



The utilisation of virtual images in patient information giving sessions for prostate cancer patients prior to radiotherapy



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ABSTRACT

The aim of the study was to explore the prostate patients' perceptions of a Virtual Environment for Radiotherapy Training (VERT) as an information giving resource prior to radiotherapy delivery.

A survey design was used to determine the level of knowledge of those patients who attended VERT for a pre-treatment talk and identify the benefits and limitations of using VERT as pre-treatment information giving resource. Participants were invited to attend a VERT patient information session four weeks prior to their planning CT scan, and then complete a questionnaire two weeks after start of radiotherapy treatment. A sample of $n = 38$ patients were recruited over a five month data collection period.

Results showed that patient perceptions on the use of VERT as information giving tool prior to radiotherapy treatment were very positive. The sessions enable patients to understand the potential impact of treatment volumes if the internal organ shape and location differed from that originally planned, enabling them to comply with radiotherapy treatment instructions. Additional key findings have demonstrated excellent levels of communication associated with the use of VERT emphasising the need for future patient preparation strategies to consider the use of virtual technology.

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Introduction

Prostate cancer is the most common cancer in men in the UK¹ accounting for 43,400 new cases diagnosed in 2012. Radical prostatectomy or radical radiotherapy remain the recommended methods of radical treatment.² The NRAG report³ recommended the future technical standard for radical treatment to be four-dimensional adaptive radiotherapy (4D ART) to take account of tumour volume in three dimensions and any changes occurring over time. 3D Image Guided Radiotherapy (IGRT) combined with Intensity Modulated Radiotherapy (IMRT) is fundamental to the delivery of 4D ART.⁴

The consistent position of the bladder and rectum in relation to the planned treatment volume (PTV) ensures minimal dose to the organs at risk (OAR) and reduction in radiation induced toxicity. It is essential that all patients conform to bladder-filling protocols, however anecdotal evidence collected within the clinical department suggested patients did not always follow the protocols and a greater compliance to instructions is required. It is anticipated that an informed patient is more likely to adhere to instructions, however prior to measuring compliance it is essential to establish the best way in which to provide information to patients.

This publication outlines the research undertaken through a collaborative project between a Higher Education Institution (HEI) and a NHS Trust using a hybrid Virtual Environment for Radiotherapy Training (VERT) skills facility. The project aimed to address the important aspect of patient education, understanding and information necessary to improve compliance of patients receiving radiotherapy for prostate cancer utilising VERT, with the intention of applying similar information sessions for patients receiving radiotherapy to other anatomical sites.

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Literature review

Advances in technology have enhanced healthcare education outside the clinical environment by providing realistic training experiences for students⁵ that are very popular amongst student groups.⁶ Students' learning experiences are enhanced through the use of computerised systems to increase the degree of realism.⁷ Patient simulated experiences in a virtual environment allowed users to replicate substantial aspects of the real world in a fully interactive manner.⁸

Literature⁶ has shown an increase in the use of simulated training for health related subjects, as it allowed students from a range of professions to gain experience in real-life situations whilst maintaining a safe practice environment. Studies⁹ also demonstrated that the controlled virtual environment allowed the educator flexibility to manage complexity within the training environment aligned with student experience which was not always possible in a real life situation. Additionally other studies¹⁰ have demonstrated how simulated controlled environments have reduced risk of adverse consequences to patients in the clinical department.

A randomised controlled trial (RCT) in the medical intensive care unit demonstrated higher results for medical students who were trained through simulation sessions compared to those who trained with real patients, however the authors recognised the need for simulation sessions to be accompanied by individualised feedback.¹¹ Other RCTs involving physiotherapy students showed that a quarter of clinical time can be replaced with simulator time without compromising student learning experience.¹²

The Virtual Environment (VERT) training facilities for therapeutic radiographers were introduced to reduce pressure within the clinical department and provide safe learning environments for students.¹³ Not only did VERT enhance student understanding of radiotherapy concepts it also enabled enhanced knowledge and understanding of anatomy.¹⁴ Other studies¹⁵ indicated mean student understanding and confidence in technical skills rose by 20% ($n = 42$) after using VERT. The authors acknowledged, however, that further study was required to reveal whether this improvement could be transferred to the clinical environment. Studies have also demonstrated that the use of supplementary workbooks in addition to practical session enhanced teaching and subsequently it was recommended that virtual simulation sessions be accompanied with clear instructions and material to support the practical content. The study provides evidence to suggest that VERT can be used to enhance decision making and teamwork skills through problem-based learning using case scenarios.¹⁶

A limited number of studies in relation to the use of VERT in respect of patient support and information giving have been published. Sulé-Suso et al.¹⁷ evaluated the use of VERT to improve patients and relatives' treatment satisfaction at University Hospital of North Staffordshire NHS Trust. A questionnaire was designed to determine if they understood how their treatment was planned, how radiotherapy was delivered and if they understood the potential treatment side effects. Data was collected from $n = 152$ patients receiving treatment for a range of cancer types, of which $n = 90$ (60%) were prostate cancer. Response rates and data analysis were not described, limiting the generalizability of the results, however responses showed a high need for patients to receive information on a range of treatment aspects.

Studies^{6,13} have shown that the use of simulation as an educational tool influenced learning and students were able to gain knowledge and develop skills through simulation-based learning. These skills include both interpersonal and technical skills. A limited number of studies¹⁷ have shown that VERT can be utilised for patient information session, however more information is

required to gain a greater understanding of the effectiveness of patient information sessions using VERT.

Methods

The aim of the study was to explore the prostate patients' perceptions of VERT as an information giving resource prior to radiotherapy delivery.

The objectives were:

- To determine the level of knowledge of those patients who attended VERT for a pre-treatment talk
- To explore patients perceptions who utilised VERT as an information giving resource prior to radiotherapy treatment
- To identify the benefits and limitations of using VERT as pre-treatment information giving resource

A survey collected data in a standardised format to gain information on the efficacy of using VERT as patient information giving tool at a single point in time.¹⁸ This study examined measurable parameters that produced ordinal data within a quantitative paradigm underpinned by a positivism philosophy.¹⁹ A total population sample was used for this study due to the limited time available for data collection. All eligible patients being referred for radical radiotherapy to the prostate were invited to participate, over a six month data collection period (April–September 2015). A total of $n = 40$ patients were referred for radical radiotherapy during this time, however only $n = 38$ patients commenced treatment. Patients were given 45 min to read a participant information sheet explaining the nature of the study and were then be asked to sign a consent form during their radiotherapy treatment consent appointment. Permission to access potential participants was agreed with the Trust where the study was registered as a service evaluation through the Clinical Governance Department on the Trust Clinical Audit database. Ethical approval was obtained through the University ethics committee (UREC number 1472).

Phase I – the VERT session

Participants were invited to attend a VERT patient information session four weeks prior to their planning CT scan. The VERT information session covered all preparation information for treatment, and comprised a one hour presentation using VERT to illustrate the proposed treatment area and indicate to the patients the potential impact to the treatment volumes if the internal organ shape and location differed from that originally planned. This VERT radiotherapy information session was the only pre-treatment information session given to patients after meeting with the consultant to sign consent for treatment. Other patients who were not included in the study received pre-treatment information in a verbal session only.

Phase II – the questionnaire

Questionnaires were administered in the second week of treatment. A purpose designed questionnaire was developed^{20,21} to address the aims of the research. The questionnaire was designed to collect data on the prostate cancer patient's knowledge attitudes and beliefs regarding pre-treatment information provided prior to their radiotherapy treatment. The responses ranged from knowledge (i.e. 'very important' to 'not at all important' or 'yes' and 'no' answers) to frequency of events or behaviours (i.e. 'always' to 'never'). A reliability co-efficient of 0.88 was achieved which is considered to be an acceptable value of reliability.²² Content validity in this survey design is the extent to which a measure

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