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EDITORIAL

Increasing consistency and accuracy in radiation therapy via educational interventions is not just limited to radiation oncologists

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The identification of tumour volumes accounts for a large amount of variation in radiotherapy treatments.[1] Some of the factors affecting clinical target volume (CTV) delineation include imaging modality resolution and interobserver and intraobserver variability. These volumes are contoured once, which could lead to a systematic error throughout the entire treatment course. It is therefore important to factor this error into the planning target volume expansion margins. Contouring error can be reduced by using delineation protocols and using multimodality imaging, for example, computed tomography (CT) and magnetic resonance imaging (MRI).

This issue of the *Journal of Medical Radiation Sciences* features work by Nicholls et al.[2] into maintaining prostate contouring consistency following educational intervention. This is a follow-up study to that completed by Khoo et al.[3] where five radiation oncologists (ROs) participated in a pre- and post-test designed study to assess the effect of educational intervention on contouring consistency of the prostate on CT and MRI. Nicholls et al.[2] then looked at the retention of this knowledge 12 months after the intervention. Four of the original five ROs participated in this follow-up study and there was a deterioration in scores of 3.2% for CT and 1.9% for MRI from the results after educational intervention. However, overall they found an improvement of 11.4% for CT and 10.8% for MRI from the baseline measurements prior to intervention; therefore, the intervention was considered worthwhile.

There are a number of different types of educational interventions that can be used in radiotherapy. Khoo et al.[3] used a series of anatomy lectures, completion of contouring modules and peer reviewing of contoured volumes. Some other methods that can be used are seminar series, anatomy or region of interest atlases, one-on-one training, offline simulations and protocols.

Multidisciplinary discussion sessions involving radiation therapists (RTs), ROs and radiation oncology medical physicists (ROMPs) focussing on specific treatment sites would be highly beneficial so all groups understand the unique issues that we face to correctly treat our patients. For example, ROMPs can explain the errors in the system that cannot be corrected, ROs can discuss what tissue they want to treat and the trade-offs they are willing to accept and the RTs can discuss patient-specific issues that they have been seeing and the effect this has on the planning or treatment process. These sessions serve as an educational intervention in themselves, but can also produce on-going educational resources such as agreed protocols.

Educational interventions have also been found by other groups to increase accuracy. Bekelman et al.[4] used a seminar series to improve the target delineation in head and neck patients by radiation oncology residents. Fuller et al.[5] used a consensus atlas to increase the accuracy of rectal cancer target volume delineation and found that exposure to the atlas led to a significantly increased interobserver agreement for the CTV volume. An atlas for organ-at-risk (OAR) contouring was tested by Yi et al.[6] They found that an atlas for brachial plexus contouring provided a consistent guideline for contouring with no learning curve. One-on-one training in protocol guidelines was conducted by Tai et al.[7] who found that this might have improved consistency in target volume delineation in cervical oesophageal tumours.

Even though Nicholls'[2] study focussed on ROs, it could be extended to other medical radiation scientists. So perhaps educational intervention should be used more for RTs?

Contouring OARs is the responsibility of the RTs in many radiotherapy departments. It is important for these contours to be consistent between RTs and to be accurately delineated because it ensures the correct

geographical avoidance of critical structures. It is also important to have standardised contouring protocols with a clear definition of the structure to enable treatment plans to be compared accurately. For example, the RAVES clinical trial states that the rectum is to be delineated by contouring the external surface of the rectum from the retro-sigmoid to 15 mm inferior to the inferior border of the CTV.[8] Standardised contouring becomes even more important when volumetric OAR constraints are applied to a plan, such as rectal constraints that state that the amount of rectum receiving 60 Gy shall be <40% and 40 Gy shall be <60%.[8] It is important that planning contouring accuracy is addressed by RTs and this can be done with an educational intervention as simple as an in-house protocol or a continuing professional development session.

Image-guided radiotherapy has become more complex in recent years with the introduction of cone beam computed tomography (CBCT). Thus, RTs now need to be more knowledgeable with soft tissue structure identification. Today's RTs complete this soft tissue verification without RO guidance, and the responsibly of making the call to treat or not to treat is regularly placed on the treating RTs. This is therefore another area that would benefit from increased consistency and accuracy resulting from educational interventions. Sahota et al.[9] assessed a region of interest atlas as an educational intervention to improve identification of structures used to assess target volume coverage or OAR avoidance on CT and CBCT prior to the implementation of daily soft tissue postprostatectomy matching, using a pre- and post-test study design. A statistically significant improvement was found with regards to structure identification and confidence with the use of the atlas. This type of training might decrease interobserver variations and increase detection of geographic miss or OAR overdosing prior to treatment delivery. This would in turn increase the accuracy of radiotherapy treatment.

In some radiotherapy centres, where there is a limited number of radiation oncology registrars and ROs, advanced practice RT roles have been created. One example of this is RT led treatment reviews.[10] There is also the potential, if medical staff resources are limited, for RTs to be trained in such tasks as basic target volume contouring that would be checked and altered by the RO, or specialised soft tissue image guidance matching. This again could be achieved by similar educational interventions to those used by Khoo et al.[3] and Nicholls et al.[2]

Nicholls et al.[2] showed long-term retention of the knowledge gained from the educational intervention, but they did see some decay. They suggested that there should be mandated retraining to combat this. Hence, it would be important to incorporate this step when implementing any educational intervention.

Nicholls et al.[2] have shown that educational interventions work. It is important to remember that this training model can be used for a variety of tasks and professional groups. Education and training with ongoing refreshers is the key to maintaining consistency throughout the radiotherapy process, which in turn will ensure all patients receive accurate treatment.

Conflict of Interest

The author declares no conflict of interest.

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