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Research Article

The Use of Simulated Participant and Virtual Reality Simulation to Enhance Nursing Students' Communication Skills in "End of Life Care" - A Single-Arm Repeated Measures Study

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KEYWORDS

Advanced care planning;
Difficult conversations;
End-of life;
Nursing;
Palliative care;
Simulated persons;
Simulation;
Virtual reality

Abstract

Background: Increasing demand for palliative care necessitates effective training for nursing students in end-of-life (EOL) and advanced care planning (ACP). Conventional teaching methods often fall short.

Methods: A single-arm pre-post design involved 219 nursing students in VR and SP simulations. Quantitative measures and qualitative feedback were obtained.

Results: Statistical analysis revealed significant improvement post-intervention ($p < 0.001$). Qualitative feedback highlighted realism, interactivity, and skill development. Challenges included emotional intensity and scenario repetition.

Conclusions: Combining virtual reality (VR) and simulated participant (SP) simulation significantly enhances nursing students' confidence and communication for end-of-life (EOL) conversations, offering a realistic educational experience. Further research is recommended in understanding this teaching method.

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Background

The World Health Organization (WHO) estimates an increase in palliative care services is in part due to an aging population combined with multimorbidity. The WHO (2018; 2020) indicates the yearly requirement for palliative care is around 57 million people with around 26 million of those being end-of-life care. End-of-life (EOL) care and advanced care planning (ACP) are some of the most complex and challenging professional responsibilities of nursing. This is not surprising as navigating through EOL and ACP conversations can be difficult, even for the most experienced practitioner. ACP is often discussed only in the terminal phase, hence may be poorly discussed, and not thoroughly documented (McVey et al., 2018). These insufficiencies may lead to repeated and distressing hospital admissions and poor-quality palliative care (Lage, 2020), including the psychosocial cultural burden on carers, families, and guardians.

Society and other health disciplines assume that all practicing nurses are adequately prepared to provide effective care to the terminally ill, carers, and their families (Milazzo, Hansen, Carozza, & Case, 2020). Undergraduate nursing programs include EOL care in preparing nurses for graduation and subsequent practice, however, there does not appear to be a standard approach to including this content in curriculums (International Association for Hospice and Palliative Care, 2014; Palliative Care Australia, 2020; Worldwide Palliative Care Alliance, 2014). Indeed, each university will have different resources to utilize in teaching EOL and nursing practice content.

Simulation-based learning has been adopted in nursing education at an unprecedented pace (Hall & Tori, 2016; Jeffries, 2022). Simulated Participants (SP) is a high-fidelity simulation (a close resemblance to the real thing) where human role players are portrayed as patients, families, or clinicians to facilitate learner experience through simulated situations or scenarios (Lewis et al., 2017). SPs emulate persons who have come to the healthcare setting with a particular diagnosis or symptoms. The learner approaches the SP assesses, communicates, and practices their psychomotor skills (Nestel & Bearman, 2015). The SP will be scripted with a characterization usually based on a real story (Nestel & Bearman, 2015). SP simulation is effective for developing communication skills, confidence, critical thinking rapport, empathy, history taking, and physical assessment, (Alexander, Sheen, Rinehart, Hay, & Boyd, 2018; Hall 2017).

Computer-generated simulation Virtual Reality (VR) is also emerging as a simulation technique. Brown, Swoboda, Gilbert, Horvath, and Sullivan (2023) refer to this type of simulation as high fidelity, fully immersive, and authentic, it is as if the learner is in a real clinical environment. As technology continues to advance at the current rapid pace, VR has now become more affordable and accessible. Current literature has shown it increases learner engagement and improves the ability to conceptualize content (McCarthy & Uppot, 2019; Valmaggia, Latif, Kempton, & Rus-Calafell, 2016) increases critical thinking problem-solving, and psychomotor skills (Brown et al., 2023). SP and VR simulation both allow for the complexity and acuity of content to be tailored to the learning needs and academic levels of the students, therefore reducing cognitive load, and increasing knowledge and skills acquisition (Foronda, Fernandez-Burgos, Nadeau, Kelley, & Henry, 2020; Hall, 2017).

It is important to note that high-fidelity simulation alone does not equate to high-quality training, and it is the role of feedback and debriefing that enables the learner to integrate their learning experience into practice (Hall & Tori, 2017). Effective debriefing enables students to critically think and make deliberate decisions in complex situations (MacKenna, Díaz, Chase, Boden, & Loerzel, 2021). It is an "integral part of the experience and creates the platform where critical thinking and learning integration takes place" (Levett-Jones & Lapkin, 2014, p.1). The debrief method used in this study was the RAS model: reaction, analysis, and summary (Rudolf et al., 2006). During the reaction phase Advocacy-Inquiry was used which begins with an observation or inquiry that explores the participant's actions,assumptions and understandings (Rudolf et al,2007). Also, plus Delta was used in feedback frames during the simulation rotations This technique explores what went well? (Plus column), what did not go well? (Delta column), and how to change? Plus Delta is well suited when time is limited for debriefing or the debriefer is a novice (Thomas et al, 2015).

To address the challenge of EOL conversations in clinical practice, this study initiated a scaffolded approach of VR followed by SP simulation to develop confidence in communication skills, care delivery addressing a person's ethical and cultural values, and enhance learning experiences for undergraduate nursing students in EOL and ACP. The simulation interventions aimed to equip nursing students with communication skills that are useful in navigating conversations with EOL patients in clear, compassionate, and sensitive ways.

Method

Research Question

Does combining VR and SP simulation increase the undergraduate nursing student's confidence and ability to have difficult end-of-life conversations?

Aim

The research aimed to explore the efficacy of simulation-based learning utilizing VR and SPs in a sample of un-

dergraduate nursing students enrolled in a Bachelor of Nursing. The desired outcome was that of increasing student confidence and ability to have difficult conversations around ACP with EOL patients.

Objective

The research trialed the use of VR and SPs in a Bachelor of Nursing program at an Australian University located in the Melbourne metropolitan area and evaluated students' self–reports of confidence around difficult conversations with palliative care clients.

VR and SP

VR for teaching is an innovative educational approach that uses computer-generated simulations to create immersive and interactive learning environments. Learners wear VR headsets to explore 3D worlds, engage in experiential learning, and interact with content (Valmaggia et al., 2016). All students studying EOL experienced the VR through Google Cardboard utilizing a program called VirtualU End of Life Care which was developed specifically for nursing students by the higher education sector, government, and industry. The VR script was written by several palliative care experts who currently work in this area of nursing and reviewed by the project team. It involved a series of 360-degree-video technologies to capture all the variations and potential outcomes resulting from nursing a person given a life-limiting diagnosis and following that care to death. Every student's decision influences what the student would do next and follows a different trajectory depending on the decisions made. Typically, the student experienced VR for around forty minutes followed by a facilitator-led debrief utilizing RAS and Advocacy Inquiry techniques (Hall & Tori, 2017).

One week following the VR simulation all the students studying EOL were involved in SP simulation. The choice to expose the students to VR before SP simulation was deliberate as SP simulation was seen as creating greater emotional intensity and more triggering to the student. This required the students to interact with SPs who were professional actors and had been scripted to portray patients with an EOL prognosis and resultant physical, psychological, and spiritual concerns. Students were required to establish and participate in difficult conversations after a patient had been given a difficult prognosis and establish an ACP with the patient. The learning outcomes required the students to: 1) Holistically discuss future care with a dying person addressing social, ethical, and cultural considerations/concerns, 2) promote quality of life, 3) Learn how to communicate during difficult conversations, 4) Practice the SPIKES technique of communication and 5) Learn how to discuss ACP. Assisted death was not part of the Unit Learning Outcomes (ULOs) for this activity and therefore was not covered by the nursing students in scenarios. The simulation exposure was of three hours duration in groups of 12 rotating between two presentations. Students interacted in threes with the SPs for 20 minutes. Each rotation /simulation was followed by ten minutes of feedback encompassing feedback from participants, peers, SPs, and teachers using the Plus Delta technique. Feedback was guided by the facilitator for each student group and SPs had all been previously trained in feedback by their SP Agency. All SPs were briefed on expectations of their character portrayal by the faculty member who wrote the scenarios. This person was also a qualified simulation educator with post-graduate qualifications in simulation. A prebrief was held with students prior to the simulation to address confidentiality, the simulation process and to create a psychologically safe space. The final debrief encompassed all groups of students together. This was facilitator-led immediately following the simulations and comprised of RAS and Advocacy-Inquiry debriefing techniques. Student counselling services were available if required and students were aware of how to access this service. Due to the emotional intensity of the role SPs were de-roled by changing out of hospital gowns, and discussing with faculty the challenges and gains from the simulation.

Research Design

This pilot used a single-arm, pre-post repeated measure design. The VR and SP occurred two times between November 2022 and October 2023; data were pooled.

Ethics

This study received ethical approval from the University's ethics committee, HREC approval number 20226719-10993.

Participants and Sample

A convenience sample was recruited from third-year undergraduate nursing students studying the EOL core unit in 2022 and 2023, with the total population of students being 219. All students in the course were exposed to the VR and SP teaching approaches. Participants were recruited via face-to-face and announcements on the unit's learning management system (LMS). Students were informed that participation was anonymous and that they would not be disadvantaged if they did not participate. Consent information statements were included in the announcement and printed in hard copy and dispersed in the classroom. Consent was implied by completing the surveys. Surveys were placed in Qualtrics and the link to the online surveys was placed in the LMS announcement both pre-VR for the pre-intervention survey and post-SP simulation intervention for the post-intervention survey. In total, 79 students participated in the VRSP study, 34 completed the surveys in 2022

and 45 in 2023. Qualitative feedback was obtained from 79 responses to the open-ended survey questions.

Procedure

Each student generated a unique code to match pre- and post-surveys; no direct identifiers were collected. Participants received both VR and SP simulation experiences. The EOL unit at the University was delivered in a scaffolded learning approach. Students were initially exposed to theory and the application of that in case studies. They were then exposed to VR in which they could make mistakes unobserved, and this was followed by SP simulation a week later. This was a deliberate scaffolding of the learning as the SP simulation was seen as more confronting and emotionally triggering due to the live presence of SPs, faculty, and peers. It was also anxiety provoking due to the requirement to perform in front of faculty and peers. The simulated experience followed the model currently used in the University's simulation programs and ensured all stages of quality simulation were adhered to (Box 1).

Measures

A 5-point Likert scale, 13-question survey, rated from strongly disagree to strongly agree along with some open-ended questions on satisfaction with the learning experience. Survey questions were selected from Lazenby, Ercolano, Schulman-Green, and McCorkle (2012) End of Life Professional Caregiver survey (EPCS) comprising 28 questions across three domains. Validity and reliability Cronbach's alpha 0.69-0.93 and Desbiens and Fillion (2011) Palliative Care Nursing Self-Competence Scale (PCNSC) comprising 50 questions across three domains. Cronbach's alpha is 0.97 and Content Validity Index is 0.95. From the longer validated questionnaires, 13 items were chosen through deliberate selection as they closely aligned to the learning outcomes of participating in difficult conversations about ACP focusing on communication, care delivery, and cultural and ethical values. The simulations provided for a small subset of EOL care and did not provide an opportunity for the participants to interact with family members, or multidisciplinary teams, assess functional status over time, or provide interventions at EOL e.g., medical relief and psychological treatments. The two

Box 1 – Model for Simulation (Hall, 2017).

1. Student Preparation
   - The environment "must reflect real working conditions" (National Industry Skills Council Australia, 2016)
   - Students are given revision guidance/resources, learning outcomes, information, and expectations of the simulation experience in sufficient time to prepare.
   - Counseling services alerted if there is a possibility of students needing this.
2. Student Brief
   - Constructive peer feedback (what was done well, missed opportunities).
   - Safe environment (respect and confidentiality).
   - 'Pause and discuss' (if the person does not know how to proceed, to stop concerning practice).
   - Learning outcomes.
   - High expectations.
3. Simulation
   - High fidelity where possible.
   - Clear frames.
   - Duration 10-45 mins.
   - Student safety.
   - Groups size 8-12 students.
4. Debrief
   - Structured.
   - Away from the simulation where possible.
   - Video assisted?
   - If feedback used between simulation, debrief can be shortened.
   - Any psychological distress attended to.
5. Evaluation
   - Student evaluation sheets.
   - Peer feedback.
   - Data collated and reported.
   - Faculty and Actor feedback.

scales selected were aimed at the clinical context and did not relate to the education context of undergraduate nursing. To address this we utilized items 2,3,4,12,13,16,17, and 26 from the End-of-Life Professional Caregiver survey (EPCS) and items 23,24,32,33, and 45 from the Palliative Care Nursing Self-Competence Scale (PCNSC), to create a modified survey of 13 items that would meet the needs of the study. In the 13 items, three factors were identified from Lazenby's (2012) instrument being Patient communication (PC), Cultural and Ethical values (CEV), and Effective Care delivery (ECD). Reliability and validity of the modified 13-item VRSP scale were demonstrated through reliability measures and principal component analysis (Norris et al., 2015; West, Mills, Rowland, & Creedy, 2018). The Cronbach's alpha for the modified 13-item scale was found to be 0.92 at pre-VRSP (T1) and 097 at post-VRSP (T2). Principal component analysis justified 13 items of one-dimension factor both pre-VRSP and post-VRSP with 52% and 73% total variance explained by 13 items respectively with significant loading for individual items (Table 2).

Results

In total, 59 participants completed the pre-intervention survey in 2022 and 63 participants completed the post-intervention survey. A total of 76 participants completed the preintervention survey in 2023 and 84 post-intervention. Once the two samples were cleaned and merged there was a total of 79 participants. Other samples were omitted as they did not match their unique identifier in pre- and post-surveys. Qualitative feedback was obtained from responses to the open-ended survey questions.

Quantitative Data Analysis

For quantitative data obtained from the evaluation tool, descriptive statistics were used initially to analyze the measures and their distribution with respect to participants' demographics, as well as the variation of the outcomes at two time points (pre and post). Data were approximately normally distributed; thus, parametric statistical analyses were used. A paired samples t-test compared means of total VRSP score and 13 items pre (T1) and post (T2) VRSP. Principal component analysis and reliability analysis were also used for the total 13-item scale to validate the single scale and its internal consistency. Seventy-nine participants were sufficient to detect a significant pre-post effect (T1 = pre-VRSP, T2 = post-VRSP) with a moderate to strong effect size, at a power of 80% and a type 1 error rate of 5% (Cohen, 2013). Three items had 1 missing value (1.3%) and missing values were substituted by scale means. Data were analyzed using SPSS Version 29 and R 4.0.2.

Table 1 – Characteristics of the Participants (n = 79).

Variables	N/Mean	Percentages/SD
Age*	27.28	9.23
Sex		
Male	14	17.7
Female	65	82.3
Born in Australia		
Yes	48	60.8
No	31	39.2
Prior experience with VR		
None	57	73.1
Beginner	20	25.6
Intermediate	1	1.3
Experience with Advance Care Planning		
Yes	13	16.7
Maybe	20	25.6
No	45	57.7
Prior experience with End-of-life Care		
Yes	42	53.8
Maybe	8	10.3
No	28	35.9
Anyone close to you have an Advance Care Plan		
Yes	16	20.3
Maybe	11	13.9
No	52	65.8

* Metric variable, SD: Standard deviation; mean and Sd used for metric variable

A total of 79 students successfully completed both the pre and post-VRSP surveys. The background characteristics of the participants are presented in Table 1. The participants' average age was 27.3 years, with an age range spanning from 18 to 55 years. Of these, 82% of students identified as female, while the remaining 18% were male students. Within the group of 79 students, 61% were born in Australia, while the remaining 31 students were born in other countries (Table 1).

Table 2 reveals a notable increase in the average responses to all 13 questions (items), indicating a substantial enhancement in participants' learning experience on EOL from pre-VRSP to post-VRSP.

Qualitative Data Analysis

All qualitative comments were read and coded by two researchers for analysis. Data was analyzed utilizing the six phases of thematic analysis outlined by Braun and Clarke (2006; 2022). These phases included familiarization with the data, initial code generation, theme construction, theme review, definition and naming of themes, and report production. This led to a inductive approach to data analysis, initiated from the bottom up to facilitate the initial categorization, themes were then generated and reviewed resulting in 20 subthemes and seven themes (Table 3).

Table 2 – Comparison of Mean Scores for Pre-and Post VRSP (n = 79) Among Nursing Students on 13 Items and the Loading of Each Item on the Modified Factor VRSP.

Items	*VRSP factor loading*		*Pre-VRSP M(SD)*	*Post-VRSP M(SD)*	*p-value /Cohen's d*
	Pre-VRSP	*Post-VRSP*			
1. I can discuss death and dying with a Palliative Care patient and their family.	0.678	0.732	3.61 (0.775)	4.06 (0.790)	<0.001 / 0.917
2. I can set goals for end-of-life care with patients and families.	0.758	0.880	3.61 (0.823)	4.24 (0.820)	<0.001 / 0.922
3. I am comfortable talking to patients and families about personal choice and self-determination in the end-of-life context.	0.652	0.886	3.77 (0.816)	4.30 (0.774)	<0.001 / 0.959
4. I am comfortable starting and participating in discussions about code status.	0.816	0.866	3.59 (0.855)	4.10 (0.810)	<0.001 / 0.972
5. I encourage patients and families to complete advance care planning.	0.560	0.831	3.90 (1.008)	4.46 (0.813)	<0.001 / 1.163
6. I am comfortable dealing with ethical issues related to end-of-life/hospice/ palliative care.	0.709	0.888	3.68 (0.856)	4.08 (0.813)	0.002 / 1.091
7. I can address spiritual issues with patients and their families.	0.649	0.772	3.70 (0.790)	4.13 (0.853)	<0.001 / 1.046
8. I can help a patient and their family to explore various sources of hope when they demonstrate signs of hopelessness.	0.696	0.847	3.71 (0.803)	4.18 (0.781)	<0.001 / 1.048
9. I can assist a patient to explore the meaning of their illness.	0.579	0.831	3.58 (0.778)	4.15 (0.849)	<0.001 / 1.058
10. I am comfortable dealing with patients' and families' religious and cultural perspectives.	0.621	0.816	3.84 (0.808)	4.08 (0.859)	0.038 / 1.015
11. I feel confident addressing requests for assisted death.	0.623	0.616	3.32 (0.955)	3.85 (1.087)	<0.001 / 0.945
12. I am comfortable providing information to a patient concerning the legal issues associated with a life-limiting illness.	0.684	0.872	3.27 (0.916)	3.99 (0.899)	<0.001 / 1.120
13. I can assist the patient to make informed decisions regarding end-of-life care.	0.728	0.758	3.52 (0.932)	4.26 (0.808)	<0.001 / 1.127

The overall mean VRSP score was significantly higher at post-VRSP than pre-VRSP, t (78) = 6.20, $p < 0.001$, Cohen's d = 0.70, indicating a significant improvement of participants' self-reports of the learning experience after attending the simulation study.

Students found simulation education to be a highly beneficial and unique learning experience, characterized by several key themes: realism, interactivity, skill development, and a safe environment. Realism and real-life experience stood out as one of the most appreciated aspects.

"Getting to experience such realistic situations that I've never been in before. Learning how to communicate and respond to palliative patients."

"The actors are very real; it is very easy to get into the situation."

"Actors were incredible, very realistic scenarios."

The realistic scenarios enabled students to engage in hard conversations in a secure and supportive environment, which helped them gain the skills and confidence needed for their future professions.

"The opportunity to have these conversations in the safe environment of simulation."

"It allowed me to feel more comfortable talking about this difficult topic."

"Real life experience in a safe space."

Interactivity was another highlight, as students embraced the opportunity for individualized and interactive learning, allowing them to engage with SPs and ask questions during the simulation.

"…the fact that it was interactive and was a different approach to learning."

"It was different to any other simulation I have ever taken part of it was individualized and interactive."

The feedback from SPs further enhanced their learning. The simulation served as a practical tool for skill devel-

Table 3 – Sub-themes and Themes.

Sub-themes	Themes
Skilled SPs	Realism
Real life experience	
Realistic scenarios	
Realistic interaction	
Immersion in VR	
Engagement	Interactivity
Interacting with SPs in character	
Constructive feedback	Skill Development
Actor feedback	
Opportunity to practice	
Confidence	
Discussion	
Time to process information	Safe Environment
Relaxed Environment	
Peer support	
Small groups	
Performing in front of the class	Group size
Large groups	
Past experiences	Emotional Intensity
Confronting topic	
	Scenario repetition

opment and learning several ways of having conversations and formulating questions.

"Being able to learn new ways to approach end of life care."

"Learning how to interact with the patients and how to formulate the best questions to continue conversation."

"How good the actors were and the feedback they provided."

The engagement of SPs and the realism of their performances were also commended. The SPs' abilities to vary their reactions and portray different patient personalities added depth to the learning experience. Students appreciated the safe environment that the simulation provided, enabling relaxed conversations without rushing. The SPs' simulation feedback contributed to a positive learning atmosphere. Furthermore, for visual learners, the alternative learning approach was a significant advantage. Overall, the simulation allowed students to practice real-life scenarios and helped them develop the skills and confidence necessary for their future careers in nursing and communication.

Students had various concerns and reservations about simulation education, reflecting a range of themes including group size, emotional intensity, and scenario repetition. Group size was an issue, with a few students feeling uncomfortable in larger groups during the simulation.

"Initial fears about performing in front of others."

"The groups were too big."

Additionally, the limited time allocated to the simulation, often just one class, was seen as insufficient, leaving little room for comprehensive learning. The emotional intensity of some scenarios was another common challenge, particularly when dealing with negative emotions, confronting topics such as death, or revisiting emotionally charged personal experiences.

"Confronting hard topics such as death."

"The emotion payload that needed to be unpacked."

Anxiety and nervousness before and during the simulation were prevalent, as students feared making mistakes and discussing potentially traumatic topics. Repetition of scenarios and a lack of scenario variety were also mentioned as downsides, with students expressing a desire for more diverse experiences. The use of VR technology caused discomfort for some, leading to dizziness. Cultural issues and a lack of appropriate support were raised, particularly in dealing with silence and cultural differences. Despite these challenges, students found the simulation to be valuable and expressed that they learned a lot from it. The experiences and feedback offered an opportunity to address shortcomings and improve future simulations. Overall, while simulation education offers a unique learning experience, it also presents a range of discomforts and challenges that need consideration and adjustment to enhance its effectiveness.

Discussion

There was a statistically significant improvement in participants' self-assessment scores of their knowledge, skills, and behaviors after attending the simulation study with most items on the survey questionnaire having a p-value <0.0001. Evidence for virtual reality educational environments for educational benefit is emerging as a research focus (Barteit et al 2021; Allcoat et al 2021), literature about combining virtual and augmented realities into one teaching method in nursing undergraduate programs still requires more investigation. Evidence exists for the education gains made for end-of-life higher education teaching in undergraduate nursing programs using the simulated participant/standardized patient approach, with large effects on knowledge improvement and care performance (Tamaki et al 2019). Our study reveals combining two simulated educational experiences can produce highly significant self-reported improvements in the learning experience across care performance, communication, and confidence. This finding is particularly important in topic areas taught in undergraduate nursing programs that may be triggering for nursing students, such as the topic of end-of-life care.

Overwhelmingly, students were satisfied with the VR and SP simulation education which they described as a

highly beneficial and unique learning experience. The experience was seen as realistic and authentic which allowed students to engage effectively with content, and increases knowledge and confidence (Kirkpatrick, Cantrell, & Smeltzer, 2020; Levin, Frei-Landau, Flavian, & Miller, 2023). The simulation education combined both active and observational participation for all students and students valued the interactivity and immersion afforded. The ability to receive real-time feedback from SPs, peers, and facilitators was enhanced by the structured facilitator debrief at the end of the simulation and was equated with skill development as supported by best practice research (Hall & Tori, 2017; INACSL Standards Committee, 2021). Students also appreciated the safe environment that was established by attention to confidentiality and the use of smaller groups, and this assisted with psychological safety, being able to make mistakes, and open discussions (Cantrell, Meyer, & Mosack, 2017; Hall & Tori, 2017).

Although qualitative feedback was overwhelmingly positive there were still some criticisms that warrant discussion. The VR and SP simulations were emotionally intensive and emotionally challenging for some students suggesting more attention should be given to increasing resilience and support prior to exposure. It was also identified by some participants that the duration of the immersion was too long or too short and some found the repetition of the scenario was a downside. This repetition is supported by simulation research that suggests observing peers prior to simulation experience results in enhanced student learning (Livsey and Lavender-Scott,2015). It was also felt that repetition would reduce some of the emotional responses of the highly triggering content and by scaffolding with VR first followed by SP simulation much of this could be mitigated. Group sizes were small and consisted of 12 students to enable peer interaction and to reduce performance anxiety however some students found this too large and due to the emotional content smaller group sizes may be a better solution literature suggests a group of six should be the maximin in a scenario but does not define the number of observers that can be present (Au, Tong, Li, Ng, & Wang, 2023).

Limitations

Convenience sampling from one university limits generalizability. Only a small subset of questions was able to be incorporated from two validated instruments. Given the utilization of items from two established questionnaires, it is essential to exercise caution when generalizing the results. Furthermore, in a future study with a larger sample size, both exploratory and confirmatory factor analyses can be employed to create and validate sub-scales based on the 13 selected items. The SPs and students did not initiate any discussion around Voluntary Assisted Dying and this was an omission in the script, learning outcomes and SP brief. In future studies this would be included. As this study investigated both combined SP and VR simulation as an intervention it is not able to determine where SP simulation or VR alone could produce similar results or whether the combination of SP/VR simulation is superior.

Conclusion

EOL and ACP are complex and challenging aspects of nursing care provision. Preparing nursing students to navigate complex content by providing a realistic experience that is scaffolded using VR then SP is a promising education approach for nursing curriculums. Providing a scaffolded approach combining VR and SP simulation produced statistically significant improvements in students' confidence, care provision skills, and knowledge in this area. This was also equated with a high level of satisfaction and engagement in learning by participating students.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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