of the pre- and post-test contained five multiple-choice questions regarding knowledge. Two of the five (40%) multiple-choice questions in this section reached a statistical significance (p = .05) as seen in Table 2. There is evidence to suggest that question two had a significant positive change indicating students learned practice errors were primarily the result of misjudgment (p = .028). Question two pre-test results had five correct responses in contrast to eleven for the post-test. There is evidence to suggest significant positive change occurred with question four indicating students had improved knowledge regarding the use of a one-person transfer with a sit to stand lift for the physical transfer of an older adult patient with cognitive and mobility impairments that required moderate assistance for transfers (p = .028). Question four pre-test results had three correct responses in contrast to nine for the post-test.

Table 2

Multiple Choice Pre- and Post-Test Knowledge and Self-Efficacy Questions and Results

Questions	**Mean**				
	Pre	Post	t	df	*p*
1. According to the Bureau of Labor Statistics (2010), what percentage of musculoskeletal disorder cases that involve patient handling are the result of overexertion?	0	.06	-241	15	.33
2. According to therapists, what is the number one reason for practice errors to occur?	.31	.69	-99.33	15	.03*
3. Who has a higher prevalence of injury rates (therapists ≥ 55 years old or therapists ≤ 55 years old)?	.69	.81	-97.71	15	.43
4. What would you recommend for transferring an older adult rehab patient who has cognitive and mobility impairments, and requires moderate assistance for transfers?	.19	.56	-99.33	15	.03*
5. At a minimum, how would you improve the safety of *all* patient handling situations to prevent injury to self?	.88	1	-177.12	15	.16

*Statistical significance (p = .05)

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Of the five Likert scale questions regarding student knowledge and self-efficacy, two of the five (40%) reached statistical significance (p = .05) as seen in Table 3. Section two of the pre- and post-test contained five Likert scale questions to assess knowledge. A lower score represented an improvement on this Likert scale. There is evidence to suggest question eight demonstrated a significant positive change regarding increased student self-efficacy to build upon traditional patient handling methods to improve safety (p = .005). There is evidence to suggest question nine demonstrated a significant positive change regarding student ability to correctly justify the use of a specific type of equipment to transfer a patient and protect them and self from injury (p = .001). Questions eight and nine had the most robust statistical significance out of all questions presented on the pre-, post-test, and evidenced improved student knowledge to build on traditional methods to improve safety and the knowledge and self-efficacy to justify the use of specific lift equipment for a specialized transfer.

Table 3

Likert Scale Pre- and Post-Test Knowledge and Self-Efficacy Questions and Results

Questions	**Mean**				
	Pre	Post	t	df	*p*
6: Do you agree or disagree with the fact that inexperience contributes to practice errors?	1.63	1.44	.68	15	.51
7: Do you agree or disagree there is a positive correlation between the willingness of a therapist to report a practice error and organizations desire to discover the cause rather than blame?	2.50	1.88	1.99	15	.07
8: I have the knowledge to build upon traditional patient handling approaches and improve the safety of my patient and myself.	2.88	1.81	3.30	15	.01*
9: I can justify when to use a specific type of equipment to transfer a resident to protect my patient and myself.	4.19	2.50	9.59	15	.00*
10: This course helped me be able to formulate strategies to prevent work-related injuries to protect self.	1.81	2.31	-1.23	15	.24

*Statistical significance (p = .05)

All students (n = 16) completed module five, which included the practice lab and competency assessment. The initial competency pass rate was 75% (n = 12) of the students demonstrated accomplished performance according to the AOTA Fieldwork Performance Evaluation for the Occupational Therapy Student (AOTA, 2002). Of those students, four of the sixteen (25%) received an initial score of two (developing performance). With targeted feedback and an opportunity to repeat the competency assessment, two of the four (50%) advanced to a score of three (accomplished performance), which is the minimum score needed to pass fieldwork. After the two students earned a three the overall pass rate increased to (88%). The remaining two

students who did not pass received additional targeted feedback and an opportunity to demonstrate competency outside the scope of this project. The competency assessment during the fifth and last week of the hybrid intervention demonstrated clinical significance regarding the carryover of knowledge and the development of self-efficacy.

Qualitative Results

In the first threaded discussion, students learned that all therapists are at risk of musculoskeletal injuries, and they learned about injury prevalence and the reasons for practice errors. In response, they explored their values and beliefs as to the causes of injuries and practice errors for younger therapists (see Table 4). As a result, the students made some critical and insightful discoveries. The most frequent category focused on general misjudgment and included “experienced therapists have better clinical judgment and are more aware of their abilities, and limits with clients.” The next most common student responses included variations of “younger practitioners perhaps overestimate their physical capacity or underestimate the demands of the move/transfer.” The third most frequent category expressed their attitudes toward risk, which was reflected by “being a new therapist makes us want to be very independent, and with this new independence and high self-esteem we may overestimate what we think we can accomplish on our own.” When students responded about asking for help the responses were characterized by “younger therapists may also be hesitant for asking for help or may misjudge when help is needed . . . this can cause the younger therapist to take on too much and become injured.” Students revealed a cyclical pattern that placed them at risk of injury. They knew misjudgment of their physical abilities due to their inexperience could put them at risk, yet they did not want to ask for assistance to perform a transfer because they want to be independent.

In the next module, students learned about the components of body mechanics, their benefits, and limitations, and the importance of setting up the environment to perform a transfer in the threaded discussion. Common responses included “body mechanics are very important to prevent injury,” the “need to bend our knees” and “our arms,” and to “look over the top of the patient’s head” during the start of a transfer as a means of improving the line of balance. All identified key aspects of good body mechanics such as “keeping your center of gravity over your base of support to maintain your line of balance to reduce low back loading.” A majority of students identified the need to "set up the environment" as a means to prevent injury. They also began to recognize the need to ensure the patient had good body mechanics and to obtain help from others like “the nurse aide” or the use of a lift to decrease the risk of injury. One student stated that she was “extremely surprise[d] with the weight that your lower back takes on trying to lift someone," which was a notable recognition of lifting hazards and the importance of sound judgment.

The next two threaded discussions focused on the concepts of safe patient handling where students began to identify the importance of practical assessment and communication. While preparing to transfer a patient with a mild cognitive impairment after total hip arthroplasty with a posterior surgical approach the overwhelming

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responses included the need to “go over the major precautions.” All students cited the need to educate and “explain” with “simple verbiage” and “pictures” or “physically demonstrate” the transfer. More than a simple majority identified the need to assess the patient for pain as a means to determine readiness to participate and continue with the transfer. More than half also identified the need to ensure “the wheelchair was close” as examples of preparing the environment. Only two students identified the Teach Back (Boushon et al., 2012) method by name, but some did believe it is important for the patient “to say them [instructions] back.” Students comprehended the importance of assessing the patient and communicating with a variety of methods to promote collaboration during the transfer.

The final module on safe patient handling used the same case study as the previous discussion, but asked students to solve the situation with new learning regarding the selection and use of patient lifts. Most students identified an appropriate lift and rationale for its use and correctly identified the use of the Invacare Reliant 350 Stand-Up® lift for the situation presented in the discussion. Students recognized the lift would facilitate safe standing and maintenance of the weight bearing limitation and reduce the complexity of transfer for a cognitively impaired adult. The students repeatedly cited the patient's need to adhere to hip precautions and his "mild cognitive impairment" as a rationale to use the lift to maintain his positioning and safety. Students demonstrated as they acquired new learning it deepened their understanding of safe patient handling options.

Table 4

Qualitative Threaded Discussion Responses for Modules 1 to 4

Student Response Categories	**Number**	**Percentage**
Module 1: Student (*n*=15) beliefs for causes of injuries to younger therapists		
Inexperience and misjudgment	13	87%
Overestimate physical ability	7	47%
Attitude toward risk	6	40%
Not asking for help	4	27%
Protecting the patient	2	13%
Poor time management skills	2	13%
Communication and patient-related	1	6%
Module 2: Student (*n*=14) identified components of traditional manual patient handling		
Body mechanics are important to prevent injuries	14	88%
Prepare the environment, the person, and perform the transfer	11	73%
Assess, educate, and train the patient	8	53%
Identify the level of assistance needed and ask for help	6	40%
Identify the level of assistance needed and use a patient lift	6	40%

Module 3: Students (*n*=13) who identified assessment and communication methods as components of safe patient handling		
Review precautions with the patient	13	100%
Educate and explain the transfer to the patient	13	100%
Assess for pain	8	62%
Prepare the environment	8	62%
Demonstrate the transfer	7	54%
Teach Back or repeat instructions	5	38%
Module 4: Students (*n*=12) rationale and selection of patient lifts as components of safe patient handling		
The applied correct rationale to select an appropriate lift for a case study	10	77%

Note. Percentages were the result of the total number of participants of the discussion as compared to the number of correct student responses.

The series of pre- and post-test qualitative questions asked about gait belt use, seeking assistance from others, methods of teaching safe patient handling, methods to prevent practice errors, and the best methods to demonstrate competency respectively (see Table 5). When asked about the use and application of a gait belt, only a few of the student responses were correct on the pre-test and of those that were, they had limited responses. Student responses ranged from, "I do not know how to do this yet" or "no prior training – don't know" or "wouldn't attempt alone to protect client's safety" to "make sure the gait belt is tight and secure around the client's waist . . . count to three and [use] communication efficiently . . . use the belt to help support." The responses on post-test demonstrated improved gait belt placement and fit and use of two hands to guide the patient to their feet by pulling forward rather than lifting to ensure the patient performs most of the effort. No one student response identified all three strategies of placement, fit, and a two-hand pull to stand as a method to shift more of the workload to the patient.

On post-test, when asked about seeking more assistance, students recognized the importance of avoiding practice errors or repeated errors. Common responses clustered around being “afraid to have an accident again” as the primary means of avoiding future errors. Few students articulated higher-level cognitive considerations of wanting to learn through mechanisms of feedback or seeking advice from others to prevent injury such as “to receive feedback from other therapists who may have more experience," and to also “have another individual there for safety” to verify the correct method.

The post-test results indicated an increase for hands-on training with scenarios and targeted instructor feedback to help contextualize the learning of patient handling. When asked about solutions to teaching safe patient handling, responses overwhelmingly included, "hands-on training in a safe environment" and to "give examples and have us try on each other." Students expressed a desire to have more

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hands-on practice with the lifts and included a request to work on scenarios for “two days in the lab.” Students wanted to apply what they had learned.

When asked to give examples of safe patient handling on pre- and post-test, student beliefs shifted on what constituted as safe patient handling methods. Post-test responses showed that gait belts were not necessarily a safe patient handling method, but a combination of equipment and body mechanics were appropriate methods. Common responses included the need for "bending at the knees, head up, wide base of support, back straight, and use the legs to lift.” The seeking of help from other healthcare providers also declined slightly with fewer students citing this intervention. Common statements relayed the importance of "environmental setup," the "assessment of client factors and patient motivation," the assessment of "performance skills," using "effective communication," and "determining precautions" all increased in their use.

However, on the post-test when it came to students proving that they were following safe patient handling methods to prevent injury, most of the students stated that clinical competency testing was the way to prove they followed safe patient handling techniques. Their responses showed a bias towards demonstrating competency to an individual such as an instructor or supervisor to “demonstrate to a senior therapist or someone else who is qualified to assess my ability that I can safely transfer various types of patients in several different ways” and to “document” performance.

Table 5

Qualitative Pre- and Post-Test Response Categories

Questions	**Response Categories**	**Response Rates**
11. How would you use a gait/transfer belt when practicing safe patient handling methods during a transfer of a patient who requires minimal assistance to stand?	• Place the belt around the narrowest part of the person’s trunk	Pre-Test: 25% (*n*=4) Post-Test: 44% (*n*=7)
	• Snug the belt/check to see if the belt is too tight	Pre-Test: 25% (*n*=4) Post-Test: 31% (*n*=5)
	• Hold the belt with two hands and use it to guide the person to their feet by pulling the person forward	Pre-Test: 13% (*n*=2) Post-Test: 44% (*n*=7)
12. What assumption can you make as to the reason why occupational therapists state they tend to seek more assistance from others after a practice error has occurred?	• Fear of making another mistake or the same thing happening again	Pre-Test: 50% (*n*=8) Post-Test: 63% (*n*=10)
	• The desire to learn from others	Pre-Test: (*n*=0) Post-Test: 6% (*n*=1)
	• The desire for support from others	Pre-Test: (*n*=0) Post-Test: (*n*=0)
	• The desire to obtain advise	Pre-Test: 6% (*n*=1) Post-Test: (*n*=0)

	• Recognition of the need for more experience	Pre-Test: 6% (*n*=1) Post-Test: 6% (*n*=1)
	• To obtain feedback	Pre-Test: 13% (*n*=2) Post-Test: (*n*=0)
	• To verify the correct method	Pre-Test: 13% (*n*=2) Post-Test: 13% (*n*=2)
13. What alternative solutions would you suggest regarding the instruction of patient handling methods in occupational therapy programs?	• Demonstrate	Pre-Test: 6% (*n*=1) Post-Test: 6% (*n*=1)
	• All hands-on/physical practice (experience/practice w/lifts)	Pre-Test: 50% (*n*=8) Post-Test: 88% (*n*=14)
	• Visuals, handouts, and examples	Pre-Test: 25% (*n*=4) Post-Test: 13% (*n*=2)
	• Scenarios	Pre-Test: (*n*=0) Post-Test: 19% (*n*=3)
	• Videos	Pre-Test: 6% (*n*=1) Post-Test: 19% (*n*=3)
	• Student role playing	Pre-Test: 6% (*n*=1) Post-Test: (*n*=0)
	• Instructor feedback	Pre-Test: 6% (*n*=1) Post-Test: 13% (*n*=2)
	• No responses or haven't learned this yet	Pre-Test: 13% (*n*=2) Post-Test: (*n*=0)
14. List in the space provided below, examples of safe patient handling methods to prevent practice errors.	• Use of gait belts	Pre-Test: 69% (*n*=11) Post-Test: 44% (*n*=7)
	• Floor sling lifts or equipment, slide board, walker	Pre-Test: 31% (*n*=5) Post-Test: 38% (*n*=6)
	• Manual transfers with a focus on body mechanics	Pre-Test: 50% (*n*=8) Post-Test: 88% (*n*=14)
	• Assist from another healthcare provider	Pre-Test: 38% (*n*=6) Post-Test: 25% (*n*=4)
	• Environmental set-up	Pre-Test: 13% (*n*=2) Post-Test: 31% (*n*=5)
	• Assess client factors, communication, values, motivation, performance skills, and precautions	Pre-Test: 13% (*n*=2) Post-Test: 44% (*n*=7)
	• No responses or haven't learned this yet	Pre-Test: 6% (*n*=1) Post-Test: 0% (*n*=0)
15. How would you prove you were following safe patient handling techniques to prevent patient injury?	• The use of ongoing education	Pre-Test: (*n*=0) Post-Test: (*n*=0)
	• Demonstrated competency (body mechanics) performance feedback that is documented to improve skills	Pre-Test: 38% (*n*=6) Post-Test: 63% (*n*=10)

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	• Documentation/journal	Pre-Test: 19% (*n*=3) Post-Test: 31% (*n*=5)
	• Verbal description from therapist or patient	Pre-Test: 19% (*n*=3) Post-Test: 13% (*n*=2)
	• No reports of accidents	Pre-Test: 13% (*n*=2) Post-Test: (*n*=0)
	• Written exam	Pre-Test: 6% (*n*=1) Post-Test: (*n*=0)
	• No responses or haven't learned this yet	Pre-Test: 6% (*n*=1) Post-Test: (*n*=0)

Synthesis of Quantitative and Qualitative Results

The synthesized results of the quantitative and qualitative findings revealed essential lessons. The results provide evidence of student learning and the deepening of knowledge associations through their participation in the hybrid course. The integration of the quantitative and qualitative pre- and post-test questions and the threaded discussions reflected a significant shift in knowledge and self-efficacy.

The first notable point is students learned that practice errors are primarily the result of misjudgment (quantitative). It was particularly evident in the statistically significant pre- to post-test change that was likely due to the threaded discussion where they learned about the prevalence and causes of injuries. They also hypothesized why they as younger therapists may be at risk of work-related musculoskeletal injuries, which they linked to a lack of experience, overestimation of their abilities, and reluctance to ask for help (qualitative). Because of the student's participation with the online content and the threaded discussion, students obtained an increased awareness as to why injuries occur.

The next finding was that students demonstrated improved knowledge and self-efficacy regarding safe patient handling methods. The statistically significant pre- to post-test change evidenced their engagement in the online content by the threaded discussion responses where students talked about the importance of body mechanics, but also the importance of assessment and communication skills, and the rationale for selecting lifts (qualitative). When posed with a clinical situation in the threaded discussions, students were able to provide the appropriate rationale for selecting a transfer method to meet the needs of their patient who had hip precautions and a mild cognitive impairment (qualitative). As the online content moved from traditional methods like body mechanics to assessment and communication methods to obtain the collaboration of the patient (qualitative), so did their transfer recommendations for this patient. By post-test, students changed their recommendation from the one-person transfers to a sit-to-stand lift (quantitative). Students believed they had the self-efficacy to build upon traditional patient handling approaches to improve the safety of the patient and self from injury (quantitative).

In another finding, students expressed fear of repeating practice errors but did not improve in recognizing the need to ask for assistance (qualitative). Few students

expressed a desire to learn through mechanisms of feedback to prevent the re-occurrence of an injury (qualitative). While they did not improve in recognizing the benefit of asking for assistance, they did recognize the importance of demonstrating their competency to obtain performance feedback and to have this documented (qualitative). This reluctance to ask for assistance may relate to their attitude toward risk and the desire for independence (qualitative).

Lastly, the students demonstrated their ability to carry over what they learned online to the two-hour lab and then into the competency assessment (quantitative). Because of their online learning experience, they recognized the value of the lab experience with scenarios to practice what they had learned and receive targeted instructor feedback to improve their skills (qualitative).

DISCUSSION

The results of this pilot research study demonstrated some significant findings, limitations, and implications for the use of a hybrid pedagogy to teach safe patient handling to occupational therapy students. During student engagement in this hybrid course, the students comprehended practice errors are primarily the result of misjudgment, similar to findings by Mu et al. (2005). They learned that despite experience and age, therapist injuries persist (King, Huddleston, & Darragh, 2009) and they theorized why they as younger therapists may have a slightly higher rate of injury. They recognized the importance of demonstrating competency to obtain feedback, use multiple approaches, and have their performance ability assessed and documented (Mu et al., 2011; Yassi et al., 2001). Students recognized the significance of intentional, collaborative communication with patients before the transfer to assess their readiness and motivation, their current level of performance skills, and to review precautions. The students recognized the significance of matching the environment to known patient motivation, their performance skills, and current precautions. The students demonstrated they understood the importance of proper body mechanics during transfers to prevent injury. On pre- and post-test results and during competencies, students showed an increase in the ability to apply, fit, and use a gait belt properly to assist a patient to stand during a one-person transfer by assisting the client with generating forward momentum to stand rather than lifting. The students had improved knowledge and self-efficacy for decision-making to justify specific equipment to transfer a patient. Students perceived they had enough knowledge regarding traditional patient handling approaches and safe patient handling options to make safe recommends for transfers. Students valued the practice lab and the opportunity for psychomotor learning with targeted instructor feedback.

During the lab module, students asked questions to obtain clarification of the video instructions to develop skills. Module two focused on traditional patient handling approaches of transfers and body mechanics and they demonstrated in the lab their ability to apply traditional transfer methods. Content related to balance and sequential body mechanics photos provided opportunities for the students to study this information. Students participating in the lab verbally referred to the body mechanics photos while practicing and asked questions. The use of embedded photos and videos supports the

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findings of Johnston et al. (2013) regarding the ability of video scenarios to develop problem-solving skills, and Hayden (2013) to improve cognitive knowledge and psychomotor skills when paired with instructor feedback.

Limitations

While this pilot study did reveal some important findings, there were some limitations regarding validity, generalizability, and learning. The threats to internal validity stemmed from the use of a peer-reviewed pre- and post-test and competency instrument. Piloting the questions before the start of the project may have produced a more sensitive instrument. The pre- and post-test and competency rubric likely provided anticipatory cues regarding course content. Use of the fieldwork performance scoring criteria for the competency rubric would allow for a direct comparison to fieldwork performance scores. The convenience sample of 16 students enrolled in one course of an academic program limits generalizability; however, it was a homogenous group regarding knowledge and experience.

The five-week schedule of the course limited the self-paced nature of discovering the content. Granted, students had one week to complete each module, but then had to quickly move on to the next without allowing time to integrate and apply content in a lab. Students could opt out of participation in the project at any time without penalty. Each of the four online modules required 60 to 90 minutes minimum per week to complete. Over time, student participation in the threaded discussions declined slightly. The reason for this is not clear, but it is reasonable to believe the completion time for each module may have had a role. The two-hour hands-on practice session provided a valuable opportunity for instructor feedback and psychomotor learning and the students expressed the desire for more practice time with scenarios. The lead author and the course instructor each performed skill competency assessments with 50% of the class participants that allowed the potential for score bias despite efforts to improve intra-rater reliability.

Implications for Occupational Therapy Education

There are some important implications for the education of occupational therapy students when learning evidence-based safe patient handling. The narrated online presentations, with embedded video, sequenced photos, and asynchronous discussions, along with the competency assessment and the pre- and post-tests improved knowledge and self-efficacy with skill carryover despite the time constraint of the project. The content delivery period of five weeks was an abbreviated amount of time given the extent and complexity of the content and may be beneficial to space it out throughout a semester. Increasing the time between modules may allow for more content regarding special populations and reduce module size to improved engagement. A flipped classroom of one module followed by a lab experience with targeted instructor feedback may be beneficial for skill development.

CONCLUSION

This hybrid program allowed students to engage with complex content to discover, integrate, apply, and reflect on related concepts and principles before hands-on

practice. Safe patient handling content in an online format allows time for repeated discovery so students can learn at their own pace. This allows them to revisit new content while developing knowledge associations to deepen judgment skills needed for practice to resolve situations in the lab prior to working with patients while on fieldwork.

References

American Occupational Therapy Association. [AOTA]. (2002). *Fieldwork Performance Evaluation for the Occupational Therapy Student.* https://doi.org/10.1024/85777-000

American Occupational Therapy Association [AOTA]. (2012). Fieldwork Level II and Occupational Therapy Students: A Position Paper. *American Journal of Occupational Therapy, 66*(Suppl. 6), S75-S77. https://doi.org/10.5014/ajot.2012.66S75

Boushon, B., Nielsen, G., Rutherford, P., Taylor, J., Shannon, D., & Rita, S. (2012). *How-to Guide: Reducing Patient Injuries from Falls.* Cambridge, MA: Institute for Healthcare Improvement. Retrieved from http://www.ihi.org/resources/pages/tools/tcabhowtoguidereducingpatientinjuriesfromfalls.aspx

Bureau of Labor Statistics. [BLS]. (2010). *How many musculoskeletal disorder (MSD) cases involve health care patient handling?* Retrieved from http://www.bls.gov/iif/oshfaq1.htm#q16

Bureau of Labor Statistics. [BLS]. (2014). *Incident rates for nonfatal injuries and illnesses involving days away from work*. Retrieved from https://www.bls.gov/iif/oshwc/osh/case/ostb4374.pdf

Centers for Disease Control and Prevention [CDC]. (2015). The national institute for occupational safety and health. *Safe patient handling training for schools of nursing*. https://doi.org/10.1037/e371672004-001

Collins, J. W., Wolf, L., & Evanoff, B. (2004). An evaluation of a best practices musculoskeletal injury prevention program in nursing homes. *Injury Prevention, 10*, 206-211. https://doi.org/10.1136/ip.2004.005595

Cook, D. A., Levison, A. J., Garside, S., Dupras, D. M., Erwin, P. J., & Montori, V. M. (2008). Internet-based learning in the health professions: A meta-analysis. *Journal of the American Medical Association, 300*(10), 1181-1196. https://doi.org/10.1001/jama.300.10.1181

Darragh, A. R., Campo, M. A., Frost, L., Miller, M., Pentico, M., & Margulis, H. (2013). Safe-patient-handling equipment in therapy practice: Implications for rehabilitation. *American Journal of Occupational Therapy, 67*(1), 45-53. https://doi.org/10.5014/ajot.2013.005389

Darragh, A. R., Shiyko, M., Margulis, H., & Campo, M. A. (2014). Effects of a safe patient handling and mobility program on patient self-care outcomes. *American Journal of Occupational Therapy, 68*(5), 589-596. https://doi.org/10.5014/ajot.2014.011205

Frost, L., & Barkley, W. M. (2012). Patient handling methods taught in occupational therapy curricula. *American Journal of Occupational Therapy, 66*(4), 463-470. https://doi.org/10.5014/ajot.2012.003822

DOI: 10.26681/jote.2019.030306

Gagnon, M, Gagnon, J., Desmartis, M., & Njoya, M. (2013). The impact of blended teaching on knowledge, satisfaction, and self-directed learning in nursing undergraduates: A randomized, control trial. *Nursing Education Perspectives, 34*(6), 377-382. https://doi.org/10.5480/10-459

Gagnon, M., Sicard, C., & Sirois, J.P. (1986). Evaluation of forces on the lumbo-sacral joint and assessment of work and energy transfers in nursing aides lifting patients. *Ergonomics, 29*(3), 407-421. https://doi.org/10.1080/00140138608968274

Galinsky, T., Hudock, S., & Streit, J. (2010). Addressing the need for research on bariatric patient handling. *Rehabilitation Nursing, 35*(6), 242-247. https://doi.org/10.1002/j.2048-7940.2010.tb00054.x

Garg, A., & Owen, B. (1992). Reducing back stress to nursing personnel: An ergonomic intervention in a nursing home. *Ergonomics, 35*, 1353-1375. https://doi.org/10.1080/00140139208967398

Garg, A., Owen, B., Beller, D., & Banaag, J. (1991a). A biomechanical and ergonomic evaluation of patient transferring tasks: Bed to wheelchair and wheelchair to bed. *Ergonomics, 34*(3), 289-312. https://doi.org/10.1080/00140139108967314

Garg, A., Owen, B., Beller, D., & Banaag, J. (1991b). A biomechanical and ergonomic evaluation of patient transferring tasks: Wheelchair to shower chair and shower chair to wheelchair. *Ergonomics, 34*(4), 407-419. https://doi.org/10.1080/00140139108967314

Hayden, C. L. (2013). Online learning of safe patient transfers in occupational therapy education. *Open Journal of Occupational Therapy, 1*(2), 1-20. https://doi.org/10.15453/2168-6408.1021

Holsti, O. R. (1969). Content analysis for the social sciences and humanities. Reading, MA: Addition-Wesley. https://doi.org/10.1177/003803857000400231

Hignett, S., & Griffiths, P. (2009). Risk factors for moving and handling bariatric patients. *Nursing Standard, 24*(11), 40-48. https://doi.org/10.7748/ns.24.11.40.s46

Hsiu-Fang, H., & Shannon, S. (2005). Three approaches to qualitative content analysis. *SAGE Journals, 15*(9), 1277-1288. https://doi.org/10.1177/1049732305276687

Institution Blinded. (2015). *OT4720 Course Syllabus.* Unpublished Syllabus.

Johnston, V., Nitz, J. C., Isles, R., Chipchase, L., & Gustafsson, L. (2013). Using technology to enhance physical therapy students' problem-solving skills around safe patient handling. *Physical Therapy Reviews, 18*(6), 407-415. https://doi.org/10.1179/1743288X12Y.0000000061

King, P., Huddleston, W., & Darragh, A. R. (2009). Work-related musculoskeletal disorders and injuries: Differences among older and younger occupational and physical therapists. *Journal of Occupational Rehabilitation, 19*(3), 274-283. https://doi.org/10.1007/s10926-009-9184-1

Marras, W. S., Davis, D. G., Kirking, B. C., & Bertsche, P. K. (1999). A comprehensive analysis of low-back disorder risk and spinal loading during the transferring and repositioning of patients using different techniques. *Ergonomics, 42*(7), 904-926. https://doi.org/10.1080/001401399185207

Mu, K., Lohman, H., & Scheirton, L. (2005, September 19). To err is human! Common practice errors and preventive strategies in occupational therapy. *OT Practice,* 13-17.

Mu, K., Lohman H., Scheirton, L. S., Cochran, T. M., Coppard, B. M., & Kokesh, S. R. (2011). Improving client safety: Strategies to prevent and reduce practice errors in occupational therapy. *American Journal of Occupational Therapy, 65*(6), e69-e76. https://doi.org/10.5014/ajot.2011.000562

Mu, K., Lohman, H., & Scheirton, L. S. (2006). Occupational therapy practice errors in physical rehabilitation and geriatrics settings: A national survey. *American Journal of Occupational Therapy, 60*(3), 288-297. https://doi.org/10.5014/ajot.60.3.288

Owen, B., & Garg, A. (1991). Reducing risk for back pain in nursing personnel. *American Association of Occupational Health Nurses Journal, 39*(1), 24-33. https://doi.org/10.1177/216507999103900105

Scheirton, L., Mu, K., & Lohman, H. (2003). Occupational therapists' responses to practice errors in physical rehabilitation settings. *American Journal of Occupational Therapy, 57*(3), 307-314. https://doi.org/10.5014/ajot.57.3.307

Slusser, L. R., Rice, M. S., & Kopp-Miller, B. (2012). Safe patient handling curriculum in occupational therapy and occupational therapy assistant programs: A descriptive study of school curriculum within the United States of America. *Work, 42*, 385-392. https://doi.org/10.3233/WOR-2012-1407

Waters, T., Putz-Anderson, V., Garg, A., & Fine, L. (1993). Revised NIOSH Equation for the design and evaluation of manual lifting tasks. *Ergonomics, 36*, 749-776. https://doi.org/10.1080/00140139308967940

Yassi, A., Cooper, J. E., Tate, R. B., Gerlach, S., Muir, M., Trottier, J., & Massey, K. (2001). A randomized controlled trial to prevent patient lift and transfer injuries of health care workers. *Spine, 26*(16), 1739-1746. https://doi.org/10.1097/00007632-200108150-00002

Zelenka, J., Floren, A., & Jordan, J. (1996). Minimal forces to move patients. *American Journal of Occupational Therapy, 50*(5), 354-361. https://doi.org/10.5014/ajot.50.5.354

Zhuang, Z., Stobbe, T., Hsiao, H., Collins, J., & Hobbs, G. (1999). Biomechanical evaluation of assistive devices for transferring residents. *Applied Ergonomics, 30*, 285-294. https://doi.org/10.1016/S0003-6870(98)00035-0

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Appendix A

Patient Handling Performance Task Rubric Student #:

Objective Behavioral Criteria	Beginning Performance 1	Developing Performance 2	Accomplished Performance 3	Exemplary Performance 4
Objective Behavior Criteria *Appraise, Formulate, and Apply* safe patient handling intervention strategies to protect patient and self	**Prepares the environment:** • Limited environmental set-up related to task • Correct lift, transfer equipment, method for the task **Prepares the patient:** • One of the following three: ➢ Client factors, ➢ Performance Patterns, ➢ Performance Skills related to readiness for the transfer at the start • Does not appraise comprehension of instructions • Incomplete patient position **Performs the transfer:** • Does not apply body mechanics principles • Does not comply with a no-lift policy **Restores:** • Does not restore	**Prepares the environment:** • The environment is appropriately set-up for the task • Set-up for the task is efficient • Correct lift, transfer equipment, method for needs of the patient **or** task **Prepares the patient:** • Two of the following three: ➢ Client factors, ➢ Performance Patterns, ➢ Performance Skills • Appraise comprehension of transfer instructions with yes or no • Positions patient properly for task **Performs the transfer:** • Applies own body mechanics principles and that of the patient inconsistently • Applies a no-lift policy **Restores:** • Restoration of the environment or the equipment	**Prepares the environment:** • Appraise the environment for safety issues, and formulate and apply an appropriate set-up for the task • Appraises the available equipment and formulates correct lift or transfer method for needs of the patient **or** task **Prepares the patient:** • Appraise all of the following three: ➢ Client factors, ➢ Performance Patterns, ➢ Performance Skills related to readiness for the transfer at the start • Appraise comprehension of transfer instructions • Formulates an appropriate strategy • Applies proper positioning based upon patient **or** task needs **Performs the transfer:** • Applies own body mechanics principles and that of the patient throughout the task • Applies appropriate transfer method and follows a no-lift policy **Restores:** • Complete	**Prepares the environment:** • Appraise the environment for safety issues and appropriate set-up for the task and the location of the call light • Appraises the available equipment and formulates correct lift or transfer method for needs of the patient and task **Prepares the patient:** • Appraise all of the following: ➢ Client factors, ➢ Performance Patterns, ➢ Performance Skills with follow-up questions regarding readiness of the patient • Appraise comprehension of transfer instructions through patient repetition • Formulates an appropriate strategy • Applies proper positioning based upon patient and task needs **Performs the transfer:** • Applies own body mechanics principles and that of the patient throughout the task with appropriate pauses to validate

			restoration of the environment	• Applies appropriate transfer method, reassesses patient performance while following a no-lift policy **Restores:** • Complete restoration of the environment and equipment

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