Embracing Technology: Using an Unfolding Case Simulation to Enhance Nursing Students' Learning About Parkinson Disease

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ABSTRACT

This study embraces technology and compares two teaching strategies for the undergraduate-level nursing student: a taped digital media classroom lecture with YouTube video clips and a simulated unfolding case study experience in the nursing skills laboratory. The objective was to determine which method best promotes critical problem solving around clinical care issues related to Parkinson disease. Each stage of the case simulation shows a progression of disability with increased complexity of patient symptoms, which requires higher levels of nursing assessment. Eighty-four undergraduate students in a baccalaureate nursing program participated in this research study. Significant differences were identified in knowledge and in their ability to analyze complex information. Student outcomes were reported through the comparison of scores on a preexamination and postexamination using alternative style questions.

Keywords: low-fidelity simulation, Parkinson disease, technology, unfolding case simulation

Background

It is impossible to ignore the emerging growth and rapid expansion of technology in the healthcare field and in the classroom environment. Models of technological advancements in the academic setting include academic courses being offered online with Web-based modules, simulation technologies with clinical scenarios, computerized social networks, smart phones or mobile technologies, use of video clips, and digital media classrooms (DMCs). e-Books, avatars in virtual worlds, remote telehealth robotics, and even electronic medical record documentation is being introduced into nursing courses (Cornelius, 2011; Skiba, 2009). With more hospitals integrating information and communication technologies into their healthcare systems, faculty is being challenged to integrate the use of technology that will support clinical practice and facilitate the novel delivery of learning opportunities into their already-crowded nursing curriculums. The education of nurses has had an evolving curriculum as the advancement of technologies has increased over the decades. The 2010 Institute of Medicine report, *The Future of Nursing: Leading Change, Advancing Health*, promotes the use of technology to prepare students and to maximize the use of available faculty.

Generation Y, also known as the Net generation, is characterized by its demand for immediate access to information. As this generation assimilates into healthcare programs around the country, two major features have become apparent: the first is the need to see the entire clinical picture as a whole, and the second is the need for beginning healthcare workers to enter the workforce prepared for clinical practice. Coincidentally, we see that, as the elderly population increases and the healthcare workforce is reaching critical limits, clinical mentorships have become a luxury; therefore, few employers are willing or able to provide. Can technology be effectively implemented to facilitate the transformation of nursing education? How can we utilize technology as a strategy for the evaluation of learning outcomes?

Literature Review

Nurse educators must face the challenge of effectively integrating technology into what is essentially a hands-on, people-centered profession (Dariel, Wharrad, & Windle, 2010). Technology in education is moving quickly because of the expectations of an increased digitally competent student population. Nurse educators have to rethink their pedagogy in relation to how technology can affect the classroom environment (Dariel et al., 2010; Irwin, 2006). Faculty development opportunities must be considered when implementing new technologies into nursing curriculums. Providing faculty with support

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in regards to informatics, e-health, Web-based trainings, and the use of educational technologies cannot be ignored (Mitchell, Ryan, Carson, & McCann, 2007; Pressler & Kenner, 2009; Skiba, 2009). For technologies to be used effectively in the classroom or Web-based setting, time and support must be provided to nursing faculty.

A vital component in implementing interactive technology to the educational curriculum is the use of video technology (Herrman, 2006; Sorenson & Dieter, 2005; Zerr & Pulcher, 2008). The use of video film clips or YouTube videos in the classroom changes the attention span of the learner, engages the learner, draws the learner into the experience, and provides learning stimuli that meet the needs of the Net generation student (Herrman, 2006; Skiba, 2007). The digital native student prefers multimedia learning, and YouTube is an emerging technology that can help transform the way nursing education is offered (Skiba, 2007). Digital natives have grown up in a multimedia world and are most comfortable with technology. If faculty wants to engage students of the Net generation, faculty will need to explore the use of videos as an adjunct to their classroom or online teaching environment (Herrman, 2006; Skiba, 2007).

Simulation is a teaching strategy that continues to gain attention in the nursing education community because it mimics reality and links theory to practice (Galloway, 2009; McCormick, 2005; Nehring & Lashley, 2010). Simulation learning in nursing education aims to promote clinical competency, reflective thinking skills, and the ability to provide crisis scenarios with no human risk (Ward-Smith, 2008). Simulation scenarios are being used in an array of nursing programs designed to promote critical thinking, teamwork, communication, prioritization, delegation, and leadership skills of healthcare providers (Galloway, 2009; Larew, Lessans, Spunt, Foster, & Covington, 2006). The authors' study intends to determine what effects technologies in the classroom setting has on students' knowledge in regard to their ability to care for a patient with Parkinson disease.

Methods

Design

This study was a comparative–quantitative study using an experimental design to critically appraise the effectiveness and value of the use of technology in undergraduate nursing education. It compared the use of a DMC lecture with video clips and an unfolding scenario using simulation to teach students assessment skills about Parkinson disease. University institutional review board approval was granted before this study, and a written informed consent was obtained from each participant. Participation was voluntary, and students were informed that they could withdraw at any time. All students enrolled in the course ''Health Assessment across the Lifespan'' between September 2011 and December 2011 was eligible for the study. The study took place in a classroom and simulation laboratory.

> Simulation-based learning is increasingly being used today in nursing curricula to promote critical thinking, teamwork, and communication, delegation, and leadership skills.

Instruments

A pretest and posttest with a total of 10 questions were used to measure changes in knowledge in the cognitive domain. These questions were alternative style questions including multiple choice, matching, point and click, and true/ false. They were written at the analysis, synthesis, and evaluation level of Bloom's taxonomy.

A note-taking guide was developed for student use, which included an outline to help them gather information about the structure and function of the nervous system. It allowed them to record information about the motor, sensory component of the examination. It also contained a glossary of common terms related to the neurological examination and Parkinson disease. An electronic nursing documentation sheet was developed for students to write a nurse's note after the simulation experience.

Procedure

Before beginning the simulation exercises, students in both the control and experimental groups were given presimulation activities to complete. These activities included reading an E-medicine article about Parkinson disease and familiarizing themselves with two commonly used Parkinson's rating scales (Hoehn and Yahr and the United Parkinson's Disease Rating Scale). These documents were posted online 1 week before the class. Before the lecture, the control group took a 10-item pretest and received the PowerPoint lecture on neurological assessment, which was taped using the DMC. It reviewed general assessment of the

neurological system including how to test cranial nerves, motor, reflexes, and the sensory system. The total time devoted to the DMC lecture was 1 hour and 15 minutes. During the DMC lecture, students were given a note-taking guide so that they could take detailed notes about completing a neurological examination. After the lecture, the students took a 10-item posttest containing alternative questions. The experimental group was taken into the laboratory to engage in a simulation experience. During this time, students were divided into three groups with one faculty supervisor. The unfolding case scenario was set up in the laboratory and had all of the necessary equipment to complete a neurological examination. The following items were available at the bedside: reflex hammer, tongue blade, cotton ball, cinnamon sticks, penlight, stethoscope, blood pressure cuff and thermometer, feeding tube, intravenous fluid, and Foley catheter. Students were given a blank neurological assessment form to complete, cards with information about the patient's chief complaint, medical orders, and sample dialogue for each member of the family. Each part of the unfolding scenario included an RN-to-RN report, patient's biographical data, laboratory values, and current medication list.

Students were instructed to perform a neurological assessment of the manikin. They were assigned to a group caring for a patient at either the early, middle, or late stage of Parkinson disease (see the Appendix for details of each simulation). When introduced to the simulation unfolding case study, the faculty member who was leading their group explained that their role was as a facilitator only and that they would not interfere with the decisions made during the scenario. They spoke about the importance of teamwork and communication in the clinical environment. Students were to use their clinical knowledge and technical abilities to work through the scenario. The stations were separated by privacy screens and arranged so that they would not disturb the others. The first group was given information about a patient who was newly diagnosed and experiencing unilateral rest tremors, sleep disturbances, loss of smell, depression, constipation, and orthostatic hypotension. The second group was taking care of a patient who had the disease for 10 years and was experiencing symptoms of wearing off, ''on/off'' phenomenon, fenestrating gait, bilateral rest tremors, postural instability, and falls. The third patient was 20 years into the disease; had a tracheostomy, foley, and feeding tube; and was experiencing end of life and issues related to caregiver strain. Each student was given a specific role to play and an assessment form to complete. The roles included primary nurse, student nurse, wife, son, and two observers, and the voice of the patient was spoken through a microphone.

After the completion of the time-sequenced simulation scenarios, each group was asked to develop a computer-generated nurse's note on each of their patients. They were then asked to present their case notes to the rest of the class and reflected on possible nursing diagnoses.

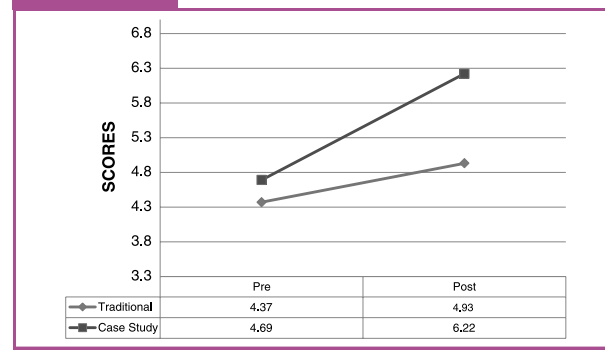
Results

A within-group and between-group analysis was performed on the data using repeated-measures analysis of variance to compare the effect on student learning using a low-fidelity teaching strategy with a traditional teaching method. The compound symmetry requirement was met using Mauchly's Test of Sphericity, which supported use of the univariate approach for analysis. A paired-sample pretest/posttest measurement indicated that there was a significant difference in the scores for traditional teaching when compared with the scores of the low-fidelity case simulation teaching method. Although the within-group analysis revealed that subjects in both the traditional teaching group and the low-fidelity case study group had significant increases in posttest scores ($p = .40$), the low-fidelity case study group had significantly higher ($p = .31$) posttest scores when compared with the scores of the traditional teaching group (see Figure 1). These results suggest that using an innovative low-fidelity case simulation was a more effective teaching strategy than the traditional classroom lecture.

Discussion

Simulations using multidimensional technology provide students with the opportunity to follow patients with neurodegenerative diseases over time through the use of an unfolding case study. Parkinson disease is a chronic, progressive neurodegenerative disease affecting approximately four million individuals worldwide each year. Improved understanding of the

FIGURE 1 Comparison of Pre-Post Test Scores for Traditional Teaching and Low-Fidelity Case Study



underlying pathophysiology and course of Parkinson disease will allow nurses to take a more active role in the advocacy and management of patients with this disease. Parkinson disease can serve as a prototype for other neurodegenerative diseases in the way that it impacts not only the quality of life of the affected individual but the family as caregivers. As educators begin to use new technologies, they must consider the notion of the ''lived body, lived space, lived time, and lived relations'' with the technologies they are using (Irwin, 2006, p. 453). It is the interconnection between the human being and the technology and its effect or implications on nursing students that must be considered in the applications of new technologies. By reflecting on these interconnections, educators can further understand how technology influences their own teaching and learning. The future of nursing education must engage, interact, and create an active and collaborative learning community while utilizing technology. We have to move from a passive driven curriculum to an active learning environment. Educators need to embrace technology to mirror practice experiences in the clinical setting.

Future of Simulation and Implications for Clinical Practice

Care of patients with neurodegenerative diseases can be intimidating, especially for the new graduate. In this area, as in others, nursing leadership has become increasingly concerned about the gap between academic preparation and the demands of real-world clinical practice in new nursing program graduates from U.S. schools (Berkow, Virkstis, Stewart, & Conway, 2009). According to the Nurse Executive Center of the Advisory Board, these concerns focus primarily on clinical knowledge, technical skills, critical thinking, communication, professionalism, and management of responsibilities (Jeffries, Hudson, Taylor, & Klapper, 2011). In response to these concerns, which focus on core competencies, case-based simulation has been advocated because it allows students an opportunity to develop these competencies in a safe and supportive environment.

In the healthcare environment, managers and nurse educators are challenged to provide competency verification programs, orientations, internships/fellowships, continuing education opportunities, and ongoing skill development of the nursing staff with fewer resources (Winslow, Dunn, & Rowlands, 2005). Regulatory organizations are requiring increased focus on competency verification of nursing staff both upon entering the system and ongoing in response to emergent technology and patients needs (Winslow et al., 2005). The use of simulation as a teaching modality has gained wide acceptance in clinical settings. Nurse educators have incorporated simulations into hospital-based orientations, nurse residency programs, internships/fellowships, continuing educations, and skill-based certification programs such as Basic and Advance Cardiac Life Support (Nagle, McHale, Alenxander, & French, 2009). Unfolding case studies using common syndromes of aging such as Parkinson disease can promote critical thinking and allow students to gain valuable experiences in decision making. According to Jeffries et al. (2011), using a clinical simulation model and incorporating informatics is an important strategy to develop competency, confidence, and readiness for entry into nursing practice. Validated assessment tools, such as the Creighton Competency Evaluation Instrument (Todd, Manz, Hawkins, Parsons, & Hercinger, 2008), are available to facilitate objective measures of these core competencies. The importance of well-prepared graduate professional is critically important particularly in those chronic diseases such as Parkinson disease where nurse–patient ratios are often stretched to their limits and care issues are complex.

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Appendix
Descriptions of the Three Simulations

Living With Parkinson Simulation 1

Report to Students

Mr. Cobb is a 60-year-old Caucasian man who is being examined by a movement disorder specialist. He grew up in the Midwest with his parents and three siblings. His father died at 87 years old from a stroke, and his mother passed away last year in the age of 81 years because of old age. Mr. Cobb now lives with his wife in Baltimore, Maryland, and is currently retired.

Patient Data

Weight: 170 lbs, height: 5′11″, date of birth: May 20, 1940

APPENDIX TABLE 1. Simulation 1

Time Frame	Patient Condition	Expected Nursing Action
0–5 minutes	(BP108/70 HR 84 RR 20 T37C) Heart sounds at NSR, bowel sounds are hypoactive, and lung sounds are clear bilaterally. **Patient states:** (soft) ″I am exhausted and cannot even blink. I cannot get up from a chair without help. I have to use a cane to walk because I am shuffling my steps. My voice has even changed. I am frustrated that everyone has to wait for me. I can't sleep like I used too, and I am also constipated.″ Slowness of movement, feels very stiff and weak, decreased arm swing, resting tremor of his right upper extremity. The patient often looks over to his wife and son for reassurance or clarification of information.	Take full set of vital signs, recognize orthostatic changes and report to M.D., actively listen to patient to collect data related to nonmotor and motor symptoms, and begin problem list
5–10 minutes	Vital signs: BP drops to 90/60 upon standing from sitting position. **Wife:** ″My husband is always very tired, and experiences dizziness especially when taking a shower. I am not sure if I should let him drive anymore. What do you think? He often talks in his sleep (seems like he is having real vivid dreams) and often wakes early. He is constipated and complains of early morning cramping pain in his shoulders.″	Conduct fall risk assessment and examination technique to determine balance and gait
10–15 minutes	**Son:** ″My dad seems real depressed. My dad is always dizzy when he sits up from a lying position or when showering. He is afraid that he will fall.″	Identify strategies helpful to empower patient and family such as risk modification, assistive devices, and support groups in community

Abbreviations: NSR = normal sinus rhythm; BP = blood pressure.

MR No. 1357
Allergies: no known allergies
History of present illness: The patient describes shuffling gait, slowness, and tremors
Social history: married for 30 years with two children and one grandchild
Past medical history: anxiety, hypertension
Past surgical history: hernia repair in 1960
Occupation: retired farmer
Childhood illnesses: usual
Hospitalizations: none
Current medications: multivitamin once a day
Tobacco: smoked 1 ppd/20 years
Alcohol: rarely

Learning Objectives

1. Describe how nursing care can be improved through the active participation of patient and family.
2. Identify safety issues related to the care of a patient with Parkinson disease.
3. Examine partnerships that nurses can make to improve the plan of care for patients living with Parkinson disease.

Living With Parkinson Simulation 2

Report to Students

Mr. Cobb is a 70-year-old patient who has been seeing the movement disorder specialist for 10 years. He has been taking levodopa/carbidopa (Sinamet 100/25, two tabs, three times a day) for his Parkinson disease. His tremors, rigidity, and bradykinesia have been well controlled until recently. He grew up in the Midwest with his parents and three siblings. His father died at 87 years old from a stroke, and his mother passed away 10 years ago in the age of 81 years because of old age. Mr. Cobb now lives with his wife in Baltimore, Maryland, and is currently retired.

APPENDIX TABLE 2. Simulation 2

Time Frame	Patient Condition	Expected Nursing Action
0–5 minutes	Has elevated BP, urinary retention, fluid in lungs, heart arrhythmia, and hypoactive bowel sounds. **Patient:** ''It is difficult for me to get dressed by myself anymore. I am having trouble brushing my teeth. It is like I brush my nose instead because my hands shake so much. Sometimes my feet get glued to the floor. I get 'locked up' and can't move. I get very rigid and slow a half an hour before my next Parkinson's medication is due. I have fallen several times this week. It is so frustrating that I can't do things by myself anymore.''	Take full set of vital signs; assess heart, lungs, and bowel sounds; assess gait and balance; identify medication dosage and schedule; and actively listen to medication schedule-related problems/wearing off/dyskinesia
5–10 minutes	**Wife:** ''I noticed that he is more depressed and withdrawn. He doesn't want to go out and socialize with the neighbors. I think he is embarrassed about incontinence and his slow movements and speech. My husband gets up frequently during the night to use the bathroom and sometimes he is not able to get there fast enough. He uses the walker at night. It gives me confidence that he won't fall.''	Discuss methods to reduce risk of falls, describe adaptive devices that may be used to help with mobility and balance; and identify progression of symptoms
10–15 minutes	**Daughter-in-law:** ''Do you think we should put dad in a home or get a certified home aide to care for him? He is a constant worry and is requiring more care every day. It is exhausting for my mother-in-law and my husband to deal with. What do you think would be the best course of action at this stage in his disease? I am afraid that he is going to fall and break his hip.''	Actively listen to wife, identify caregiver strain, and identify community resources available to improve quality of life

Abbreviation: BP = blood pressure.

Living With Parkinson Simulation 3

Report to Students

Mr. Cobb is now 80 years old. He has had Parkinson disease for 20 years. His wife has been by his side the whole time. He grew up in the Midwest with his parents and three siblings. His father died at 87 years old from a stroke, and his mother passed away 10 years ago in the age of 81 years because of old age. Mr. Cobb now lives with his wife in Baltimore, Maryland, and is currently retired. He has been taking levodopa/carbidopa (Sinamet 100/25, two tabs, three times a day) for his Parkinson disease. His wife did employ a certified home health aide to help Mr. Cobb with activities of daily living. He wears his medic alert bracelet. However, he has been having trouble maintaining his weight. He has trouble swallowing because of drooling and excess salivation. His aide cuts up the food so that it is small and thickens his liquids so he does not choke. His wife reports that he frequently falls to the side but knows how to get up and ''has not broken anything, just a few bumps and lumps on his head.'' He is now starting to have difficulty communicating with his aide and his wife. His speech is slow, slurred, and soft; and he seems apathetic to everything around him.

APPENDIX TABLE 3. Simulation 3

Time Frame	Patient Condition	Expected Nursing Action
0–5 minutes	Incontinent of urine, lungs with rales from possible aspiration pneumonia, and heart arrhythmia. **Patient states:** ''I feel so stupid, I cannot remember anything. My memory doesn't work anymore. I am in a wheelchair all the time now because I am afraid of falling.'' (Ask Mrs. Cobb. She can answer all of your questions.)	Auscultate lungs, calculate intake and output, discuss toileting schedule, and examine heart monitor
5–10 minutes	**Wife:** ''It is getting harder to care for him. He isn't sleeping well because he cannot turn over in bed. Sometimes he has accidents because he can't get to the bathroom fast enough. I hardly get a break. How much longer do you think I can keep him at home? Do you think that the hallucinations mean that he is going to die? I have power of attorney. Could I talk to someone about advance directives? He has difficulty communicating and I can't identify his desires and wishes. I am having some health issues myself and I don't know if I can continue to balance my multiple responsibilities and roles.''	Use physical/occupational therapy for strengthening and, for speech therapy, consult use of assistive devices
10–15 minutes	**Son:** ''We need to figure out how to care for dad. Mom is feeling overwhelmed and exhausted. She has always stood by his side. They have been married for close to 50 years. I do not know what she will do without him. We do have Medicare. What do you think about Hospice care?''	Modify home environment, discuss possibility of hospice care, and discuss ''five wishes''

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