Virtual reality in specialist palliative care: a feasibility study to enable clinical practice adoption

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ABSTRACT

Background The use of virtual reality (VR) is increasing in palliative care. However, despite increasing interest in VR, there is little evidence of how this technology can be implemented into practice.

Aims This paper aims to: (1) explore the feasibility of implementing VR therapy, for patients and caregivers, in a hospital specialist inpatient palliative care unit and a hospice, and (2) to identify questions for organisations, to support VR adoption in palliative care.

Methods The Samsung Gear VR system was used in a hospital specialist inpatient unit and a hospice. Patients and caregivers received VR distraction therapy and provided feedback of their experience. Staff completed a feedback questionnaire to explore their opinion of the usefulness of VR in palliative care. A public engagement event was conducted, to identify questions to support implementation of VR in palliative care settings.

Results Fifteen individuals (12 (80%) patients and 3 (20%) caregivers) participated. All had a positive experience. No adverse effects were reported. Ten items were identified for organisations to consider ahead of adoption of VR in palliative care. These were questions about: the purpose of VR; intended population; supporting evidence; session duration; equipment choice; infection control issues; content choice; setting of VR; person(s) responsible for delivery and the maintenance plan.

Conclusions It is feasible to use VR therapy in palliative care; however, further evidence about its efficacy and effectiveness is needed. Palliative care practitioners considering VR use should carefully consider several factors, to ensure that this technology can be used safely and effectively in clinical practice.

Key messages

What was already known?
⇒ The use of Virtual Reality (VR) is increasing in palliative care.
⇒ However, despite increasing interest in VR there is little evidence of how this technology can be implemented into practice.

What are the new findings?
⇒ We conducted a quality improvement project in two UK specialist palliative care inpatient units to explore the feasibility of implementing VR therapy, for patients and caregivers.
⇒ Our data suggests that it is feasible to use VR in hospital and hospice settings.
⇒ VR was well received by patients, caregivers and staff. All participants described a positive experience with no major adverse effects.
⇒ We identified questions for organisations to consider, to support VR adoption in palliative care.

What is their significance?
⇒ Our data suggests that it is feasible to use VR in palliative care.
⇒ Practitioners considering using VR should consider a number of factors, concerning the evidence and practical issues, to ensure that this technology can be used safely and effectively in palliative care.

BACKGROUND

Virtual reality (VR) is a computerised technology that uses visual graphics, sounds and other sensory input to create an interactive computer world.[1] VR is increasingly used in healthcare for symptom management of several conditions.[1–5] The use of VR in palliative care is growing for variety of purposes, such as education delivery,[6 7] and symptom management in hospital[8] and hospices.[9–12] Currently, there is little guidance of how VR should be used in clinical care,[13] and no information about the organisational requirements (eg, internet connectivity) and system processes (eg, infection

control) necessary to ensure VR can be used safely, effectively and sustainably.

AIM

This paper aims to: (1) explore the feasibility of implementing VR therapy, for patients and caregivers, in a hospital specialist inpatient palliative care unit and a hospice, and (2) to identify questions for organisations to support VR adoption in palliative care.

METHODS

This quality improvement project was conducted according to the Plan, Do, Study and Act (PDSA) quality improvement cycle.[14] The PDSA cycle was chosen as it is an accepted mechanism of implementing change. The project was done through the Liverpool Global Digital Exemplar (GDE) programme.[15] The GDE programme is a knowledge-sharing platform developed by the English National Health Service, which enables digitally advanced hospitals to innovate and share knowledge globally.[16]

Planning/organisation

The project was conducted over 3 months (August–October 2018) in two UK specialist palliative care inpatient units. This included a hospital-based 12-bedded (Academic Palliative Care Unit, Liverpool University Hospitals National Health Service Foundation Trust—LUHFT) and a 20-bedded hospice (Marie Curie Hospice Liverpool—MCHL). Both units provide specialist palliative care services (cancer and non-cancer) to a similar geographical population.

Choice of equipment

The Samsung Gear VR system was chosen due to its portability and ease of use (online supplemental file 1: Virtual reality equipment requirements). This involved a Samsung Galaxy S8 phone positioned in a head-mounted display (https://www.samsung.com/global/galaxy/gear-vr/#gear-vr). The foam-face cushion was replaced with a polyurethane cushion (Cusfull) to enable decontamination between participants (via 70% isopropyl alcohol wipe). Bluetooth headphones (Sony WH-CH500) were connected to the phone to provide audio.

Participant evaluation

Inpatient admissions (both sites), outpatients (hospice only) and caregivers (both sites) were identified by clinical staff (MM—MCHL; SR—LUHFT) and were offered the opportunity to use the VR system. Participants providing written consent were asked to choose one of three VR experiences and complete an evaluation. The VR experiences were downloaded from the Oculus Gear VR store[17]; these included: (1) a 5-minute-guided relaxation video of a beach (Relax VR[18]); (2) a 10-minute-guided meditation through a computer-generated forest (Forest of serenity—St

Giles Hospice[19]) or (3) a 5-minute-video rollercoaster ride.[20] A modified version of the 'evaluation of VR intervention questionnaire' (online supplemental file 2: Modified virtual reality intervention questionnaire) was used to record feedback.[4] Participants were verbally asked the following (by MM and SR): *What did you think of the VR? What did you like? Was there anything you did not like? Would you want to use this again?*

Staff evaluation

Staff involved in the project were asked to complete an electronic feedback survey (online supplemental file 3: Healthcare professional feedback questionnaire) to gather their feedback on using VR. The survey was a combination of closed and free-text responses. Staff were asked for feedback on the following issues in VR: helpfulness of VR in clinical practice, what went well, problems, barriers and opportunities for future use.

Public evaluation

We identified public opinion to VR in palliative care by organising a public engagement event, which provided an opportunity for lay representatives to share their views(conducted in MCHL, September 2019). We first presented the project results to the group and then we used a modified world café method[21] to ask the attendees the following question: 'what questions can organisations use to support VR adoption in palliative care?' A facilitator (ACN) promoted discussion through open questions, and a scribe (SS) collected written feedback.

RESULTS

Fifteen people participated in the evaluation (table 1). This consisted of 12 (80%) patients and 3 (20%) caregivers. Median age of participants was 63 years (SD ±16.50). The majority were men (n=9, 60%). Cancer was the most common diagnosis for patient participants (n=10; 83.3%). Most people were from the hospice inpatient setting (n=7, 46.7%) followed by hospital (n=6, 40%) and outpatients, respectively (n=2, 13.3%).

Relaxation was the most common reason for using VR (n=11, 73.3%). The beach (n=7, 46.7%) and forest experiences (n=7, 46.7%) were most popular. Most participants had a positive experience of the VR (n=14, 93.3%). All participants indicated that they would like to use the VR again. No major complications were noted; although, two participants (13.3%) reported minor problems (heaviness of the headset, difficulty in adjusting the head straps and problems focusing the image).

Six people (lay representatives) participated in the public engagement event. We identified ten questions to support adoption of VR in palliative care settings, which consisted of the following: the purpose of VR; intended population; supporting evidence; session

Table 1 Participant demographics and virtual reality (VR) characteristics

Participant demographic	N (%)	VR characteristic	N (%)	VR characteristic	N (%)
Median age, years (±SD)	63.0 (±16.50)	*Setting*		*Experience of using VR*	
Male	9 (60)	Hospice inpatient	7 (46.7)	Good	14 (93.3)
Female	6 (40)	Hospice outpatient	2 (13.3)	Indifferent	1 (6.7)
		Hospital	6 (40)	Poor experience	0 (0)
Participants					
Patients	12 (80)	*Reason for VR*		*Adverse events*	
Caregivers	3 (20)	Relaxation	11 (73.3)	Yes	0 (0)
		Pain	2 (13.3)	No	15 (100)
Patient diagnosis, n=12		Boredom alleviation	1 (6.7)		
Cancer	10 (83.3)	Anxiety	1 (6.7)	*Problems with VR use?*	
Amyloidosis	1 (8.3)			Yes	2 (13.3)
Neurological	1 (8.3)			No	13 (86.7)
		Choice of VR experience			
		Beach	7 (46.7)	*Would they use VR again?*	
		Forest	7 (46.7)	Yes	15 (100)
		Rollercoaster	1 (6.7)	No	0 (0)
		Time VR used			
		5 min	3 (20)	*Was VR requested to be used again?*	
		10 min	5 (33.3)	Yes	2 (13.3)
		15 min	6 (40)	No	13 (86.7)
		30 min	1 (6.7)		

duration; equipment choice; infection-control issues; content choice; setting of VR; person(s) responsible for delivery and the maintenance plan (online supplemental file 4: Public engagement event discussion—questions for organisations).

Seven staff members completed the feedback survey (online supplemental file 5: Staff perspectives on virtual reality). Most were based in MCHL (n=6, 85.7%) and the majority were doctors (n=4, 57.1%). All respondents rated VR as helpful, providing high Likert scores of 4 (n=4, 57.1%) and 5 (n=3, 42.9%). Following the end of the project, further VR use was recommended by five (71.4%) respondents. All staff stated their willingness to use VR in the future. Free-text responses provided further feedback (online supplemental file 6: Free-text questionnaire responses from health professionals detailing their views about the use of virtual reality in palliative care); in summary, the reported benefits of VR were its ease of use, the improvements in psychological well-being and the observed positive short-term effects in participants. Problems with the VR included the discomfort of the headset, disorientation noted by some participants, and technical issues relating to setting up and charging the device. Barriers to VR use were identified as infection-control issues, issues with staff unfamiliar of how to use the equipment, and technical issues of ensuring the equipment was updated, charged and ready for use. Future possible opportunities to use VR in palliative care were identified, and these included 'distraction therapy' for patients undergoing clinical procedures (eg, ascitic drain insertion), virtual hospice visits, family meetings and therapy sessions.

DISCUSSION
Our data suggest that it is feasible to use VR in hospital and hospice settings. VR was well received by patients, caregivers and staff. All participants described a positive experience with no major adverse effects. Ten questions were identified for organisations to consider, to support VR adoption in palliative care.

Contribution and strengths of this paper
This is the first paper in the literature to begin to develop a framework to consider how VR can be implemented in palliative care. This paper is consistent with previous studies which demonstrate the feasibility of using VR in palliative care settings.

Relation to previous work
The findings of this paper suggest feasibility of VR in hospital palliative care settings. This is consistent with previous work by Niki *et al*,[8] who identified symptomatic improvement for 20 hospital inpatients with advanced cancer. Similarly, our work suggests feasibility of VR in hospice settings, which supports the outcomes of previous studies that demonstrate positive outcomes of VR in hospice populations.[9–12]

For palliative care VR, it is important to consider the purpose of the activity, to identify how content is developed, and to define how (and by whom) it is delivered. Our study used software developed specifically for palliative care[19] and generic resources.[18 20] To date, no VR resources have been validated for the specific purpose of providing symptom relief in palliative care. Consistent with previous work, our findings report that palliative

care VR should be evidence based.[13] Knowledge-transfer considerations to support implementation of VR in palliative care have not been previously reported in the literature. Our study reports on important practical issues, such as choice of VR system, infection-control issues and technical device issues such as storage, charging and maintenance.[22]

Limitations

Limitations to this project are its small scope and feasibility focus, meaning that no conclusions about the effectiveness and efficacy of VR can be made. A completely immersive experience was not possible from the device; meaning that participants may have a better experience with other systems.[10] Some participants struggled to independently operate aspects of the VR device and required assistance, demonstrating that technology should be optimised for user requirements. Remote operation and second screen viewing were not possible from this VR device, which meant that the operator needed to stay with the participant for the entirety of the session.

Technical challenges were observed. First, software updates were frequently required, which necessitated planning to ensure the device was updated prior to use. Second, it was necessary to charge the phone and headphones separately, which was occasionally impractical. Finally, internet connectivity problems were encountered which prevented VR use; cellular mobile internet was used in these occasions, which reduced the video quality.

Implications for policy and practice and research

Our paper highlights a number of practical questions to support organisations considering use of VR in palliative care. Although the clinical use of VR in palliative care appears feasible and safe, further evidence of its benefit, effectiveness and practicality are required before recommendations can be made about its usefulness. Further research is needed to examine whether VR can effectively improve symptom management in palliative care and to ensure its use is practical, meaningful and evidence based.

CONCLUSION

Our data suggest that it is feasible to use VR in palliative care. Practitioners considering using VR should consider a number of factors, concerning the evidence and practical issues, to ensure that this technology can be used safely and effectively in palliative care.

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