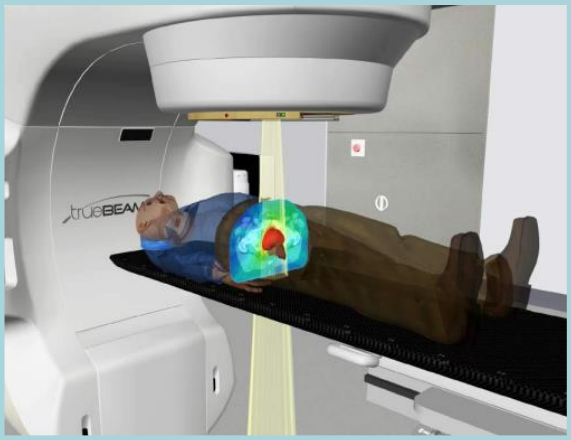
Daniel Murray

Swansea University

Case Study



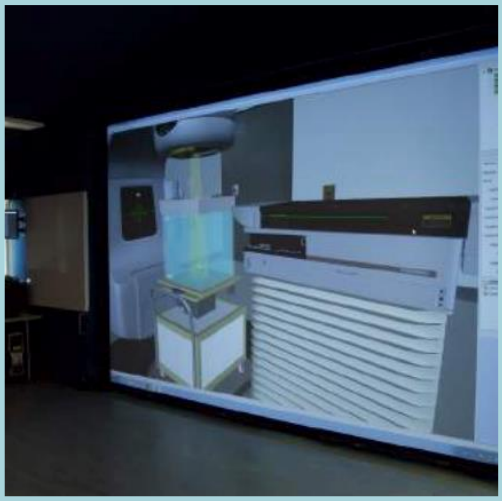
Trainee medical dosimetrists at Swansea University are undergraduate students completing a 3-year degree in Healthcare Science while gaining clinical competence in medical dosimetry and radiotherapy physics. At the University, we are one of the only Medical Physics Practitioner Training Programme (PTP) courses in the UK, with our graduates gaining 50 weeks of clinical placement experience alongside an academic degree. Many of our graduates secure Dosimetrist/Treatment Planning roles in the NHS or continue with postgraduate study or higher clinical qualifications, e.g. the Scientist Training Programme.

As part of their clinical training, Summative Case-Based Discussions (CBD) are delivered by clinical mentors to assess the student's clinical knowledge and understanding of radiotherapy treatment planning. For these CBDs, an anonymised clinical case is reviewed by the student and then presented to the academic faculty. Student-created treatment plans are central to this assessment, where they are presented using VERT.
Previously, CBDs were only conducted in clinical practice because access to and use of clinical treatment plans in the University environment was limited. This presented a problem because, to maintain rigorous assessment standards between the University and clinical practice, a need for one of the students' CBDs to be completed in-house by academics was identified. It could then be moderated alongside their clinical CBDs to ensure all were delivered at a suitable level.

Virtual simulation was employed as an assessment method to ensure these assessments were as close to clinical practice as possible. Virtual Environment for Radiotherapy Teaching (VERT) replicates the same clinical environment used in radiotherapy in virtual reality, with interactive tools to evaluate, present and discuss clinical cases. At the University, we currently use VERT 5.0 & Physics 1 as part of our routine radiotherapy physics teaching and CBD assessments. This includes treatment plan evaluation and comparison from conventional to MR-LINAC treatments, visualisation of Organs at Risk (OARs), simple or advanced dosimetry measurements, and image fusion/patient setup.

CBDs conducted using virtual simulation presented an opportunity for the academic faculty to evaluate a student's practical competence, which mentors previously only determined in clinical practice: clinical pressures, the pandemic and remote working all test CBDs as an assessment tool to its limits. CBDs using virtual simulation were explored in response to clinical pressure and offer a meaningful and robust assessment method.

Methodology



A simulated clinical scenario was prepared by academic staff and given to the student in advance of the CBD. A case brief is provided three weeks before the assessment, containing an anonymised patient history and the patient's treatment plan information.

VERT was used to present and discuss concepts in a virtual environment, relating them to the patient's case. Using VERT's error simulation tools, routine radiotherapy quality control tests can be influenced by a percentage error, which will closely replicate typical errors seen within clinical practice.

Treatment methods can also be compared, providing an opportunity for the student to evaluate the advantages and disadvantages of alternative treatment techniques and approaches for the patient's case. Medical images visualised in 3D can provide a visual aid for the student's presentation of the clinical history and a method to review the student's knowledge and understanding of the patient's internal anatomy.

Guided by questions from academic staff, the student was then assessed on their knowledge and understanding of each learning outcome in their radiotherapy physics-specific module, using the level 6 undergraduate marking criteria. In this case, the CBD was conducted in person. The student begins by delivering a PowerPoint presentation covering the case details and further reading and research to support their discussion. As VERT software can be remotely accessible, these CBD assessments can

Discussion

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Clinical mentors have a significant onus to assess students and determine clinical competence within many clinical programmes whilst completing their clinical responsibilities. For example, clinical pressures such as high patient numbers, complex treatments, and shortened treatment pathways can all impact the time dedicated to student assessment.

In addition, infrequent assessment can lead to mentors lacking the confidence and experience to appropriately assess students at the required level and hesitance to deliver constructive criticism. All the points above can directly impact assessment rigour within a clinical setting.
By bringing some CBD assessments back into the University, we can ensure assessment standards remain high whilst reducing the clinical pressures for our placement partners. VERT is the only system to simulate radiotherapy environments in this way, with functionality that supports critical discussion and evaluation of clinical scenarios. Following this study, we aim to incorporate VERT clinical assessments into more undergraduate modules within the programme and trial other assessment types using VERT, e.g., 'OSCE examinations.

Assessment in the University setting helps maintain fair assessment and provides an opportunity for the External Examiner to input into the simulated clinical assessment. Students' performance during the assessment is also not subject to clinical pressure or differences in clinical practice between clinical mentors.

We recently presented this work at the Society for Medical Simulation in Europe (SESAM) annual conference meeting in Seville, Spain. Please visit the ***'BSc (Hons) Healthcare Science (Radiotherapy Physics) page on the Swansea University website for a recording of the presentation.'***

https://youtu.be/vXBLQq5ynZg

Thank you for engaging with our work; we welcome any questions via our email addresses in this article. Furthermore, we are open to collaboration with other universities or clinical departments using VERT.