

In this issue

To open this issue, we feature a guest editorial by Pete Bridge, a proactive member of the Journal's Editorial Board and a senior lecturer in radiotherapy and oncology at the University of Liverpool, UK. In this editorial, Pete outlines the progress made to radiotherapy educational research during the last decade and details the increasing impact and relevance of educational research in radiotherapy practice and training. This impact is being acknowledged by the introduction of a new 'Educational Note' format for JRP submissions. This guest editorial presents the context for this development by reviewing published evidence from the last decade in order to identify the key factors influencing the changing face of radiotherapy education. The first educational note is featured in this issue and is on the subject of education and research using the training tool the virtual environment for radiotherapy training (VERT).

To complement the first educational note on VERT, we present an interview with one of the founders of VERT, Professor Andy Beavis, who talks us through his journey during the development of this important training tool, along with highlighting key aspects of his career development, his views and thoughts on future developments and how VERT will be developed in the future.

In the first of the original articles, Henry, Summers, Murray, Jain, Tahir, Ali, Joseph, Bastow, Artschan and Sykes, undertake a study to evaluate the need for adaptive therapy when delivering conformal bladder radiotherapy. The purpose of this study was to audit positioning errors during bladder Image Guided Radiotherapy (IGRT) and quantify survival outcomes.

A retrospective review of 141 patients treated between March 2007 and July 2010 with 3D

conformal radiotherapy (CRT) was undertaken. An offline imaging protocol using kV cone beam CT (CBCT) was used. Positioning errors, clinical interventions and re-planning rates were quantified. Cancer outcomes and survival were collected by review of patient notes and a registry search. The authors concluded that organ deformation during radiotherapy for bladder cancer is a significant problem for over 40% of patients. Strategies to compensate are essential to ensure optimal plan delivery.

The aim of the next paper by Chin, Rantshilane, Chin, Chaudhuri, Tyrie and Hartoceanu, is to report the survival outcomes and late toxicity of high-dose-rate brachytherapy (HDRBT) boost for dose escalation in patients with intermediate to high risk prostate cancer.

Retrospective data were collected from 137 patients who had definitive radiotherapy for prostate cancer between 2006 and 2010. All patients had external beam radiotherapy (median dose 46 Gy) and HDRBT. Brachytherapy dose was 19 Gy in two fractions (six hours apart) with one implant using Ir-192. The data from this study adds to the growing body of literature supporting the use of HDRBT in prostate cancer. Late toxicity rates were marginally higher than expected.

In the next article, Kausar, Gurjar, Bagdare, Gupta, Bhandari, Naik, Nag and Kancherla, the authors note that for chest wall irradiation in breast cancer patients, three dimensional conformal radiotherapy (3DCRT) and intensity modulated radiotherapy (IMRT) have made tremendous changes in treatment delivery. The purpose of this study was to compare the dosimetric parameters in IMRT and 3DCRT plans. To achieve this, IMRT and 3DCRT plans were generated for twenty five randomly selected postmastectomy

breast cancer patients. The prescribed dose was 50 Gray (Gy) in 25 fractions (#) at the rate of 2 Gy/# with 5# per week. Dose volume histogram (DVH) was evaluated for planning target volume (PTV) coverage and dose to organs at risk (OARs). All the dosimetric parameters were compared using unpaired student t-test. The authors concluded that adequate target coverage was achieved by both the techniques, however dose to OARs were lesser in 3DCRT plans as compared to that in IMRT plans. Thus, it can be concluded that 3DCRT is as efficient as IMRT for the chest wall irradiation.

In the next article, Bridge, Fielding, Pullar and Rowntree present their research into the development and initial evaluation of a novel 3D volumetric outlining system. The novel 3D Radiotherapy Interactive Outlining Tool allows volumes to be created from a handful of points within axial, sagittal and coronal planes. 3D volumetric visualisation allows users to directly manipulate the resulting volume using innovative sculpting tools. This paper discusses the development and initial evaluation of the software ahead of formal clinical testing. User feedback was collated as part of the software development phase to ensure clinical suitability, define user training strategies and identify best practice. A loosely structured format was adopted with leading descriptive questions aiming to generate suggestions for improvements and initiate further discussion. The findings revealed that mesh generation from a small number of points placed on a range of planes is a rapid and effective means of target delineation. Multi-slice volume sculpting and 3D orientation is challenging and may indicate a need for a paradigm shift in anatomy and CT training.

The next paper is on the subject of emotional intelligence development in radiation therapy students, by Carmichael, Bridge and Harriman. Emotional intelligence (EI) is an increasingly important aspect of a health professional's skill set. It is strongly associated with empathy, reflection and resilience; all key aspects of radiotherapy practice. Previous work in other disciplines has formed contradictory conclusions concerning development of EI over time. This study aimed to determine the extent to which EI

can develop during a radiotherapy undergraduate course and identify factors affecting this. The study used anonymous coded Likert-style surveys to gather longitudinal data from radiotherapy students relating to a range of self-perceived emotional intelligence traits during their 3-year degree. Data were gathered at various points throughout the course from the whole cohort. The study revealed that radiotherapy students increase their EI scores during a 3-year course. Students reported higher levels of EI immediately after their clinical placement; radiotherapy curricula should seek to maximise on these learning opportunities. Variance of scores decreased over time; there was a reduced change in EI for mature students who tended to have higher initial scores. EI increase was most evident immediately after clinical placements.

The purpose of the paper by Ujaimi, Isfahanian, Samant, Bredeson, Genest, and La Russa, was to review the incidence of clinically significant pulmonary toxicity following total body irradiation (TBI) as a part of the conditioning regimen for acute lymphoblastic leukemia (ALL) patients undergoing bone marrow transplantation (BMT) at The Ottawa Hospital cancer Centre (TOHCC). This is a retrospective review of ALL patients who received TBI in the Ottawa Hospital Bone Marrow Transplant Program (TOH-BMT) as part of their conditioning regimen from 1991-2011 inclusive. The patients were treated using a locally developed translating-couch irradiation technique. The authors have analyzed all available data for the first 100 days following TBI to determine the incidence of radiation-induced pulmonary toxicities. The authors conclude that TBI continues to be an important component of the conditioning regimen for ALL patients undergoing BMT, and the incidence of radiation-induced pulmonary injury, using their technique and lung dose, is comparable to the published literature.

In the next paper, Ponnusamy, Casasola and Niblock present their study into palliative split-course hypofractionated radiotherapy for incurable mucosal squamous cell head and neck cancer. Locally advanced head and neck cancer can be a distressing disease due to a variety of reasons. This retrospective study looks at the tolerability and outcomes for palliative split-course

hypofractionated radiotherapy for this group of patients treated at their centre. 59 patients were treated with hypofractionated split-course radiotherapy for incurable mucosal squamous cell carcinoma of the head and neck region in the centre over a 10-year period. The authors concluded that they are the first UK centre to report, with long-term data, the use of a palliative three phase regime that provides meaningful palliation with acceptable toxicities. In addition, for some patients, it has resulted in durable long-term control.

The final original article presented in this issue, is the second in a series of JRP interviews with individuals who have, and are recognised for, an expert knowledge in their subject area in radiotherapy and oncology. The interview is titled: Radiation physics: A major contribution to practice and to the education and training of practitioners in radiotherapy: an interview with Professor Andy Beavis, Consultant Clinical Scientist and Head of Radiation Physics at the Radiation Physics Department, Queen's Centre for Oncology and Haematology, Castle Hill Hospital, Hull, UK

The next paper is a literature review by Bayles, Collins and Clarkson. The authors' aim was to systematically review published literature to allow evidence based recommendations to be made to current practice to reduce interfraction prostate motion. A systematic search of CINAHL, Medline, PubMed, Science Direct, NHS Evidence and The Cochrane Library was performed. Limited searches of The Society of Radiographers (SOR) website, OpenGrey and COPAC were undertaken, alongside manual searches of cross references of eligible articles. The quality of included papers was measured using a pre-existing tool. The causes, consequences and solutions to manage rectal volume and its effect on prostate position were extracted, compared and evaluated to extract solutions to be implemented into clinical practice. The results found that a combined medicinal and dietary approach adaptable to departmental workflow is required to managing rectal volume, with special consideration to patients with pre-existing extrinsic factors.

In this issue, we are pleased to present the first educational note titled: From education to

research—a journey of utilising virtual training by Adele Stewart-Lord. Adele outlines how the use of the virtual learning environment for radiotherapy (VERT) at the London South Bank University has been successfully implemented across the therapeutic radiography training curricula. They are now supporting the use of VERT for patient education in clinical departments. A number of publications have reported on the use of VERT in education and training; more recent literature has focused on the use of VERT for patient education. The introduction of VERT as an education tool has enabled academic staff to develop a range of teaching methods to embed virtual training into the traditional classroom setting, demonstrating innovation and collaboration.

In the first of two technical notes, Chan, Malam and Loudon, describe their work on implementing radiation oncology care plans as a foundation for process improvement.

At the radiation medicine program described, the entire radiation therapy (RT) workflow was previously conducted through the use of two electronic programs. It duplicated workflow and created a situation where it was difficult to measure the RT process. Recent enhancements to the electronic medical record facilitated the consolidation of RT planning and treatment workflows into one electronic system. This report describes the clinical implementation of electronic Radiation Oncology (RO) Care Plans at a Regional Cancer Centre, and how they can be applied as a foundation for RT processes improvements. A total of 51 Care Plans and 95 IQ Scripts were successfully implemented. The benefits of RO Care Plans include a more streamlined process, removed ambiguity, improved communication, standardized workflow, and automation of tasks. In addition, multiple performance indicators can be obtained from the RO Care Plans, such as caseload reports, workflow reports and a 'White Board'. The implementation of RO Care Plans serves as a foundation for data driven process improvement.

In the second technical note, Trifiletti, Wijesooriya, Moyer, Lain, Geesey, Forbes and Reardon, undertake a comparative analysis of intensity modulated radiotherapy versus 3-D

conformal radiotherapy during deep inspiratory breath hold for left sided whole breast irradiation. Deep inspiratory breath hold (DIBH) during left breast irradiation helps to minimize cardiac irradiation by physically separating the heart from the left breast. The dose to organs at risk in intensity modulated radiotherapy (IMRT) and opposed tangent 3-dimensional conformal radiotherapy (3D-CRT) during DIBH in patients with left sided breast cancer was compared. Twenty consecutive patients with left sided breast cancer had a computed tomography scan utilizing DIBH. Mean volumes of the heart, left anterior descending coronary artery (LAD), total lung, and right breast receiving 5% to 95% of the prescription dose were calculated. Findings indicated that under DIBH, absolute differences between 3D-CRT and IMRT were minimal. 3D-CRT under DIBH provided excellent dosimetric results in most patients with left-sided breast cancer without the need for IMRT.

To complete this issue is a case study presented by Palled, Naveen T., Sugashwaran Jagadheesan and Khaleel. The authors present the history of a 13 year old girl who presented with complaints of headache associated with vomiting, blurring of vision in the left eye and history of diplopia in the right eye. The patient underwent left parietal parasagittal craniotomy and near total excision of the tumor and then was planned for postoperative radiotherapy 5940 cGy in 28 fractions along with concurrent temozolamide 100 mg. Astroblastomas are a distinct clinic pathologic entity, with well-described radiologic, pathologic, and cytogenetic features. The tumors recurrence is high and efforts must be made to elucidate the role and usefulness of radiotherapy and chemotherapy in these tumors.

Professor Angela Duxbury