

Experiences using VERT with undergraduate trainee dosimetrists to enhance learning and increase engagement

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Background

VERT, the Virtual Environment for Radiotherapy Training system, is a simulation platform based around the visualisation of a radiotherapy treatment room. Used for the teaching of theoretical concepts, cross-sectional anatomy, visualisation of 3D structures, acquisition of clinical skills, or patient education, it is a powerful tool (Jimenez et al., 2017; Jimenez & Lewis, 2018).

Swansea University, Wales, offers three undergraduate medical physics degree programmes: nuclear medicine, radiotherapy physics and radiation physics, training healthcare science students to practitioner-level competence in their respective specialities, following the Modernising Scientific Careers model. An integral part of the programmes is the placement experience that each student builds up over the three years of their studies, which totals at least 50 weeks. Due to a shared 1st year curriculum, students on all three programmes rotate around the nuclear medicine, radiotherapy physics and radiation physics departments, completing competencies as they go, meaning radiotherapy physics content needs to be accessible to all medical physics students.

Before implementing the VERT system into the syllabus, students had fed back that they found it challenging to prepare for their upcoming radiotherapy placements. Anxiety around placement attendance was not uncommon, especially for the first block of placement activity each year. Whilst theoretical sessions were delivered before each placement, to prepare the students for what they would need to achieve whilst in the NHS, a lack of practical/situational

learning was evident. In response to this, in late 2018, the VERT system was procured, immediately supplementing the theoretical teaching with applied simulation.

Implementation of VERT

Using VERT, undergraduate medical physics students now get hands-on with a linear accelerator pendant, rather than just discussing how the machine works and moves. Students can visualise the QC setup and tasks can be formed in which the students apply their knowledge. Importantly, students go into placement with more of the necessary skills to contribute to clinical practice. Placement centres have commented that the students are more useful and, significantly, achieve competency more quickly in the first year.

As the radiotherapy physics students' progress into the 2nd and 3rd years of the programme, the expectations of their competence on placement also progress. Over the two final years of the programme, students must complete 72 practical competencies and 14 portfolio assessments, most of which is led by trained clinical mentors across the different NHS departments involved in the programme. Understandably, the placement mentors found this assessment load to be very high. In response to this, university staff now support placements by performing practical assessments of the students using the VERT system. This has been delivered with such success that, during the next quality review, the programme also intends to embed a mock OSCE into the programme's taught component in years 2 and 3.

The VERT system has also meant that lectures are now delivered in such a way that they apply directly to portfolio competencies. Blended learning, using workbooks, allows the students to collect secondary evidence, supporting their clinical work and strengthening their portfolio. In the 2019/20 academic year, more than 15% of the student's medical physics-specific training used the VERT system. In total, 8 workbooks spread across 3 different modules have been used to support evidence collection for practical competencies. Workbook activities using the VERT system, such as the prediction and measurement of simulated beam profiles, all contribute to the solidification of student understanding and engagement with the syllabus.

Impact of COVID-19

In the 20/21 academic year, in part due to COVID-19, the use of VERT increased again. Remote sessions were organised, with students interacting via Screenshare over Zoom. These sessions were integral to the maintenance of clinical skills while placements were suspended, with students spending one week following simulated activities.

Findings

The VERT system's ability to visualise treatment planning concepts has been documented before (Leong, Herst, & Kane, 2018). This was found to be particularly useful when teaching the effect of wedges on a beam, as well as other aspects of beam modification. Quality assurance lectures were also well supplemented, with one-to-one simulation sessions providing an opportunity for students to perform a mock testing protocol.

Feedback was collected anonymously via end-of-module, online feedback forms, including free-text comments. Several common themes emerged from student feedback on the VERT sessions; feeling more prepared for clinical work, using the system to collect secondary evidence in a safe environment and seeing the practical application of the theory are all benefits that were highlighted. The benefits also translate into academic successes, with a drop in assessment failures in modules that make use of the VERT system, in the first year of its implementation. Interestingly, there was little improvement in the grades of the best-performing students when compared to previous cohorts, who were assessed before implementation of VERT.

As well as the OCSE mentioned earlier, the plan going forward is to develop further practical sessions, focussing on treatment plan evaluation and critique. Students would bring their anonymised treatment plans from clinical placements, for presentation to the cohort. Working in partnership with the clinical departments, use of the VERT system for training and scholarship, both local and remote, has also been discussed. Journal clubs, patient review and update training are all possible using the VERT system, increasing the students' exposure to clinical practice.

Conclusion

Moving from a purely theoretical approach to a more blended style of delivery, integrating the VERT system across all years of the programme, has better-prepared students for placement and allows them to practice several techniques and skills in a safe, controlled environment, without impacting on service delivery and clinical staff time. Assessment outcomes have improved, particularly at the lower end of the scale, and engagement with modules using VERT simulation has increased in comparison to pre-VERT delivery.

References

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