

In this issue

I am pleased to introduce the June 2017 issue of the *Journal of Radiotherapy in Practice*.

In the first paper, Palin and Richardson present their research into the dietary advice provided to those undergoing pelvic radiotherapy. The aim of the study was to identify the gastrointestinal symptoms experienced by those undergoing pelvic radiotherapy and to identify the dietary support provided to these patients.

A service evaluation was undertaken in one NHS Trust hospital whereby patients undergoing radical pelvic radiotherapy during a fifteen-week recruitment period were invited to complete an anonymous questionnaire. Participants were recruited using purposive sampling and the data was analysed descriptively using SPSS.

Thirty-one patients responded achieving a response rate of 48%. The most frequent reported gastrointestinal symptoms were gas and flatulence followed by diarrhoea, nausea and abdominal pain.

The results illustrate the impact of gastrointestinal side effects on patients' dietary intake. The results highlight that nutritional guidance need to be standardised, especially for the management of diarrhoea and gas and flatulence as these were the most common occurring side effects. With radiographers most frequently giving nutritional advice they must be provided with guidance to support those undergoing pelvic radiotherapy.

In the second paper by Sarakr and Pradhan, authors investigate the dosimetric advantage of quasi-continuous couch motion enabled trajectory modulated arc radiotherapy therapy (TMAT) over the co-planar tangential partial-arcs volumetric modulated arc radiotherapy (VMAT) for treating left breast and chest wall patients.

Treatment plans of 43 patients who received radiotherapy for left breast (17) or for left chest wall (26) using coplanar partial tangential arcs VMAT (reference plan) were considered for this study. For each patient, in addition to the treatment plan, a TMAT plan was also generated using quasi-continuous couch rotation. The TMAT plan consisted of original two 30° tangential arc beams and two supplementary beams having a couch rotation of $\pm 10^\circ$, $\pm 20^\circ$ and $\pm 30^\circ$ respectively. The difference in PTV volume coverage (PTV V95%) between TMAT plan and VMAT plan was calculated for all the cases and normalized to the plan's prescription dose. Similarly, differences in PTV_V105% and several dose-volume parameters related to organs at risk (OAR) were also computed and tabulated.

The authors conclude that TMAT plans were found to be better than VMAT plans in terms of better PTV coverage and D1% for heart. For other evaluated dose parameters, although no significant differences were observed, TMAT plans yielded better values.

In the next paper, Panichevaluk, Akarasakul, Pongpirul, Tharavichitkul and Galalae, undertook a retrospective study aimed to report clinical outcomes of high dose rate brachytherapy (HDR-BT) and whole pelvic radiotherapy in intermediate-to-high risk localized prostate cancer and to gain a better understanding of how behavioural variability of patients from various ethnic origins affects clinical practice.

One-hundred and sixteen localized intermediate-to-high risk prostate cancer patients who were treated during 2004–2012 were enrolled into the study. Whole pelvic radiotherapy was delivered to the full pelvis (50 Gy per conventional fractionation) and two fractions (15 Gy per fraction) of HDR-BT were designed for all patients to the peripheral zone of McNeal. The reported results

were biochemical control rate, toxicity profiles and behavioural variations of patients.

The authors concluded that the clinical outcomes of intermediate-to-high-risk prostate cancer patients from various ethnic origins were comparable to that of the Caucasian-only population reported previously. A number of detected ethnic-related factors might be beneficial for treatment decision making for patients with different cultural background and could be utilized to better personalize/optimize cancer care and aftercare

In the next paper, authors Ma, Syed, Rivers, Gomez and Singh, present their research into a comparison of single- and five-fraction schedules of stereotactic body radiation therapy for central lung tumors. Stereotactic body radiation therapy (SBRT) is a treatment option for patients with early-stage non-small cell lung cancer who are medically inoperable or decline surgery. In this study, authors compare the clinical outcome of patients with centrally located lung tumors who underwent either single fraction (SF)- or five-fraction (FF-) SBRT at a single institution over 5 years.

Between January 2009 and October 2014, patients with centrally located lung tumors who underwent SBRT were included in this study. Data were retrospectively collected using an institutional review board-approved database. For analysis, the Kaplan-Meier method and competing risks method were used.

Authors concluded that SF- and FF-SBRT have comparable overall survival. SF-SBRT may have some utility for patients unable to have multi-fraction SBRT.

In the next paper, Aziz, Kamarulzaman, Termizi, Raof and Tajuddin, present their findings on the effects of density from various hip prosthesis materials on 6 MV photon beam. The aim of this study was to quantify the impact of a hip prosthesis on 6 MV photon beam dose distribution using the Monte Carlo (MC) simulation in the EGSnrc source code. To quantify the radiation dose at the hip prosthesis accurately, image processing techniques were used to generate CT images free from

streak artefacts. After a phantom containing Perspex and Teflon was fabricated to represent the human hip, MATLAB software was used to produce computer-generated phantoms consisting of bone, titanium, stainless steel, and CoCrMo. These phantoms then were used in the MC simulation.

Percentage depth dose (PDD) and beam profile were used to analyse the impact of the hip prosthesis on the dose distribution of the photon beam. PDD showed that the absorbed dose was reduced as the density of the material increased, and the dose was reduced by as much as 49% when the photon beam struck the highest density material (CoCrMo, 8.2 g/cm³). However, dose was increased at the tissue-hip prosthesis interface (depths of 4 and 19 cm). As the depth increased, the absorbed dose decreased due to attenuation of photons by the tissue and the metal.

In the next paper, Kim, Suk, Lee, Cao and Chang, present their study to develop predictive models to predict organ at risk (OAR) complication level, classification of OAR dose-volume and combination of this function with their in-house developed treatment decision support system.

The authors analyzed the support vector machine and decision tree algorithm for predicting OAR complication level and toxicity in order to integrate this function into their in-house radiation treatment planning decision support system. Twelve TomoTherapyTM (TomoTherapy, USA) treatment plans for prostate cancer were established, and a hundred modelled plans were generated to analyze the toxicity prediction for bladder and rectum.

Authors conclude that they verified the accuracy of the tested algorithm using prostate cancer cases. Side effects can be minimized by applying this predictive modelling algorithm with the planning decision support system for patient-specific radiotherapy planning

In the next paper, Cecen, Yavuz, Cecen, Duman, Ozdemir and Aksu, authors perform a retrospective analysis of survival, local-regional control and the effect of prognostic factors in 61 non-small cell lung cancer (NSCLC) patients who were treated with postoperative radiotherapy (PORT) using a linear accelerator (LINAC).

A total of 50 to 66 Gy PORT with a fractional dose of 1.8 to 2 Gy was administered to 24 patients (24.5%) for surgical margin positivity, 33 patients (54%) for mediastinal lymph node involvement, and 13 patients (21.5%) for both mediastinal lymph node involvement and positive surgical margins.

The author's survey of the literature demonstrated that, without PORT, local recurrence or progression rates increase while overall survival rates decrease. In this study, only patients with PORT are studied and the results show that the local progression and overall survival rates are comparable with literature of LINAC-based PORT. In the case of overall survival, 3D treatment shows better results than 2D treatment modality.

In the next paper, Mahmoud undertakes a comparative dosimetric study comparing dose to the carotid artery using 3 dimensional conformal radiotherapy and intensity modulated radiotherapy (IMRT) for T1-T2 glottic cancer. The feasibility of carotid artery sparing was a primary objective, as well as planning target volume (PTV) coverage and dose to spinal cord as a secondary objective, by using 3 dimensional conformal radiotherapy (3DCRT) and IMRT for patients with early glottis cancer

Six patients who had been treated for early stage glottic carcinoma (stage T1-2 N0M0) were included in this study. All patients were immobilized in the supine position with a thermoplastic mask and treatment planning. CT scans were obtained from the top of the skull to the top of aortic arch with a 3 mm slice thickness. Two plans were created for every patient, one using 3DCRT and the second using IMRT. Comparison between the two plans was undertaken and analysis was made regarding the dose to the carotids arteries, target coverage and doses to the organs at risk.

The author concludes that IMRT significantly reduces the radiation dose to the carotid arteries compared with 3DCRT while maintaining clinical target volume coverage. Such a results assists in decreasing the incidence of radiation induced carotid stenosis thus improving the quality of life for patients

The aim of the next paper, by Buzea, Mirestean Butuc, Zara and Iancu, was to compare neural induced changes in 3-Dimensional conformal radiotherapy (3D-CRT) versus intensity modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT) for nasopharyngeal cancers.

Radiotherapy plans for 10 patients with nasopharyngeal cancer stages III and IV were prospectively developed for 3DCRT, IMRT and VMAT using Varian Eclipse (Varian, California, USA) planning system. The same radiation therapist carried out all planning and the same clinical dosimetric constraints were used. Normal tissue complication probabilities were calculated.

The authors concluded that VMAT is associated with similar dosimetric advantages as IMRT over 3D-CRT for nasopharyngeal cancer. VMAT is associated with faster delivery times and greater number of mean monitor units than IMRT. Brain radionecrosis severity and risk were undervalued and by improving the life expectancy of patients with nasopharyngeal cancer, maintaining of neural structures recommended dose limits should be considered as a first degree priority (as the spinal cord, brain stem etc.) when IMRT and VMAT plans are implemented.

In the literature review presented in this issue, Chamunyonga, Rutledge, Caldwell and Burbery, address the rationale for implementing and integrating a Radiation Oncology Information System as a pedagogical tool for undergraduate radiation therapy training and explore the pedagogical benefits supported by educational theory.

A review of MOSAIQ (Electa, Stockholm, Sweden) functionality shows potential to transform learning through development of authentic and engaging learning tasks. It provides students with an opportunity to learn two-dimensional image matching through the use of digitally reconstructed radiographs and electronic portal images as well as three dimensional image matching using cone beam CT data in a safe learning environment without clinical time pressures. Additionally, this provides the students with knowledge of quality assurance (QA) checks through the verification of treatment parameters

and the transfer of information from the planning system to the treatment units is essential. The authors conclude that the application of MOSAIQ OIS could potentially transform teaching and learning strategies for radiation therapists. Increased knowledge and hands-on skills at undergraduate levels in areas such as image matching and QA can be powerful tools to drive the standards of practice a step further.

The educational note in this issue is presented by Carmichael and Bridge and is on the subject of patient involvement in health profession student training. Despite a growing evidence base supporting patient involvement, there is little published data concerning motivation for involvement.

A qualitative study was performed to provide narrative relating to patient experiences in expert patient sessions on an undergraduate radiation therapy course. A phenomenological approach utilised semi-structured interviews with two expert patients from different backgrounds. A common set of questions were used for each participant. Interviews were digitally recorded and transcribed prior to thematic coding.

The authors concluded that patients enjoyed this experience and identified clear value of the teaching for themselves and the students. Previous public speaking or clinical experience seemed to have limited impact on patient experience and suggested the vulnerability of the situation. Both had different perspectives of their fellow patients and their role in the healthcare partnership. These findings indicate the value of ensuring students have access to a range of perspectives from different patients.

The technical note presented in this issue is by author Akber and it considers the notion 'One dose does not fit all'. Akber argues that to compute the radiation dose to the human body and to

an individual organ from internal and external radiation sources requires information on several anatomical and physiological parameters of the exposed individual. The human body varies in size and weight from one individual to the other. Total body weight of human is indeed a reflection of genetic makeup, intake of nutrition value, calorie consumption, life style (active or passive), culture and weather.

To complete this issue, is a case study on the use of acupuncture-like transcutaneous electrical nerve stimulation (ALTENS) therapy, presented by Iovoli and Singh. ALTENS therapy has been shown in prospective studies to be effective in the treatment of radiation-induced xerostomia. Those studies treated patients within 27 months from end of radiation with ALTENS delivered in the clinic using a Codetron unit. However, this unit is no longer produced and there is limited data on success of ALTENS when delivered at home.

In this case report a 50 year old man with xerostomia, 8 years post radiation for T4N1 squamous cell carcinoma of the tonsillar fossa, was given ALTENS with a currently commercially available unit from Girish Surgical. He used the unit at home, 20 min daily for 8 weeks.

After eight weeks of ALTENS therapy the patient saw a reduction in the Self-reported University of Michigan Xerostomia-Related Quality of Life Scale (XeQOLS) from 20 to 1.

This case report demonstrates that the Girish Surgical unit is effective, self-administration of ALTENS in patients who cannot come to clinic regularly may be practical, and ALTENS can still offer durable benefit to patients even 8 years after chemoradiation therapy.

Professor Angela Duxbury