

Impact of an Interprofessional Alzheimer's 3-D Virtual Training on Student Knowledge and Confidence



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Introduction

Dementia is a term used to describe a range of neurological conditions that cause the loss of the ability to think, remember, and reason to levels that affect daily life and activities (National Institute on Aging, n.d.). Almost 6 million Americans age 65 and older currently live with dementia and this number is expected to rise to 14 million by mid-century (Alzheimer's Association, 2020). Alzheimer's disease is the most common type of dementia and accounts for approximately 60–80% of dementia cases (Centers for Disease Control and Prevention [CDC], 2019a). In 2019, more than 16 million family caregivers provided an estimated 18.6 billion hours of care to persons with dementia (PwD) in the United States (U.S.) (Alzheimer's Association, 2020). Compared with caregivers of persons without dementia, caregivers of PwD have a higher level of caregiver burden; are more

likely to experience depression and anxiety; and report greater emotional, financial, and physical stress (Hvidsten, et al., 2020; Ma, et al., 2018; CDC, 2019b). The most frequent sources of stress reported by caregivers include lack of personal boundaries among PwD, repetitive and

aggressive behaviors, and need for constant care (Unson, et al., 2015). African Americans are disproportionately affected by dementia making them more vulnerable to the impact of caregiving when compared with non-Hispanic whites (Alzheimer's Association, n.d.; U.S. Department of Health and Human Services, 2014).

The collaborative approach to providing care for PwD is less a defined structure than a model of care that utilizes an interprofessional team to provide comprehensive care to patients and their caregivers (Galvin, et al., 2014). In this approach, each member of the care team provides their own clinical strengths. However, working together in an interprofessional manner is often undermined by a lack of understanding of the nature and scope of responsibilities among healthcare professionals (Warshaw

& Bragg, 2014). Interprofessional education (IPE) is a way to increase this understanding and is considered essential for developing "collaboration-ready" practitioners (Hopkins, 2010). Although IPE in dementia care could provide the knowledge and skills necessary to deliver collaborative practice, there is a weak body of published literature related to IPE interventions in dementia care (Jackson, et al., 2016).

Background

Three-dimensional virtual worlds (3-DVW) enable participants to access virtual environments, interact with digital objects, represent themselves through avatars, communicate with other participants, and take part in experiences incorporating modeling and mentoring about problems similar to those in a real-world context (Duncan, et al., 2012). 3-DVW are one of three basic types of virtual reality (VR, Bracc et al., 2019): 1) Screen based systems (SBS), used extensively for training technical skills such as surgical techniques; 2) 3-DVW, which use desktop or laptop systems in which learners enact roles as avatars to practice skills central to collaborative practice; and 3) immersive virtual reality (IVR), which provides an environment that blocks perception of the outside world using a head-mounted display (HMD).

Accessed online, 3-DVW provide meaningful opportunities for students to practice communication with patients and other



The participants' view from inside Ms. Jenkins' environments in the virtual world

providers in a safe, low-stakes environment. Simulation using 3-DVWs allows for the inclusion of geographically diverse learners and the simulation of physically, ethically, or financially prohibitive scenarios (Ghanbarzadeh, et al., 2014; Warburton, 2009). 3-DVWs can create transformative experiences for students to practice interpersonal skills, such as teamwork and communication, within a social environment (Bracq, et al., 2019; Edwards, 2012).

The Jefferson Center for Interprofessional Practice and Education (JCIPE) created Alzheimer’s Virtual Interprofessional Training (AVIT) in the 3-DVW of Second Life™. Using avatars, students participate in three case-based simulations that follow Mrs. Jenkins, an African-American woman with dementia, over a period of six years. The first simulation takes place in Mrs. Jenkins’ primary care office where she is being seen for a follow-up appointment for hypertension. This case focuses on recognizing signs and symptoms of dementia. The second simulation, occurring 3 years later, takes place in Mrs. Jenkins’ home following hospitalization for a fall. This case focuses on home safety for Mrs. Jenkins and caregiver support for her daughter. The third simulation occurs in the long-term care facility where Mrs. Jenkins is living. The third case takes place 3 years after the home visit and focuses on the management of dementia-related behavioral issues. The purpose of this study was to assess the impact of AVIT on students’ knowledge and confidence related to dementia care.

Methodology

AVIT was implemented with 24 students [nurse practitioner (n = 13), pharmacy (n = 6), medicine (n = 4), occupational therapy (n = 1)] at Jefferson in summer 2021. The basic format of AVIT is preparation, simulation, and debriefing. First, students prepared for AVIT by reading evidence-based content related

to dementia, reviewing their assigned roles in the simulation, and receiving an orientation to the AVIT 3-DVW. Then, students participated in interprofessional teams of 3-5 learners to enact the roles of provider(s), patient, caregiver, and observer in each of the cases. After each case, faculty facilitated a debriefing of the case within their assigned interprofessional teams. At the end of all 3 cases, the entire student group debriefed with faculty facilitators about lessons learned related to dementia care and IPE.

JCIPE-developed surveys to assess knowledge and confidence were administered pre- and post-participation in AVIT. Knowledge was measured with a percent-correct score across 25 items that consisted of a mix of multiple choice, true/false, and matching. Confidence was measured as the average of 6 items on which students rated how strongly they agreed with statements such as “I feel confident identifying the potential signs of dementia” on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The post-survey also included a student satisfaction section eliciting feedback on the content and format of the virtual program and preparatory materials. Pre-post changes on each variable were evaluated with paired-samples t-tests using data from students who completed both pre-test and post-test assessments. Confidence scale scores were evaluated for internal consistency using coefficient α .

Results

Twenty students [nurse practitioner (n = 9), pharmacy (n = 6), medicine (n = 4), occupational therapy (n = 1)] completed both pre- and post-tests, for an 83% total response rate. Students averaged 86.35% (SD = 7.64) correct on the pre-test knowledge items and performance increased significantly to 89.74% correct (SD = 5.75) at post-test, $t(19) = 2.74, p =$

.01, $d = 0.68$. So, while students start AVIT with substantial knowledge about dementia care and IPE, they showed consistent increases in their knowledge. Pre-post gains in confidence were also significant ($t(19) = 4.67, p < .001, d = 1.04$). Pretest confidence scores averaged 3.83 (between neutral and agree, SD = 0.62) while post-test confidence scores averaged 4.24 (between agree and strongly agree, SD = 0.54). These gains in confidence were more sizable than those in knowledge. Finally, though the process of validating the confidence items is ongoing, internal consistency of the confidence survey was high at pretest ($\alpha = .91, 95\% \text{ CI: } .85, .97$) and at post-test ($\alpha = .94, 95\% \text{ CI: } .90, .98$). The latter result suggests that the confidence scale scores (averages) contain very little measurement error. Reliability analysis of the knowledge items requires a larger sample size.

Related to student satisfaction, 84% reported their overall experience with AVIT as good or excellent. Ninety-two percent of participants regarded the preparatory materials as valuable. Most students rated the simulation (88%) and debriefing (84%) as valuable. In response to the question, “What were your main takeaways from this experience,” students reported on benefits related to working in an interprofessional team and gaining insight into complex care of PwD and their caregivers (see Figure 1).

Discussion

The aim of this study was to examine the effect of AVIT on health professional students’ knowledge of and confidence in dementia care. Students demonstrated gains in knowledge and confidence in dementia-related care after participating in AVIT. These findings contribute to previous evidence of improved dementia-related knowledge (Annear, et al., 2016; Mastel-Smith, et al., 2019) and confidence (Mastel-Smith, et al., 2019) with IPE interventions. Increasing health care

Figure 1. Selected student quotes on the value of AVIT Training.

What were your main takeaways from this experience?
I learned more about the role of an interprofessional team in caring for a patient and caregiver with Alzheimer’s. I also learned ways to help the caregiver and reduce their burden.
Both the patient’s and caregiver’s needs must be addressed in a complex disease such as Alzheimer’s. It’s important to acknowledge that the caregiver also experiences the consequences of the disease and the difficulty that comes with caring for a parent with dementia.
Learning more about all aspects of care with this patient population and how they progress over time.
This was a great learning experience to gain insight of the patient, family, and care team of a patient with Alzheimer’s Disease. I enjoyed reading information leading up to the cases and working through each case with members of OT and Pharmacy.
It was a good learning experience seeing the patient’s trajectory from being independent to being in a nursing home. The case gave a good insight into caregiver stress and outlined the importance of each health care provider.

professionals' knowledge and confidence has benefits for dementia care delivery and provider wellbeing (Rivett, et al., 2019).

The surveys used in this study were newly-developed by JCIPE and, thus, psychometric data were not available. In this study, it was promising that the internal consistency of the confidence survey was high at pre- and post-test suggesting very little measurement error. Unfortunately, the sample was not large enough to complete reliability analysis of the knowledge survey. Further work is needed to refine and validate these surveys.

The use of a 3-DVW for interprofessional dementia education is innovative. Although IVR and 3-DVW have been used for dementia education, most existing research was conducted with different populations than our sample (Hirt & Beer, 2020). Adefila and colleagues (2016) have published on their work with interprofessional students; however, this program differed from AVIT in that it immersed learners in sensory and task-related challenges using IVR. In addition to the potential for learning innovation, AVIT provides a flexible IPE learning opportunity for learners from different geographic locations.

Conclusion

The care of PwD and their caregivers is complex and requires specialized knowledge and communication skills. Given the lack of robust published literature related to IPE interventions in dementia care (Jackson, et al., 2016), AVIT represents an innovative IPE experience for health professional students to learn to provide care for PwD and their caregivers.

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