Journal of Radiotherapy in Practice

Journal of Radiotherapy in Practice (2016)
15, 219–222 © Cambridge University Press 2016
doi:10.1017/S1460396916000327

In this issue

In the first article, Goldsworthy, Roe, McGrail, McCormack and Walther present their project to develop and implement a Radiotherapy Research Activity Assessment Tool (RAAT) in order to assess the feasibility of newly proposed projects within clinical settings. A multi-step development method was used. The steps involved the principles of quality function deployment and consecutive steps involved developing a user friendly and replicable tool that would fit on one A4 page. The process involved multiprofessionals and patients throughout the design process. The tool was preliminary tested on usability among eight stakeholders on a ten-point scale (1 = poor; 10 = very good). Percentage agreement was evaluated at 6-month post initial RAAT assessment. Authors conclude that the RAAT seems to be feasible in clinical practice, in addition, they provide a framework to guide the decision-making process. This study calls for further testing of usability and a review of long-term implications on all stakeholders.

In the next article, Thompson and Clarkson investigate patient and research radiographer perspectives on recruitment to radiotherapy clinical trials. Radiotherapy randomised-controlled trials provide evidence to support the development of new techniques and dose/fractionation regimens. Some radiotherapy trials have previously had to close early or revise recruitment targets due to low recruitment rates. Many authors have recommended research into recruitment strategies for many areas of medicine; however, little work has been carried out in the specific field of radiotherapy. Using a survey of research radiographers followed by radiotherapy patient interviews, this project provides perspectives on motives for patient participation in radiotherapy clinical trials, and how to best support them through this decision-making process. The authors recommend that strategies should be offered proactively to support patients through the decision-making process when considering trial participation. Research radiographers are ideally qualified to offer support and expert knowledge to these patients.

In the next article, Clarke and Burke undertake a study to ascertain prostate cancer patients' perceptions of the quality of physical and emotional support they receive as standard during their course of radiotherapy treatment. Semi-structured interviews were conducted on 13 patients undergoing radical radiotherapy treatment for prostate cancer. Interviews were conducted between fractions 32 and 37 and data were analysed using the Giorgi method.

Findings indicated that this small single centre study has highlighted the importance of good quality and timely information provision. Although patients were, for the most part, very satisfied with the services they were being provided with, areas in need of development were also highlighted. If a more structured review process is to be further investigated, then the role of the review radiographer should be considered as part of this. The potential benefits of patient peer support is also worthy of further exploration.

In the article by O'Sullivan, Rock and ElBeltagi, the purpose of this study was to assess the radiotherapy fields being offered to women with a positive sentinel lymph node (SLN) who have not had axillary lymph node dissection (ALND), based on the ACOSOG Z11 results. Authors conducted a postal survey, addressed to radiation oncologists specialising in breast cancer treatment. In all, 179 cancer centres were contacted. Three hypothetical case scenarios were presented. In each case, the patient is clinically node negative but has a positive SLN following breast conserving surgery, without further ALND. Respondents were asked what radiotherapy fields they would treat within each scenario. Responses were received from 90 radiation oncologists from 73 centres in 11 countries. In the three scenarios (low, intermediate and high risk of further lymph node involvement), standard tangential beams would be used by only 27, 12 and 7%, respectively; high tangential beams by 33, 18 and 13; tangents with full axillary/supraclavicular irradiation by 26, 51 and 61%; the remaining 14, 19 and 19% would use a nomogram to aid their decision. This survey describes the lack of consensus regarding the management of the axilla in patients with clinically node-negative breast cancer but a positive sentinel node and who have not had ALND.

In the article by Sinnatamby, Nagarajan, Reddy, Karunanidhi and Singhavajala, authors undertook a comparison of the image-based 3D treatment planning using AcurosTM BV and AAPM TG-43 algorithm for intracavitary brachytherapy of carcinoma cervix. A total of 27 patients with carcinoma cervix, stage IIB or IIIB with vaginal involvement limited to the upper third of the vagina were included in the study. Patients included in this study had CT and MRI compatible ring applicators used. GEC-ESTRO recommended doses to target volumes and organs at risk (OAR) compared using dose–volume histograms (DVHs). Results demonstrated that the differences in dosimetric parameters between the AcurosTM BV and TG-43 proved to be statistically significant; however, the differences are very small and are clinically insignificant.

In the next paper, Chow, Jiang Kiciak and Markel present their study on the dosimetric comparison between prostate intensity-modulated radiotherapy (IMRT) and volumetric-modulated arc radiotherapy (VMAT) plans using the planning target volume (PTV) dose–volume factor. Authors demonstrate that their proposed PTV dose–volume factor (PDVF) can be used to evaluate the PTV dose coverage between the IMRT and VMAT plans based on 90 prostate patients. PDVF were determined from the prostate IMRT and VMAT plans to compare their variation of PTV dose coverage. Comparisons of the PDVF with other plan evaluation parameters such as D5%, D95%, D99%, Dmean, conformity index (CI), homogeneity index (HI), gradient index (GI) and prostate tumour control probability (TCP) were carried out. Prostate IMRT and VMAT plans using the 6 MV photon beams were created from 40 and 50 patients. Dosimetric indices (CI, HI and GI), dose–volume points (D5%, D95%, D99% and Dmean) and prostate TCP were calculated according to the PTV DVHs of the plans. All PTV and DVH curves were fitted using the Gaussian error function (GEF) model. The PDVF were calculated based on the GEF parameters. Findings concluded that the calculated PDVF for the prostate IMRT and VMAT plans agreed well with other dosimetric and radiobiological parameters in this study. PDVF was verified as an alternative of evaluation parameter in the quality assurance of prostate treatment planning.

In the next article by Fujita, Kuwahata, Hattori, Kinoshita and Fukuda, authors present their study to evaluate the dosimetric aspects of whole brain radiotherapy (WBRT) using an irregular surface compensator (ISC) in contrast to conventional radiotherapy techniques.

Treatment plans were devised for 20 patients. The Eclipse treatment planning system (Varian Medical Systems, Palo Alto, CA, USA) was used for dose calculation. For the ISC, a fluence editor application was used to extend the range of optimal fluence. The treatment plan with the ISC was compared with the conventional technique in terms of doses in the PTV, dose HI, 3D maximum dose, eye and lens doses, and monitor unit counts required for treatment. Authors conclude that the ISC technique for WBRT considerably improved the dose homogeneity in the PTV. As patients who receive WBRT have improved survival, the long-term side effects of radiotherapy are highly important.

In the next article by Radaideh and Matalqah, the aims of this study were to measure skin doses and to identify potential factors that may contribute to skin reactions in nasopharyngeal cancer patients undergoing IMRT. This was a prospective study with 21 nasopharyngeal cancer patients treated by IMRT. Personal data were collected and in vivo skin dose measurements were performed using thermoluminescent dosimeters. All patients were monitored clinically and skin reactions were

https://doi.org/10.1017/S1460396916000327 Published online by Cambridge University Press

classified according to the Radiation Therapy Oncology Group criteria. Univariate and multivariate logistic regression was conducted using Statistical Package for Social Sciences Software to identify skin toxicity risk factors. Findings indicated that the neck skin should be identified as a sensitive structure for dose optimisation. Skin dose measurement and skin-sparing techniques are highly recommended for head and neck patients treated with IMRT.

In the article by Goyal, Kehwar, Manjhi, Barker, Heintz, Shide and Rai, this study aimed to evaluate dosimetric parameters for cervical high dose rate (HDR) brachytherapy treatment using varying dose prescription methods. The study included 125 tandem-based cervical HDR brachytherapy treatment plans of 25 patients, who received HDR brachytherapy. Delineation of high-risk clinical target volumes (HR-CTV) and OAR were outlined on the original CT images. The dose prescription point was defined per ICRU-38 also redefined using ABS 2011 criteria. The coverage index (V100) for each HR-CTV was calculated using DVH parameters. A plot between HR-CTV and V100 was plotted using the best-fit linear regression line (least-square fit analysis). Authors conclude that for cervical HDR brachytherapy, dose prescription to an arbitrarily defined point (e.g., point A) does not provide consistent coverage of HR-CTV. The difference in coverage between two dose prescription approaches increases with increasing CTV volume. The authors' ongoing work evaluates the dosimetric consequences of volumetric dose prescription approaches for these patients.

The final article in this issue is on the topic of Monte Carlo simulation of proton therapy using bio-nanomaterials (bio-NM) presented by Belamri, Dib and Belbachir. In recent years, there has been a spectacular development in nanomedicine field with new nanoparticles for diagnosis and cancer therapy, although most researchers have been interested in gold nanoparticles (GNPs). In this paper, authors present work undertaken on a comparison between the uses of different bio-NMs in proton therapy. Results of this study show that platinum nanoparticles (PtNPs) present interesting advantages comparing GNPs and silver nanoparticles and PtNPs facilitates proton therapy.

In the educational note presented in this issue, authors Kataria, Gupta, Sasikumar, Vishnu, Goyal, Bisht, Basu, Abhishek, Narang and Banerjee present their hypothesis: is wheat germ grass detrimental during radiotherapy? Antioxidant therapies to control oxidative damage have already attracted the worldwide attention in recent years. Extensive studies on phytochemicals in cell culture system and animal models have provided a wealth of information on the mechanism by which such nutraceuticals show their beneficial effect. Nutraceuticals include plant-derived factors (phytochemicals) and factors derived from animal sources as well as from microbial sources. The activities of nutraceuticals are broad and include antioxidation, modulation of enzyme activity and modification of natural hormonal activity (agonist or antagonist) to act as a precursor for one or more beneficial molecules. Antioxidants scavenge free radicals that cause cell damage. Antioxidant consumption during radiotherapy and its effects are still controversial. Some studies suggest that antioxidant supplementation during chemotherapy or radiotherapy may be beneficial and some harmful. Wheat grass is rich in superoxide dismutase, an antioxidant enzyme. Radiotherapy causes tumour cell kill via activation of reactive oxygen species, specifically by the hydroxyl radical and needs the reactive species for effective tumour control. Wheat grass which is rich in free radical scavengers can interfere with reactive oxygen species generated by radiation for tumour cell kill and can be detrimental to the therapy per se. Having said that the antioxidant properties of wheat grass could influence tumour activity, the effects of radiation therapy on tumour cells can be nullified when wheat grass is taken during radiotherapy.

To complete this issue, the technical note is presented by Qu, Singer, Chen, Shugard, Garsa and Yom on the topic of using a slant board immobilisation of head and neck radiotherapy patients who cannot tolerate a flat position. Patients treated with IMRT for head and neck cancer are often positioned supine on a carbon fibre board to which a thermoplastic mask is attached to immobilise the head and shoulders.

For patients unable to tolerate a supine position, authors developed a tilting board that accommodates a full-scale head and shoulder mask. Phantom measurements were obtained to confirm the dosimetric accuracy of our treatment planning system when using this board. A patient was simulated in the flat and tilted positions on the board. The two corresponding treatment plans were evaluated by comparing the target coverage and doses to OAR. The patient's intra-fraction motion was quantified during his tilted treatments. Results produced found that phantom measurements confirmed the accuracy of the dosimetric calculations. The tilted plan met dosimetric standards for clinical acceptability. The intra-fraction motion of the patient in the tilted position was <3 mm in any direction. Conclusions made are that the tilting board met clinical requirements for IMRT planning and delivery. Full-scale head and shoulder immobilisation was achieved in a more tolerable tilted position.

Professor Angela Duxbury