Virtual Reality and Patient Simulator, Technology to Teach Humanistic End-of-Life Care

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***Abstract* –** **The preparation of students to provide end-of-life care is a challenge for nurse educators. Beginning nursing students benefit from the opportunity to confront this care area in a learning environment before the reality of the situation in the clinical area. End-of-life care is provided to meet the physiological, psychological, social, and spiritual needs of the dying individual. An innovated use of virtual reality and simulation is combined to facilitate the process of learning and practicing delivery of care to those at the end-of-life. Immersing students using technology is a strategy to teach humanistic delivery of care.**

***Keywords* –** End-of-Life, Learning, Nursing Students, Patient Simulation, Virtual Reality.

I. INTRODUCTION

Students enter the profession of nursing with the focus on maintaining and restoring health to the clients that receive nursing care. The students do not initially reflect on the nursing care that is needed at end-of-life. Nursing students need to have the knowledge and skills to provide physical, psychological, and spiritual comfort. Care given to persons who are in the last stage of a serious illness is called hospice care.

The challenge for nurse educators is to introduce end-of-life care to students before they care for a person who is dying. Students embrace technology in education. Nurse educators have used technology to teach skills and demonstrate application of knowledge. Patients in virtual reality and human patient simulators provide the mechanism for students to experience providing humanistic end-of-life care.

II. LITERATURE REVIEW

A. Aging in America

In the United States of America between 1980 and 2010, the largest growth was in persons 85 years and older in age. There has been a 66% increase in centenarians. Those persons over 100 years are now referred to as supercentenarians [1]. In 2011, 41.4 million persons or 13.3% of the population are elderly. The anticipated rise by 2030 is for the elderly to increase to 72.1 million or 20% of the population [2]. It is expected that these persons will present nursing care needs as they approach their final months of life. Data supports this with 1.6 million persons in the USA receiving hospice care [3].

B. Nursing Students and End-of-life

As part of undergraduate education nursing students are taught about providing and improving end-of-life care [4]. Evidence has shown that nursing students have less death anxiety if they are allowed to reflect on their attitudes and beliefs over time [5]. Experience in providing end-of-life care increases skill, knowledge, and empathy [6]. Another study showed that five themes emerged in examining end-of-life and nursing students. The themes are importance of values and beliefs, personal and professional experience, good vs. bad death, ethics and legislation, and education and knowledge [7].

C. Simulation and Virtual Reality

A systematic review of the literature demonstrates the evidence that simulation is an effective method for teaching skills and reinforcing concepts [8]. Evidence shows that simulation is effective in transfer of learning from the classroom and clinical setting [9]. A study compared learning with a CD-ROM with a human patient simulator. Findings demonstrated that health care personnel performance was improved with using a human patient simulator [10]. While knowledge and skills are important, end-of-life also involves the attitude or affective domain in providing care. One study done with nursing students documented that simulation was more effective in enabling learning in the affective domain [11].

There is huge potential for learning with immersive interactive virtual reality [12]. Studies have shown that that the digital environment in virtual reality can enhance education by allowing multiple perspectives, situated learning, and transfer of learning [13]. The use of 3-D virtual worlds to improve inter-professional heath education has been documented with the benefits and issues discussed [14]. Students are engaged with the use of these technologies.

III. SETTING

The education experience was with beginning nursing students in a pre-licensure program at a public university in the northeast section of the United States of America. The students take pre-requisite courses in sciences, humanities, and social sciences during the first year of study in a program leading to a baccalaureate of science degree in nursing (BSN). So although the students were in the sophomore year, this experience was during the first year of nursing courses. Health assessment and nursing theory courses are taken during the fall semester. In this semester, students have the initial experience with the virtual patient and begin learning using simulation. It was during the following semester, spring, that this learning experience with end-of-life care was conducted. Students are co-registered for courses in gerontology nursing and caring for a well population. Students spend the second half of the semester caring for elders in long term care as part of the gerontology nursing course. Students have experienced the death of a patient during this first clinical course. Students are often caring for patients more than 85 years old. During the 2016 spring semester, this author had

two students assigned separately to two patients both 101 years old. Last year, a student cared for a woman who was 107. These persons present end-of-life nursing needs.

IV. TECHNOLOGY EXPERIENCE

A. Virtual Reality

Students purchase access to an immersive 3-D clinical world during the first semester of nursing courses for a purchase price of approximately $100.00. This is a one-time fee and the student has continued access to this virtual world. Currently there are four avatars that are available. In the gerontology nursing course, the students are assigned to a patient who is a 78 year old female from an Asian heritage. Having an ethnic heritage which may be different from the students allows them to consider the cultural or spiritual needs which will affect the nursing plan of care. The students are informed that the virtual patient's support person is her daughter. The student is expected to perform certain tasks such as handwashing, checking identification, and providing privacy in the virtual world. The student types to greet, ask questions, and empathize. The virtual patient responds verbally to the text. The virtual patient presents with a complaint of abdominal discomfort. The student is expected to assess the patient using inspection, auscultation, palpation, and percussion. During this examination, the student can have the virtual patient move, auscultate heart, lung, and bowel sounds with a stethoscope, and hear percussion sounds. The student is expected to correctly identify the nursing problem, recommend interventions, and communicate with other health care personnel in the virtual world. This assignment is completed individually during the first third of the course.

The faculty then develops this case study with results that demonstrate that with more tests, the patient has been medically diagnosed with metastatic colon cancer. Because the faculty had direct contact with students, this was done in the classroom. The woman's status changes to a situation where she is admitted to acute care for symptom management including control of pain.

B. Simulation

The students working in groups then encounter this patient with the use of human patient simulator in the laboratory on campus. This simulator can vocalize and provide vital signs that can be monitored. The students are expected to identify critical elements such as checking for the presence of an order for Do Not Resuscitate, administer/titrate medication to manage pain, and to meet psychosocial needs of the simulated patient and support system. Students are expected to perform humanistic care such as providing comfort measures such as oral hygiene or skin care. Students are expected to ascertain the patient's spiritual care practices and to intervene if these have not been met. A senior nursing student who was working in the nursing laboratory on campus, role played the daughter during the simulation. The students are expected to communicate with both the patient and her daughter. The students are expected to provide humanistic care such as offering to remain with the simulated patient

if the daughter needs to leave the bedside. Debriefing took place after each scenario. All of the technology experience was completed before the students' real world clinical experience with elders in long term care settings.

V. DISCUSSION

A. Learner Performance

Student performance with the virtual reality was well done as students had ample time to assess the interactive digital patient in the virtual world. Since they had open access to the virtual world, they could keep assessing, intervening, and evaluating nursing care. Student performance in the simulation laboratory on campus was varied. When the simulated patient's status deteriorated some were prompt to provide resuscitation without checking for code clarification. Other students were more mindful to verify code status before initiating interventions. Pain management was another area of concern. Some students were comfortable administering prescribed analgesic medications. Other students verbalized concern about not wanting to be the nurse who administered the last dose of pain medication before the patient expired. All students interacted with the simulated patient and acknowledged the support person. However, the amount and type of interaction varied from communication to offering the daughter services such as providing beverages or contacting other family members or health care providers.

B. Educator

Planning for this unfolding case study using technology is essential to allow for time for students to process information from the virtual world to simulation. The faculty could have used an assignment in the learning management system such as a discussion board posting to advance the case study rather than classroom time. Three areas were discussed in the classroom after the simulation experience. One area involved an ethical discussion about the difference between terminal sedation and euthanasia. The second area involved legal issues involving right to die legislation. The third discussion was on policy related to insurance reimbursement for end-of-life care. When this educational strategy is used again the faculty will add a reflective writing assignment after the technology experience.

VI. CONCLUSION

Teaching nursing students early in their education about end-of-life care is beneficial for the students and patients. Students have time to examine and develop personal beliefs about dying. Patient care will be improved by nurses who can plan, intervene, and evaluate to provide comfort to meet the physiological, psychological, social, and spiritual needs. The educator can use technology to engage and immerse the student in the learning experience.

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AUTHOR'S PROFILE

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The author earned a Doctorate in Nursing Practice in 2013 from Sacred Heart University, Fairfield, CT, USA. Received a Master Degree in Public Health in 1991 from the University of Connecticut in Storrs, CT, USA. Received Bachelor's in Nursing in 1981 from the State University of New York in Albany, NY, USA. Received an Associate Degree in Nursing in 1974 from Quinnipiac College in Hamden, CT, USA. The author's major area of study is in nursing education concentrating on the use of simulation. She has been an educator in nursing for more than twenty-five years. She is currently Assistant Professor at Central Connecticut State University in New Britain, CT, USA. She is the RN to BSN Coordinator. She teaches students in the BSN and RN to BSN programs. Her previous education experience was with students at the associate degree level. She has earned current certifications in Nursing Education and Gerontological Nursing. Her work experience includes critical care, medical-surgical, and gerontology nursing. She has been in management positions in acute and long term care. Her current research is in service learning.
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