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Title:

Using Virtual Reality to improve overall well-being for hospice patients.

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Acknowledgements:

The patients that took part in the study and the hospice staff and volunteers at St Columba's Hospice for enabling it to take place.

Billy Agnew and Viarama for bringing the Virtual Reality equipment and running the sessions.

Professor Jan Dewing, Sue Pembrey Chair in Nursing and Director of The Centre for Person-centred Practice Research at Queen Margaret University, Edinburgh, for reading and offering advice on the manuscript.

Word Count

3687

ABSTRACT

Background

Virtual Reality (VR) technology as a therapeutic intervention has been gaining attention in health care settings in recent years. Studies suggest that using the technology can help alleviate symptoms such as pain and anxiety and induce positive emotions for people in hospital. Managing symptoms and promoting emotional and psychological well-being are core palliative care goals of relieving suffering of people with life-limiting illness. Accordingly, VR may be highly beneficial for use in hospice care yet remains underdeveloped in such settings. This qualitative study aimed to trial the technology and consider what benefits may emerge for hospice in patients.

Methods

A one-off VR session was offered to patients at a hospice in Scotland. Sessions were observed by a researcher and followed by qualitative semi-structured interviews to discuss the experience with those who took part. Interviews were audio-recorded, transcribed and thematically analysed.

Results

Nineteen hospice patients successfully tried an immersive Virtual Reality experience. VR sessions were acceptable for people within the hospice environment. The majority of participants enjoyed the experience. Many expressed joy and delight at the process. Virtual Reality holds possibilities for relieving symptoms such as pain and anxiety frequently experienced by people in hospices. Furthermore, the technology offers the capacity to reconnect with a previous sense of self and to allow respite through the capacity to transcend current reality and connect with another meaningful reality. This exploratory study offers a starting point for larger studies to investigate the utility of Virtual Reality for hospice patients.

Key Messages:

- Virtual Reality (VR) can help to alleviate symptoms and emotional well-being
- Benefits of VR in hospice settings remains underdeveloped
- Hospice patients enjoyed the technology
- VR offers symptom relief and respite from the current reality
- VR can improve well-being for hospice patients
- Larger studies across a range of sites are needed

Keywords:

Virtual Reality

Palliative Care

Hospice Care

Well-being

Qualitative Research

INTRODUCTION

Over the past two decades, the use of Virtual Reality (VR) within health care has been gaining attention. What initially began as a form of entertainment has expanded into a therapeutic application for people with various acute and chronic conditions. VR may be ‘non-immersive’ where interactions with the virtual world occur via a computer screen or ‘immersive’ where all visual stimuli experienced by the user is that of the virtual environment through a headset and the person can feel like they are ‘in’ the virtual environment [1].

Several studies have confirmed positive outcomes for people using VR for conditions such as anxiety disorders, phobias, post-traumatic stress syndrome and eating disorders as well as for pain management [2-5]. Meta-analysis shows VR as most effective in acute pain but with less clear evidence in chronic pain [6]. Immersive versions of VR technology in particular have been found to have greater analgesic effect compared to non-immersive and in increasing pain tolerance as well as threshold [7]. In people with terminal cancer, VR has been shown to be safe and effective in improving common symptoms experienced by people with cancer, including pain, tiredness, drowsiness, shortness of breath, depression, anxiety and in enhancing overall well-being [8].

VR has also been employed to promote emotional well-being and induce positive emotions for people in hospital. Research into the clinical applicability of VR in health care settings remains in its infancy and, until now, little research has focused on VR in a hospice setting. Those in palliative care settings can experience psychological and existential suffering as they face adapting to irreversibly changed life circumstances and the end of their life. They may be mourning the loss of potential futures that may include the reality of not being able to physically visit places that they wished to or return to places that have been important or meaningful for them. VR has the potential to contribute to health and social care through helping to relieve symptoms and also has the capacity ‘to address the psychological, existential and spiritual aspects of a person’s dying experience’ [9]. Specific benefits may emerge for people whose deteriorating health limits their quality of life and ability to access positive experiences.

We undertook a small-scale qualitative study in an in-patient hospice setting to explore the potential benefit of VR for palliative care patients. Outcomes may have relevance to other hospice settings or to palliative and end of life care more broadly.

Aims

The aim of this study was to explore the acceptability and potential benefits of using immersive VR for people with life-limiting conditions in a hospice setting in Scotland/UK.

Research Questions:

- Is VR acceptable to people with life-limiting conditions within a hospice setting?
- What are the potential benefits of VR on the well-being of those with life-limiting conditions?

Ethical Issues

Ethical approval for the study was granted by Queen Margaret University Edinburgh Research Ethics Committee (REP0108).

METHODS

This was a qualitative study using observation and interviews. Qualitative methods allow participants to articulate their responses using their own terms and can elicit rich contextualised accounts of a situation or phenomenon [10]. This study was carried out utilising a constructivist epistemology that considers knowledge to be socially constructed [11]. The approach recognises that people ‘create, negotiate, and interpret meanings’ within a particular context [12]. Accordingly, the person’s experience of VR will be constructed in relation to the context of their diagnosis, life expectancy and experiences of the hospice and their wider social experience and history.

Recruitment and population

A convenience sample was sought. Participants were recruited from an independent hospice in central Scotland. The hospice provides both inpatient care and day services to those with supportive and palliative care needs referred from both primary and secondary care settings.

Clinical staff were asked to identify people that they considered would be suitable participants based on their clinical judgement regarding whether the person would have the capacity to manage a session and ask if they would be interested in trying it out. Potential participants were then approached by the hospice researcher to ask if they would be willing to hear about the study. If so, they were given a brief description of what was involved and an information sheet to read that outlined the researchers’ backgrounds and reasons for doing the study, and told that the researcher would return the following day to answer any questions and to carry out the VR sessions. If a family member was present they were able to observe the sessions if they wished.

Inclusion criteria

Adults diagnosed with an advanced life-limiting condition who are inpatients or were attending the outpatient unit and expected to be in the hospice for at least 1 week and with a life expectancy over 1 month and who have been in the hospice for at least 24 hours. Those with the capacity to speak and understand English enough to give informed consent and to take part in the intervention and interview.

Exclusion criteria

Those that staff considered to lack sufficient capacity to give informed consent to take part in the research. Those who may struggle to consent and take part due to their level of English comprehension and/or speech.

Consent

Consent was sought prior to the sessions taking place. All potential participants were made aware that they could choose to change their minds about taking part when they saw the equipment and could terminate the session at any point.

The VR sessions

30-minute VR session where participants were immersed in a virtual world, using ‘room-scale’ VR technology that tracks the user’s movement and relates them to the virtual world, guided by a highly experienced

VR facilitator (BA). Participants wore the headsets with headphones and were able to engage in the session while remaining in their beds or sitting in a wheelchair which could be moved around as necessary by those assisting or standing if they were able. Finding the correct interpupillary distance and refraction for an immersive VR session can be controlled by properly locating the headset. This requires good communication to be had with the user, and was the approach used here. The session began by the facilitator (BA) demonstrating the technology when the participant was immersed in a simulated underwater environment. They were then asked to decide upon a destination of their choice.

Data Collection

Semi-structured interviews took place during the 24 hours following the VR session. Individual semi-structured interviews were conducted by AL, a research fellow, and EH Director of Education and Research, both experienced female qualitative researchers, over a 9-week period within the hospice. The interviews were carried out with just the participant and the researcher present and utilised open-ended questions to explore participants' experiences of and responses to the VR session. Interviews were audio-recorded and lasted around ten to twenty-five minutes each. Parallel data analysis was used to inform subsequent data collection and to allow ongoing consideration of when data saturation was being reached [12]. Observations were carried out and patient verbal responses and non-verbal reactions to the session were noted down alongside places that were visited and any verbalisations given regarding these decisions.

Data Analysis

Interviews were transcribed from audio recordings verbatim. Anonymity was ensured by allocating anonymous identifiers in place of names and with all names and places omitted in the transcripts. Data were analysed using thematic analysis [13]. Initial coding was carried out using NVivo12. Themes were developed and refined inductively, through repeated re-reading of the transcripts. Data from observations were used to provide contextual understanding of what occurred in the sessions in terms of what places were visited and how patients appeared to respond to the virtual reality session.

RESULTS

Twenty five participants were approached and twenty were recruited and took part in a VR session although due to difficulties with internet access one session was unsuccessful. Five people declined to take part stating disinterest in the technology. Nineteen participants thus took part in a full VR session and subsequent interview. Interviews lasted approximately 10 to 20 minutes. No participants subsequently dropped out. Table 1 shows the background information regarding the 19 recruited participants.

Table 1: Table of participants

Participant	Gender	AGE	Illness
P1	Male	71	Cancer
P2	Female	102	Cancer

P3	Male	64	Organ Failure
P4	Male	82	Cancer
P5	Female	81	Cancer
P6	Female	67	Cancer
P7	Male	58	Cancer
P8	Male	39	Cancer
P9	Female	75	Organ Failure
P10	Female	46	Neurological
P11	Female	74	Cancer
P12	Male	77	Cancer
P13	Female	72	Neurological
P14	Female	68	Cancer
P15	Female	40	Cancer
P16	Male	74	Cancer
P17	Male	72	Cancer
P18	Male	82	Cancer
P19	Male	79	Cancer

Overall, participant responses were generally positive towards their experience of VR with some neutral responses given. Negative responses were offered very infrequently and were mild. Participants described virtual reality experiences that they had chosen that were personally meaningful for them in terms of being fulfilling or in helping to access memories. Participants chose to virtually visit various different places during a session. These were places where they had spent periods of their life, for example a childhood home, previous holiday destinations or places that they had always wished to see such as Paris or the Grand Canyon. It was evident from the responses during the session of nearly all participants that the experience had positive impact. Words such as ‘wonderful’ and ‘amazing’ were voiced along with smiles and laughs as descriptions of the places were offered if they had been places of relevance to the person. Some descriptions and explanations were detailed with personal stories regaled animatedly and accompanied by smiles and sighs.

Key findings are presented under three themes: the capacity for new experiences, the capacity to reconnect with the past and the capacity to forget.

The capacity for new experiences

Some participants were able to find a degree of fulfillment through having new experiences, be that visiting places in the world that they had never been able to, or doing something they had been afraid of doing. These were experiences that would be beyond the capacity of those involved as a result of their physical illness.

Participant 15 had wanted to visit other parts of the world, however her terminal diagnosis in her early 40s had cut short her capacity to do so.

P15: 'I've always wanted to go [to New York] but obviously I can't fly, so I won't be able to go, but um, yeah it was really good'

P15: 'It was different; it was really good.'

Interviewer: 'So what did you enjoy about it?'

P15: 'Just seeing the world, because not everyone can – just being able to see physically the buildings and the surrounding areas and stuff like that. It was really good.'

For participant 15, this feeling of fulfillment extended beyond the session itself to the following day.

P15 'Yeah; I don't know what it was but I just felt happier. Yep.'

Interviewer 'Than before you had it?'

P15 'Mmm hmm.'

Interviewer 'And are you still feeling happier?'

P15 'Yeah. I just think it's the memory I have of going there.'

Participant 9 had been disappointed to miss a planned trip to New Zealand yet was able to virtually visit during her session. The surprising element was that she was able to find peace with the idea that she had not really missed out on as much as she had thought she would have. Looking down the city streets and even across some scenic sights had proved underwhelming.

P9 'It kind of proved that I wasn't really missing anything by not going to New Zealand.'

Being able to do something that had previously been fearful was described joyfully also. Participants could enjoy the experience whilst knowing they were completely safe almost overcoming their fears.

P14 'I could look and stare a whale in the eye and I could look underwater and I wasn't scared! You know, normally I think, you know if you look underwater, if you put your head under the water you're terrified. I would just have my eyes shut all the time.'

Interviewer 'So that's, a lifelong thing that you may not have ever wanted to go underwater but you got to experience going underwater without having to actually do it?'

P14 'Uh huh. Without the fear of water.'

Participant 14 was also overwhelmed by being able to visit Paris and also go to Monet's garden. She had always wanted to travel and been unable to due to the ill health of her husband.

P14: 'Because he [husband] could never ever take me [to all the places that I wanted to see in the world]. You know. Much as he wanted to, he can't. He's got a bad heart so he can't do anything. Anyway so, we just sat and talked about it the whole night.'

Monet's garden was also highly significant for her. Before the session, she described her love of art and her great passion for the impressionist painters. The experience of feeling like she was in the garden was profound.

P14: 'And then I've always been interested in art.'

'There were so many flowers and I kept looking and each one you saw was bigger than that one and I would never get to see that amount of flowers in a lifetime. You know. And I've always wanted to go to Monet's garden, just to see the waterlilies. And I did, and I've seen them. It was amazing.'

Capacity to reconnect with the past

Many participants were particularly moved by being able to visit places, often from younger days, that they wished to see again expressing that this had allowed recourse to a happy time of life.

P2 was the oldest participant in the study aged over 100. She had been feeling low in mood as she anticipated a move to a care home. Using the VR allowed her to access experiences from her life and bring back memories that allowed her connect to the past. This was profoundly moving for her and helped to lift her mood following the session.

P2: 'I love mountains. I always go up the Highlands every year if I can. I love the mountains. So I think it brings back memories.'

'I was really depressed but [it was] nice seeing all those places and seeing those different places where you were happy made a big difference.'

For others, the memories allowed what may have been a sense of closure. Participant 11 was able to visit her childhood home. This again enabled her to reconnect with her past and the comfort that the home remained largely unchanged with many of the garden's trees still there. She described various parts of the house and garden each told with individual stories of events and characters from her childhood.

P11: 'I was absolutely thrilled to put my home address in and see the house that I was born to seventy-five years ago. And I can be quite an emotional person and I wondered if it would make me cry. I wonder if it was the way I saw it. I didn't think I would see it as clearly as I did but I also knew there was a distinct possibility that the area around it might have been changed or even demolished. But it hadn't. I was thrilled to bits.'

'So it was very – it was a lovely memory and I had all sorts of childhood memories.'

'And also a memory is of my father sleeping in a deckchair on a Sunday. And I was also sitting in a deckchair shelling peas for lunch. It was just lovely. I wasn't remotely sad. I was actually very energized by it.'

Participant 11 also was able to address her experience of coping with functional loss following from her illness by reconnecting with the many positive experiences of her life. Being able to re-visit places highlighted and enhanced positive memories.

P11 'And that was actually good because recently there's been a lot of my life which has been involved in loss, tragically. Em, I'm not talking about death; I'm talking about loss of function so for me the things that I remembered and being with my husband – so it was a good thing to do.'

'It was a joyful thing and even going to Greece was a deliberately joyful thing.'

For other participants, the memories specifically brought back family members that had died long ago and rekindled comforting childhood emotions.

P14 [my family] always – we loved watching cowboy films when we were wee. We were raised with the cowboys. And it was so nice being so close to knowing that a film that John Wayne made, in the Grand Canyon.'

'I really felt like I was with my Dad. In the Grand Canyon waiting to meet John Wayne.'

'And it was lovely to have the sense the feeling that your family were quite close.'

P15 'It brought back memories of generally we would go there on the Sunday. We lived about thirty-five miles away, so our Sunday outing would have been there. And my Mum and Dad would have been asking me to get out of the car, and I was only a small child at the time, but all I wanted to do was read my book, lie on a rug and read my book.'

Capacity to forget

The majority of those who used the VR described the experience very positively with emotional reactions that were uplifting including joy and happiness (often associated with the past) in a manner that suggests being lifted out of their current situation. This is most evident in the use of dreaming as an explanatory metaphor or the suggestion that life was again capable of bringing joy.

P14: 'But this was a dream – normally it's a nightmare – but it was anything but a nightmare: it was a joy; a pleasure. I was so happy. I was like just leave me here; come back and get me whenever you need to but I don't want to go.'

'I mean when I came back, to reality. You come back with a sort of bounce!'

Interviewer: 'Did it make you feel anything while you were doing it?'

P16: 'Happy'

Interviewer: 'OK'

P16: 'Yeah. Like life's worth living'

This capacity to be virtually removed from one's current physicality allowed some participants to be able to forget their pain.

P13: 'I had no pain whatsoever. It really took me out of myself.'

Similarly, participant 19 left the session saying he had been unaware of pain that had been notable just prior to the session.

Interviewer: 'And afterwards you said you didn't feel pain while you're having that. Do you remember that feeling?'

P19: 'Yes, I mean I was thoroughly involved in the um experience which you might say – yes'

Participants also described having felt removed to another world and experiencing feeling calm and relaxed during the sessions, feelings that could be maintained after the session had ended also.

P4: *'very relaxing. Yeah. Eh calming.'*

Interviewer: *'Calming?'*

P4: *'Very calming. Yes, like being in a different world.'*

Interviewer: *'And did he start off with the underwater thing?'*

P18: *'Yes, he did. The fish swimming past.'*

Interviewer: *'Yes, the fish swimming past. So, what was – how would you describe what it was like?'*

P18: *'Another world.'* *'Personally I thought certainly it was relaxing'*

Interviewer: *'And do you remember how you felt afterwards?'*

P18: *'I was..... Calm'*

DISCUSSION

Our findings suggest that VR is acceptable and has benefits for people who are inpatient in a hospice setting. The key findings of the study demonstrate that VR can have a positive impact on well-being for patients receiving palliative care through the capacity to transcend their current reality and to connect with another meaningful reality. This is reflected in the themes that emerged in the study describing the capacity for new experiences, for reconnecting to past experiences and to forget the present.

Transcending the physical illness of the body was possible through the capacity to become absorbed in another reality and forget the physical self. How the body is experienced can be described according to four distinct but intertwining dimensions of embodiment based on Husserl's concepts. First is the affective element where the body is the bearer of sensations. Second is the functional element where bodily movement characterises physical capacity. Third encompasses the material aspect where the body exists as a physical entity in the world. Fourth is the social element where the body is that which interacts with others in the social environment [14]. Thus an individual's body is experienced through the physical existence and through feeling, acting and interacting. The present reality of physically being ill and in a hospice imposes limitations on the overall experience of existence due to the declining physical body. However, through entering the virtual world people were able to transcend the bodily sensations of illness and the constraints of the ill body.

Transcending the present could occur through remembering the past via potent or happy memories. Transcendence in both of these contexts may be important in terms of enabling connection with one's sense of self in terms of life story and to offer avenues for asserting a sense of self identity, through re-connecting to the past and to a coherent life story [15]. It was evident that the sessions enabled a degree of connection with people who had been important in the past through triggering strong memories and associations. A key component of Chochinov's model of 'Dignity-Conserving care for addressing suffering towards the end of life' involves maintaining the continuity of self [16]. In our study it was evident that the capacity to retreat to memories brought solace often through a level of re-experiencing the social bonds that the experiences rekindled. Participants in our study connected with places and experiences of their past such as visiting somewhere they used to live or an enjoyed holiday destination. They also experienced places that they were passionate about for example the lady who had a lifelong love of impressionist painters and was able to visit Monet's garden. She was able to reconnect with her own sense of self as an art lover.

The sessions were able to help people to address internal conflicts by regaining a sense of control through experiencing situations they were not physically able to. Considering psychological and social distress, the VR sessions were able to offer people the capacity for respite from emotional suffering as participants found their experiences to be joyful and calming.

Towards the end of life somatic distress and that which originates from psychological suffering can become ever more entwined and may be unresponsive to the traditional medical symptom management approach [17]. The experiences described following the VR sessions resonate with descriptions of the capacity, when confronting one's demise, to create new understandings or re-evaluations of life's value, meaning and purpose that are important for protecting well-being in remaining time [18]. More broadly, what may be regained here is an element of personhood. McCormack and McCance describe personhood as 'Connecting with an innate sense of ourselves as human beings with feelings, emotions, thoughts and desires is an essential component of being a person and de facto having personhood' [19 p15]. People who are living with non-curable illness towards the end of life can experience loss of personhood through reduced physical independence and control of bodily functions [20, 21] that can also challenge social identity [22]. Such experiences are exacerbated by a focus on the physical body. VR sessions can offer the capacity to reconnect with the sense of identity of the personal and social self that can tackle threats to personhood. It is within these areas that VR may have its greatest potential for alleviating suffering for those in hospice or palliative care settings. By focusing on traditional bio-medical understandings of illness, the capacity to relieve 'suffering' may be limited [17]. The capacity to link to the person is where VR can be a beneficial driver for person centred culture [23] through offering patients the capacity to regain lost personhood by accessing a broader sense of self and connect with a previous sense of self that is not constrained by the illness experience. Simply put, VR may enable emotionally uplifting experiences that offer people new avenues for coping with a terminal illness and associated symptoms through care that acknowledges the total person as more than the sum of their psychological and physical parts [24].

Chochinov describes the growing awareness in palliative care that patients must not only be made to feel more comfortable but more broadly, provided with comfort. Although the distinction may appear subtle or merely semantic, it is in fact the difference between technically competent symptom management versus a holistic approach to end-of-life care – "an approach that encompasses the psychosocial, existential and spiritual aspects of the patient's experience" [9 p84]. Accordingly, suffering can be alleviated through the soothing of somatic symptoms, psychological distress or addressed simply via Chochinov's description of 'comfort' which involves the relief of suffering that arises from personal anguish in the holistic sense. This may be accomplished through attending to concepts such as meaning and purpose in life, dignity and existential well-being. This study illustrates how Virtual Reality experiences can help to relieve suffering towards the end of life in its broadest sense as defined by Chochinov and Kearny [9, 17] .

Strengths and limitations

The strengths of this study are in its situation in a hospice setting where participants were able to try the technology in a place that was familiar but also to consider its utilisation in such an environment. The sessions were led by the wishes of the patient in terms of what they thought they would gain the most from rather than imposed from outside. Furthermore, the interviews were carried out by the same researchers who witnessed the

VR sessions being carried out which enabled the experience to be contextualised. Finally, the interviews were open to allow participants to discuss their experience and responses without being prompted by the researcher. It should be noted that although people generally responded to the VR sessions in a way that largely concurred with what they said about it, it is possible that they felt compelled to give more positive evaluations and to minimize criticism given the evident efforts of the staff to set up the sessions. The study is limited by the low number of participants and the specific context and delivery as it was a single centre study of 19 patients who received a one-off intervention. It would be useful to investigate larger numbers of participants across different centres and also with the effect of having more than one session, however findings indicate potential benefits for hospice patients and warrants further exploration.

CONCLUSION

First of all, VR sessions are acceptable for hospice patients within the hospice environment. In terms of responses to the technology, some benefits are likely. As people become increasingly unwell with life-limiting illness and towards the end of life, their lives become ever narrowed in terms of physical capacity and scope but also the sphere of inhabitation within which they exist. Life becomes ever more focused on illness, symptoms and treatment, such that the broader aspects of existence are progressively limited and their access is mourned. The sense of self and what previously made up a person's existence can become subsumed into a world of illness, receding into the background as treatment and the physical-self occupies centre stage. This study builds on previous research surrounding VR as a health care technology in an area where it has been little considered and reveals how it can be helpful for hospice patients. This is through the potential to directly impact symptoms such as pain and anxiety by offering the capacity for respite by briefly 'escaping' the restrictions imposed by illness and reconnecting with the self in its broader sense. This study provides encouraging evidence for future larger scale research to explore the use of VR technology in hospice care and to consider bringing it into every day practice.

Conflict of Interest

This project was carried out by St Columba's Hospice and was supported by Queen Margaret University. St Columba's funded the social enterprise firm, Viarama to carry out the Virtual Reality sessions but had no further financial arrangement or involvement or incentive with Viarama. No additional funding was sourced therefore the authors had no financial relationship with funders. Authors have full control of all primary data and are agreeable for this to be reviewed by the journal if requested.