INTEGRATING VIRTUAL REALITY APPROACHES TO SIMULATIONS IN INTERPROFESSIONAL EDUCATION: A CASE STUDY

Susan Toth-Cohen [1] and Sara Stainthorpe [2]

[1] College of Rehabilitation Sciences, Department of Occupational Therapy, Thomas Jefferson University, Philadelphia, USA
[2] College of Nursing, Thomas Jefferson University, Philadelphia, USA

ABSTRACT

This paper presents a case study on developing and implementing metaverse-based VR simulations for training interprofessional health and human service students to work with vulnerable populations. Key challenges and strategies are discussed and include the need and justification for the simulation programs, the challenge of changing technology and educational trends over time and plans for enhancing existing programs and creating new programs and cases.

KEYWORDS

Virtual Worlds, Healthcare, Educational Technology, Interprofessional Education

1. INTRODUCTION

The use of virtual reality (VR) has increased exponentially in health education and many other professional fields [1]. From an educational perspective, VR can be viewed as a form of computer technology that enables realistic simulated environments in which people can interact to accomplish learning goals. VR can be conceptualized broadly under the term extended reality (XR), which encompasses specific forms including augmented reality and immersive reality [2]. Within this overall categorization, some authors classify VR as consisting of different subtypes. For example, Bracq et al. [3] classify VR into the three categories of screen-based systems, virtual worlds (VW) accessed through laptops or desktops, and immersive VR. However, the lines between these different categories increasingly overlap as enhanced VR options and technologies have become more multi-faceted.

Building on these developments in VR, the concept of the metaverse has emerged as a more expansive and immersive application of XR technologies. The metaverse is an immersive virtual 3-dimensional (3D) environment which uses both augmented and immersive realities [4]. Metaverse-learning allows multiple people to have interactive role play experiences in a virtual environment that mimics a real-life environment [5]. Several advantages of metaverse learning have been identified in the literature. Metaverse platforms provide an infinite potential for creativity and sharing, a safe place to collaborate with others while practicing a variety of skills without the risk of harm, and cost-effectiveness due to the ability to produce simulations that would otherwise be expensive to reproduce and repeat [4,5,6].

The two metaverse-based programs discussed in this article are the **P**ersons experiencing homelessness **I**nterprofessional **V**irtual **O**utreach **T**raining (**P**IVOT, formerly called Enhancing Services for Homeless Populations) and the **A**lzheimer's **V**irtual **I**nterprofessional **T**raining program (AVIT), both using a case-based learning format described by Okun [7] and further elaborated by Smith [8]. The two programs are implemented in a large academic health center in a densely populated area on the East Coast of the U.S. within a University Center for Interprofessional Education. PIVOT trains interprofessional students in health and human service professions to use strategies and resources for working with people experiencing homelessness (PEH) while AVIT focuses on training these future professionals to work with people who have Alzheimer's disease and related dementias (ADRD) and their caregivers. More detailed descriptions of both programs' delivery methods and outcomes have been published in scholarly work elsewhere [9, 10].

In both AVIT and PIVOT, students from various health and human services professions are invited to participate in the simulations, including students from Advanced Practice Nursing, Medicine, Pharmacy, Public Health, Occupational Therapy, and Physical Therapy programs within the University. All participants are added to an online course consisting of pre-work including the learning objectives of the simulation, educational materials, articles, and videos, an overview of each case scenario, and a detailed description of each role and the corresponding schedule for each student within their respective roles. Students are placed in interprofessional teams and assigned to a virtual world designed and created for each case and program. Students rotate between the roles of various health care providers, patients, family members, and observers, allowing them to take on different perspectives in each case. After each simulation, a debriefing is led by trained facilitators.

1.1. Rationale for Using VR and the Metaverse for Interprofessional Simulations

Jeremy Bailensen [11], a researcher at Stanford University created a framework for justifying VR using the DICE acronym that illustrates the fit-for-purpose of PIVOT and AVIT. In this framework, use of VR is justified when a training experience is too Dangerous, Impossible, Counterproductive, and/or too Expensive to enact in real life. In both the AVIT and PIVOT simulations, students practice techniques with each other as they enact the roles of provider and patient. These situations could be **dangerous** to enact in real life, due to student errors or poor judgement when providing care—such as mistakes in medication management with a person who has ADRD (AVIT) or inadequate recommendations when advising a PEH with diabetes and alcohol addiction on how they can enact harm reduction strategies such as caring for a foot ulcer to avoid infection or amputation (PIVOT).

In the **impossible** category, a 22-year-old White male student would be unable to become a 77-year-old Black woman experiencing ADRD or a 35-year-old mother of three children aged 2 months through 13 years. And, if enacting a situation in real-life settings that involves mobile outreach (e.g. going to where PEH are living), additional personnel would be required to participate, along with physical transportation, making a real-life experience **counterproductive** (not worth the additional resources considering students themselves could enact these roles). Additionally, VR simulations can reduce costs when students enact the roles of provider and patient, since the simulation would not require paid standardized patients.

1.2. Changes in VR Technologies

PIVOT launched in 2017 using Second Life™ an early foundation of the metaverse [12]. AVIT was implemented using the same overall structure in 2018. The Second Life™ platform offered several advantages for implementing metaverse-based interprofessional training, including remote student participation and access to many free or low-cost, high-quality resources for creating realistic virtual environments. These benefits were especially evident when AVIT andPIVOT trainings continued without interruption**.** We also noted disadvantages of the Second Life™ program. For example, in each cohort of students participating from AVIT or PIVOT, some students had difficulty running the program because 1) their computers lacked the ability to handle its complex graphics 2) not all students could use the voice option, making it necessary to use a separate program (Zoom) for the audio 3) they had to download the program to their personal computers to participate in the program and 4) there was a steep learning curve for doing tasks they expected to be easy such as navigating the simulated world and sitting on a chair. This made it necessary to hold extensive orientations and multiple “check your tech” sessions to accommodate different student schedules. While helpful for orienting and increasing students’ comfort with the technology, sessions were time-consuming and complex for faculty and staff to schedule, implement, and track.

We found that typically, students with more experience in using VR worlds or playing computer games found it easier to manage the demands of downloading the Second Life™ program and navigating the virtual world. However, there were always some with limited or no experience. Level of interest for engaging in VR also varied. While some students viewed the simulations as opportunities to practice safe “hands on” clinical skills, others expressed feeling limited by the inability to read non-verbal cues or make eye contact--despite our emphasis on “suspension of disbelief” [13] as key to feeling engaged and immersed in the simulations. At the same time these challenges for students and the faculty were occurring, the first author began taking classes to learn virtual reality development, gaining exposure to newer metaverse formats that could be used in VR simulations, such as Spatial and VR Chat. This led to consideration of Spatial as an alternate platform for PIVOT and AVIT.

2. METHODOLOGY

We conducted a series of pilot case studies [14] framed within a continuous quality improvement (CQI) process using the Plan-Do-Study-Act cycle [15]. The purpose of these exploratory pilot case studies was to examine the feasibility of using the alternate metaverse platform, Spatial, for delivering PIVOT and AVIT simulations. The specific focus was to assess the Spatial platform’s usability, level of student immersion, and perceived value in supporting student learning related to working with vulnerable populations. This was accomplished throughorientations, simulations and debriefings within Spatial that formed the structure for obtaining feedback from two stakeholder groups: administrative staff of the University Center for Interprofessional Practice and Education and students/alumni.

Key guiding questions for this CQI process included:

1. How effectively can staff set up and use Spatial to support students during simulations?
2. How easily can students navigate Spatial and complete simulation tasks?
3. To what extent do students experience a sense of immersion in the simulation environment?
4. How well does the metaverse-based simulation format support student learning about working with vulnerable populations in an interprofessional, team-based contex?

2.1. Participants and Focus of Pilot Cases

Table 1 illustrates the specific pilot cases that were conducted for PIVOT and AVIT. We started with a 10-participant staff pilot primarily addressing technical issues with the Second Life platform, then ran a small-scale student/alumni pilot. Finally, we conducted a larger AVIT pilot. We ran the pilots three months apart, over a 7-month period.

Table 1. Simulation Timeline and Data Collection

Stakeholder Group	Program	Participants	Activity Focus	Date(s)	Data Collection Method
Staff	N/A (applied to both)	8	Set up account and avatar	8-22-24	Discussion (inperson and Zoom)
	PIVOT	8	Simulation	8-29-24	Post-simulation Survey
Students	PIVOT	3	Simulation and debriefing	12-10-24	Focus Group
Students/ alumna	AVIT	36	Simulation and Debriefing	3-04-25	Post-simulation Survey (response rate 55.6% - n= 20)

3. RESULTS

3.1. Staff Pilot

The staff pilot consisted of two components: a general test of our initial plan to set up Spatial for both PIVOT and AVIT (focused on orientation and basic features of how to implement the simulation) and a simulation of two of the three PIVOT cases. The staff pilot (n=8) focused on ease of use and technology issues, with data collected using a survey.

Survey data collection categories were derived from usability challenges previously reported by staff with the Second Life™ program. Main subcategories were related to initial setup and task-specific issues during simulation-based case enactment (see Table 2).

Table 2. Staff Pilot Survey Results

Ease or Difficulty of Spatial Compared to Second Life Platform								
Task Type	Initial Set-up	Tasks Required to Fully Engage in Simulation						
	Down-load or update software, connect to Internet	Change avatar outfit for specific role	Interact with objects	Use keyboard shortcuts to zoom in and out	Move around using keyboard arrows	Locate tools required to engage in sim	Find other location within sim	TP quickly to other location
Partic.	Rating							
1	4	3	2	2	2	3	3	4
2	4	4	2	2	2	4	4	3
3	4		3		3	4	4	
4	3		4		4	2	3	
5	3	4	3	3	3	4	4	
6	4	2	2		2	3	4	3
7	4	3	2		2	1	1	
8	3	4	3		2	3	4	4
Mean	3.6	3.3	2.6	2.3	2.5	3.0	3.4	3.5

Key
4 Significantly easier
3 Easier
2 Same
1 More difficult
0 Significantly more difficult

The survey also included open-ended items asking staff to identify specific issues and reflect on their experiences with the existing Second LifeTM platform and the Spatial program under consideration for adoption. Most frequent comments about greater ease using Spatial were related to the procedures necessary to set up the program for use and to navigate through the simulation:

- …each time I logged into SL, I had to wait for the system to set up or there was some downtime message.... I first set up on a laptop using Spatial on [network names]and 2nd time on a desktop, no problem either time.
- [in Spatial] I found it easier to interact with objects in the environment. As soon as I get close to an object, the "F" shortcut popped up, allowing me to interact. [And] it was more intuitive to stand using my laptop arrow keys than to utilize a separate command.”
- “…It is vastly easier to navigate to different locations within a simulation utilizing Spatial. The use of teleportation in SecondLife had always been a struggle for staff and students alike.”

Comments noting instances in which some participants mentioned that Spatial was less easy to use than Second Life focused on greater difficulty identifying other participants through their name tags:

- …in Spatial not all users had their names consistently above their avatars, whereas in SecondLife, they were,"
- I found it challenging to determine who was who. Only a few people (the same ones throughout) came up with name labels even when I approached them."

Participants had noted difficulty with audio:

- Bad sound using a laptop. Breaks up.
- The audio could be choppy within Spatial, though I never lost comprehension.

Others had difficulty but thought they might be able to solve the issues with more careful set-up.

- I did not fully explore the audio settings to ensure whether a different setting would alleviate the choppiness.

Even with these challenges, participants generally expressed that use of built-in audio vs. using the metaverse program along with Zoom as we had done previously with Second Life helped make the simulation more engaging:

- The use of audio…made the simulation extremely more immersive. The avatars seem a lot more dimensional and life-like."

3.2. Student/Alumni PIVOT Pilot

The student and alumnus focus group consisted of two current students and one alumnus who had participated in the PIVOT program as a student (N=3). Their professional disciplines were Nursing, Occupational Therapy, and User Experience and Interface Design. We introduced the focus group by asking students to discuss their experiences with previous simulations and to describe what they liked and disliked. All described commercially available simulations for science or healthcare used on a computing device or a physical mannikin.

Participants discussed customization as a primary advantage regardless of the medium used. For example, the nursing student reported that "with the simulated mannequin practice I used in nursing school, a person can change their vitals and symptoms, even religious aspects to learn respect on spiritual beliefs."The main disadvantage of the commercial products was also related to customization: "Everything was pre-scripted, there was not much variation, [it] was interactive but had restrictions, if you did something outside of the box you were not listened to." Similarly, lack of customizability was also in relation to the product's inability to produce spontaneous responses.

- fully scripted simulations [are] not as beneficial because you do not have to come up with you want to say, there are many ways the guided conversations can go, you get to decide what way you take it.
- more spontaneous responses are more helpful because in real world situations you really do not know what people are going to say. This teaches you how to respond to people. How someone says something depends on who is playing the part and changes how you need to respond to them."

After the initial warm-up question, participants were asked to share what they liked and disliked about Spatial. They discussed technical aspects along with general comments and suggestions:

Table 3. Student and Alumni Comments

Beneficial to Learning	**Less Beneficial to Learning**
Really easy to play around with Spatial and grasp as a platform.	It was difficult to switch avatars, I premade both avatars but could not find the new custom one while I was in the simulation.
The PIVOT simulation has real people [peers] unlike other [commercial] simulations where it is more individualized [has computer generated patients]	Makes computers choppy and would freeze, takes up a lot of memory on a computer. I do not remember if this was the same situation as second life or not.
Instructions were easy to follow when creating the avatar and setting everything up.	Audio issues, was not clear that the avatar needs to be close to the other avatars to hear other people.
General Comments	
Would be beneficial if the city looked more like Philadelphia, [the Spatial sim] looked less urban than the second life world.	
If people got used to the spatial site at first, maybe by playing some of the other games spatial offers, this could make people feel more comfortable and be more “fluid” in using it.	

3.3. AVIT Pilot

The AVIT pilot consisted of three cases with two separate student groups (n=36). The three cases had been used for previous AVIT programs. See Figure 1 for an illustration of the first case, in which a 78-year-old woman is diagnosed with ADRD by her primary care provider (left), who conducts a cognitive screening test. The patient (right center), is accompanied by her caregiver (left center). During the encounter the primary care provider collaborates with an in-office pharmacist (right) who performs a medication review.

Figure 1. AVIT Pilot Showing Doctor's Office Simulation

Data reported for this paper consist of survey responses to questions about student satisfaction indictors: perceived usefulness, ease of use, and engagement. Other data including knowledge of ADRD and confidence with specific tasks learned in the simulation (including technical and non-technical skills) will be reported in a separate scholarly work currently in progress, along with student satisfaction indicators.

Table 3. AVIT Student Pilot Survey Results (n=20)

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Overall, my experience in the AVIT program was positive.	0	0	1	14	5
I was fully able to immerse myself into the client or provider role in the simulation.	0	1	4	10	5
The case based virtual learning format was a good way to learn about the needs of persons with dementia.	1	1	2	11	5
It was easy to navigate the virtual world.	3	0	3	11	3

Students were also asked, "what were your main takeaways from this experience," in which they identified some of the aspects they felt contributed to the educational value of the Spatial simulation. Sample comments included:

- Patience and compassion go a long way when working with fellow healthcare providers and the caregivers in giving the best treatment.

- That dementia can be a frustrating disease state for everyone involved and it takes a team of [skilled] health care workers …to provide the best level of care.
- Utilizing a collaborative team approach to effectively treat individuals diagnosed with Alzheimer’s disease represents one of the most advantageous strategies for delivering high-quality care, not only for the patients themselves but also for their family members.
- I learned how important it is to work collaboratively with a variety of professionals to ensure the patient's needs are met on all fronts. Also, how important it is to support the caregivers in these scenarios as their role is quite difficult and comes with a lot of conflicting thoughts and emotions.
- Knowing patient perspective and role-playing helps to look at the real life scenario/situation

Student recommendations for improving the AVIT program using Spatial focused primarily on the need to become more familiar with the metaverse world prior to participating in the simulation.

- It may be a good idea to have a "virtual playground" available a day before for participants to familiarize themselves with the virtual space, supervised or unsupervised.
- I had trouble navigating the Avatar world, but I'm not verse (sic) in the world of video games, which would have been very helpful to me. Overall, I enjoyed the experience.
- I think it would have been helpful to have a space in Spatial where we could practice moving around a bit while doing our pre-work. I think getting the hang of using the platform was my biggest challenge.

4. DISCUSSION

The pilot implementation of the Spatial platform for both PIVOT and AVIT simulations yielded promising results, highlighting both the potential and the challenges of transitioning from Second Life™ to a more modern metaverse environment. Across staff, student, and alumni participants, the findings suggest that Spatial offers several usability and engagement advantages, while also presenting areas for improvement that warrant further development and support.

4.1. Usability and Technical Considerations

Staff participants generally found Spatial easier to set up and navigate compared to Second Life™, particularly appreciating the intuitive interaction with objects and simplified movement controls. These findings align with prior literature emphasizing the importance of ease of use in virtual learning environments. However, some technical issues persisted, especially in regard to audio quality and avatar identification. The inconsistent display of name tags in Spatial was a noteworthy disadvantage compared to Second Life™, which consistently labeled avatars. Audio issues, while not universally disruptive, were frequently mentioned and suggest a need for clearer guidance on audio settings and troubleshooting.

Participants in the small student and alumni pilot also discussed some of the same points. While they found Spatial relatively easy to learn and appreciated the realism and interactivity of peer based simulations, technical challenges such as avatar switching, memory usage, and audio clarity were noted. These issues may be especially relevant for users less familiar with gaming or virtual environments, underscoring the need to prepare students for participation using orientation sessions or “virtual playgrounds” to build confidence and ease of enacting the simulation.

4.2. Engagement and Learning Value

Participants across all groups reported that Spatial enhanced the immersive quality of the simulations. They expressed that the integration of built-in audio, rather than relying on external platforms like Zoom made the experience more engaging. This immersive quality seemed to be especially valued in the AVIT pilot, where students reported high levels of engagement and perceived usefulness for learning about dementia care.

The student and alumni focus group also emphasized the value of customization and spontaneity in simulations. Unlike commercial products that rely on scripted interactions, they valued the PIVOT simulation’s flexibility and the presence of real human participants, which allowed for more authentic, unscripted interactions. This aligns with experiential learning theory, which emphasizes the value of learner-driven, context-rich environments in developing critical thinking and communication skills.

The ability to engage in spontaneous dialogue and adapt to dynamic scenarios was seen as facilitating more dynamic and responsive communication, which participants felt better mirrored real-world scenarios. This aligns with educational approaches that emphasize the importance of authentic, learner-driven experiences in developing critical thinking and collaboration skills.

4.3. Limitations

This pilot study was limited by small sample sizes, especially in the student and alumni focus group (n=3). And, while the response rate to the AVIT post-program survey was more than 50%, a higher response rate may have provided more diverse views about the Spatial simulation. One possibility is that students who perceived the simulation more favorably responded to the survey at a higher rate than those who did not find the experience worthwhile. Additionally, while this CQI focus provided actionable findings to improve usability and engagement, future scholarly work could utilize quantitative and qualitative research approaches to explore learning outcomes more systematically, including knowledge gains, skill development, and long-term application to actual clinical settings.

5. Enhancements and Future Planning

In addition to implementing key recommendations discussed by the stakeholder groups, such focusing on improving or solving audio and avatar identification issues, we are planning several other enhancements. Our main focus will be to continue testing and building upon ways to make the simulations more engaging and interactive. Through our experience with the pilots and a grant that enabled us to hire a VR consultant, we have learned how to add scripts to the existing Spatial interface to complement its Quest development feature. We plan to incorporate a game format to enable students to self-orient by using a quest game in which they follow clues to learn specific tasks and do quizzes to gain a greater command of the knowledge base needed to work with people PEH and patients and caregivers experiencing ADRD. Additional strategies for fostering interactivity are to use a quest-type game format for specific steps in the simulation— such as identifying home environmental hazards in AVIT. The home hazards will include obstacles making it difficult for an older person to move around optimally within her home and specific tripping hazards that make the home unsafe (e.g., throw rugs and electrical extension cords).

6. CONCLUSION

This CQI initiative, implemented through multiple pilot case studies discussed how a University Center for Interprofessional Education designed and implemented two metaverse-based simulation programs—PIVOT and AVIT—to support interprofessional student learning in working with people experiencing homelessness (PEH) and individuals with Alzheimer's disease and related dementias (ADRD), along with their caregivers. The development process was guided by Bailensen's [7] DICE framework and included a platform transition from Second Life™ to Spatial to enhance usability and immersion.

Looking ahead, planned improvements will focus on expanding the range of cases and programs offered in addition to incorporating greater interactivity. These enhancements aim to provide students with more opportunities to practice interprofessional collaboration and develop skills for working with vulnerable populations. As with previous iterations, we will apply the Plan-DoStudy-Act (PDSA) cycle to guide and evaluate these changes, focusing our attention on perceived usefulness, ease of use, and learner engagement.

Through this ongoing CQI process, we remain committed to strengthening our training programs and better preparing health and human services students to meet the complex needs of PEH, individuals with ADRD, and other underserved populations.

ACKNOWLEDGEMENTS

The authors would like to thank the Jefferson Center for Interprofessional Education and Practice at Thomas Jefferson University, for its substantial contributions and support in developing, implementing, evaluating, and sustaining this work. We also thank the peer reviewers who provided thoughtful, in-depth comments which contributed to enhancing this paper.

REFERENCES

[1] Hamad, A., & Jia, B. (2022). How Virtual Reality Technology Has Changed Our Lives: An Overview of the Current and Potential Applications and Limitations. International journal of environmental research and public health, 19(18), 11278. https://doi.org/10.3390/ijerph191811278

[2] Lee, M. J. W., Georgieva, M., Alexander, B., Craig, E., & Richter, J. (2021). State of XR & Immersive Learning Outlook Report 2021. Walnut, CA: Immersive Learning Research Network. Retrieved from, https://www.immersivelrn.org/files/file/12-2021-state-of-xr-and-immersive-learning-report/

[3] Bracq, M. S., Michinov, E., & Jannin, P. (2019). Virtual Reality Simulation in Nontechnical Skills Training for Healthcare Professionals: A Systematic Review. Simulation in healthcare : journal of the Society for Simulation in Healthcare, 14(3), 188–194. https://doi.org/10.1097/SIH.0000000000000347

[4] Kye, B., Han, N., Kim, E., Park, Y., & Jo, S. (2021). Educational applications of metaverse: possibilities and limitations. Journal of educational evaluation for health professions, 18, 32. https://doi.org/10.3352/jeehp.2021.18.32

[5] De Gagne, J. C., Randall, P. S., Rushton, S., Park, H. K., Cho, E., Yamane, S. S., & Jung, D. (2023). The Use of Metaverse in Nursing Education: An Umbrella Review. Nurse educator, 48(3), E73–E78. https://doi.org/10.1097/NNE.0000000000001327

[6] Ahuja, A. S., Polascik, B. W., Doddapaneni, D., Byrnes, E. S., & Sridhar, J. (2023). The Digital Metaverse: Applications in Artificial Intelligence, Medical Education, and Integrative Health. Integrative medicine research, 12(1), 100917. https://doi.org/10.1016/j.imr.2022.100917

[7] Okun, B., Kantrowitz, R. (2014). Effective helping: Interviewing and counseling techniques. Nelson Education.

[8] Smith, A.C. (2011). Client and Helper feedback forms (revised). Brisbane, Au. Five Sparrows Productions Counselling and Holistic Development Services.

[9] Toth-Cohen, S., Salzman, B., & Kazharova, O. (2019). "Enhancing Services to Underserved Populations through Innovative Virtual World Training and Collaborative Partnerships," Department of Occupational Therapy Posters and Presentations. Paper 61. https://jdc.jefferson.edu/otpresentations/61

[10] Toth-Cohen, S., Kates, J. & Hass, R.W., "Student Satisfaction and Quality Improvement for an Alzheimer's Virtual Interprofessional Training (AVIT) Program" (2022). Department of Occupational Therapy Posters and Presentations. Paper 75. https://jdc.jefferson.edu/otpresentations/75

[11] Bailenson, J. (2018). Experience on demand: What virtual reality is, how it works, and what it can do. WW Norton and Company.

[12] Ball, M. (2022). The metaverse and how it will change everything. New York: Liveright PublishingCorporation.

[13] Muckler, V., & Thomas, C. (2019). Exploring suspension of disbelief among graduate and undergraduate nursing students, Clinical Simulation in Nursing, 35(1), 25-32. https://doi.org/10.1016/j.ecns.2019.06.006

[14] Yin, R. (2017). Case study research and applications: Design and methods. Thousand Oaks, CA: Sage.

[15] Silver, S.A., Zorel, Z., McQuillan, R., Weizman, A.V., Thomas, A., Chertow, G.M.,...& Chan, C.T (2016). How to begin a quality improvement project. Clinical Journal of the American Journal of Nephrology, 11(5), 893-900. https://doi.org/10.2215/CJN.11491015

AUTHORS

Susan Toth-Cohen, PhD, OTR/L is Professor of Occupational Therapy at the Jefferson College of Rehabilitation Sciences and Co-Lead of the Alzheimer's Virtual Interprofessional Training (AVIT) program and Lead of the People experiencing homelessness Interprofessional Virtual Outreach Training (PIVOT) program at the Jefferson Center for Interprofessional Practice and Education at Thomas Jefferson University in Philadelphia, USA

Sara Stainthorpe, DNP, CRNP, AGPCNP-BC, is Program Director of the Adult-Gerontology Primary Care Nurse Practitioner Program at Jefferson College of Nursing and Co-Lead of the Alzheimer's Virtual Interprofessional Training program (AVIT) at the Jefferson Center for Interprofessional Practice and Education, Thomas Jefferson University in Philadelphia, USA