POSTER DISCUSSION: 7: RTT

PD-0266
A survey of UK practice in cervical cancer radiotherapy aimed at developing trial specific quality assurance
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Purpose/Objective: To determine the current variation in radiotherapy practice for the treatment of cervical cancer across the United Kingdom (UK) with the aim of developing a comprehensive radiotherapy quality assurance (QA) programme for both external beam radiotherapy (EBRT) and brachytherapy within the context of the INTERLACE trial: a phase III trial of weekly induction chemotherapy and chemoradiation versus standard chemoradiation. The data will also be used to help determine the need for a national brachytherapy dosimetry audit.

Materials and Methods: A pre-trial questionnaire was circulated to 31 radiotherapy centres that had expressed interest in participating in INTERLACE. In addition to external beam radiotherapy (EBRT) details, in depth information on brachytherapy technique and QA was collected.

Results: To date, 22 questionnaires have been completed and evaluated. Local practice was seen to vary significantly between centres with particular variation in brachytherapy techniques. For EBRT, all but 2 centres localise using CT and MRI modalities, only 6 of these also utilise PET imaging. Seven out of 22 centres use 3D virtual simulation (Vsim) techniques for EBRT planning. With respect to total EQD2 dose, 9 out of 22 centres did not achieve the proposed minimum dose requirement for the trial of 78 Gy, with values ranging from 68.3 to 83.9 Gy. The intended trial requirement for the overall treatment time of ≤ 50 days was also not met by 7 of the 22 centres. Out of 21 brachytherapy centres, 18 use 3D imaging for the planning of all fractions. Twelve of these optimise their plans for each individual patient; 6 to the target volume and 6 to OAR volumes or critical points, while the remaining 9 use standard plans. Six out of 21 centres have not participated in any brachytherapy dosimetry audit to date.

Conclusions: The INTERLACE pre-trial questionnaire has revealed a wide variation in dose fractionation and treatment techniques being used in centres across the UK. Following our results new minimum standards for centres wishing to participate in the INTERLACE trial have been set. Now Vsim techniques for EBRT planning will not be permitted from UK centres. This will therefore require an advance in technique to 3D conformal planning for some centres. Several centres will be required to increase their total EQD2 dose for trial patients. The overall treatment time has now been amended to up to 56 days. Finally our results have highlighted the need for a national brachytherapy dosimetry audit which is now currently under development.

PD-0267
A comparison of two radiosurgery delivery techniques for brain metastasis.
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Purpose: To determine the current variation in radiosurgery delivery techniques for brain metastasis using LINAC based stereotactic radiosurgery with micro-multileaf collimator (Brainlab M3) since 2008. Patients are immobilised using Brainlab fixation and treated with static fixed fields (6 MV photon). In June 2012 a TrueBeam STX (Varian Medical Systems) was installed. Patients with localised CNS lesions are now treated with 10 MV flattening filter free (FFF) volumetric modulated arc therapy (VMAT).

Results: This study evaluated the impact of the new technique by comparing beam on time (BOT), time in room (TIR), and clinical dose rate (CDR) with the previous technique.

<table>
<thead>
<tr>
<th>Material/Method</th>
<th>BO (minutes:seconds)</th>
<th>TIR (minutes:seconds)</th>
<th>CDR (MU/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT 5:65</td>
<td>1:30</td>
<td>2:60</td>
<td>6.65</td>
</tr>
<tr>
<td>Range 4:55-6:6</td>
<td>Range 2:01-3:9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIR 34:17</td>
<td>17:12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MU 2726</td>
<td>MU 6216.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range 2119-3168</td>
<td>Range 4472-9340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR 600 MU/min</td>
<td>2385.5 MU/min</td>
<td></td>
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</table>

Conclusions: The implementation of VMAT FFF has dramatically reduced the TIR. The shorter BOT reduces the likelihood of intrafraction motion although this cannot be verified as no post treatment CBCT was performed. It is envisaged that VMAT FFF treatment times will be reduced further as Radiographer competency and skill increases. This is essential in busy RT departments where treatment slots are at a premium.

PD-0268
Using systematic CTC registration in the clinic to aid competent care of acute side-effects of radiotherapy
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Purpose/Objective: This study examined the use of Systematic Common Terminology Criteria for Adverse Events v. 3.0 (CTC) registration to enable consistent patient care and prevention of acute side-effects from radiotherapy (RT). The goal was to enhance the ability of the radiation therapist nurses (RTN) to evaluate and act on acute side-effects. Hence we investigated whether performing CTC registration combined with prior delegated medical actions and supplementary nurse prescribing reduced the need for physician consultations and interventions.

Materials and Methods: We randomly selected 20 patients treated with RT for rectal cancer during October 2011. At that time point, CTC registration was done on every fifth day of the patient’s treatment course. We evaluated the relative number of planned CTC registrations actually performed and all medical interventions. This was compared to similar data collected for 20 randomly selected rectal cancer patients treated during October 2012, where CTC
registration was carried out on a predefined day of the week. Proportions were compared using Fisher's Exact test.

**Results:** For patients evaluated on a fixed treatment fraction (October 2011), 58 CTC registrations were recorded. For patients evaluated on a predefined weekday (October 2012), 83 CTC registrations were performed of 108 possible (0.77, 0.72-0.81). The absolute difference in the proportions of registrations performed was 0.34 (95% CI: 0.21 to 0.45, p=0.001). Of the 20 patients treated in October 2011, 19 (0.95, 95% CI: 0.84 to 0.99) received medical treatment of their acute side effects administered by a RTN, by the use of prior delegated medical interventions (i.e. no physician involvement). In October 2012, only 12 of the 20 patients (0.60, 0.46 to 0.72) received medical treatment. This corresponds to an absolute decrease in medical treatment of acute side-effects by 0.35 (0.10 to 0.58, p=0.02).

**Conclusions:** We found an increased number of planned registrations performed as well as a decrease in the number of patients in need of medical treatment of acute side effects. This is believed to reflect that improved CTC registration results in more effective early nursing interventions from the RTN. The pre-defined levels in the CTC-system and the prior delegated medical intervention options allow for quick and independent response to acute RT toxicity by the RTN. As an added benefit, systematic CTC registrations will provide additional and improved scientific data on patients' tolerance to RT.

As this is a retrospective study comparing two patient cohorts, there may be an effect of simply introducing a new procedure on the compliance with planned toxicity scoring. However, the decrease in medical interventions following an increased focus on consistent toxicity scoring is nevertheless of interest.

**PD-0269**

Mepilex Lite dressings decrease the severity of acute radiation-induced skin reactions post-mastectomy

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**Purpose/Objective:** Severe acute radiation-induced skin reactions occur in a significant proportion of women who receive radiation therapy for breast cancer. We previously showed that Mepilex Lite dressings decreased the severity of erythema. Here we report their effect on the full range of skin reactions in 74 breast cancer patients post-mastectomy.

**Materials and Methods:** A total of 80 women were recruited from four hospitals in New Zealand with 74 women contributing a full data set for analysis. The first skin area on the chest wall to develop erythema was randomly divided into two similar halves; one half was treated with Mepilex Lite dressings, the other half with aqueous cream. Skin reactions were assessed using the Radiation-Induced Skin Reaction Assessment Scale (RISRS).

**Results:** Comparing with aqueous cream, Mepilex Lite dressings did not significantly reduce the incidence of moist desquamation but did reduce the overall severity of skin reactions by 41%, the average moist desquamation score by 49% and the sum of the moist desquamation time for all patches by 28% (see table below). Most patients preferred the dressings, found them easy to use and very comfortable to wear.

**Table 1: Key trial results**

<table>
<thead>
<tr>
<th>Measures</th>
<th>Aqueous Cream</th>
<th>p values</th>
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</thead>
<tbody>
<tr>
<td>RISRS (combined)</td>
<td>3.02 ± 0.29</td>
<td>1.77 ± 0.12</td>
</tr>
<tr>
<td>RISRS (moist desquamation)</td>
<td>0.37</td>
<td>0.18</td>
</tr>
<tr>
<td>Incidence of moist desquamation</td>
<td>19%</td>
<td>15%</td>
</tr>
<tr>
<td>Time to moist desquamation</td>
<td>49.9 ± 3.3 days</td>
<td>40.3 ± 2.7 days (MIXED)</td>
</tr>
<tr>
<td>Time to healing</td>
<td>12.5 ± 1.5 days</td>
<td>11.4 ± 1.7 days (MIXED)</td>
</tr>
<tr>
<td>Total moist desquamation time</td>
<td>25 weeks</td>
<td>18 weeks</td>
</tr>
</tbody>
</table>

**Conclusions:** Mepilex Lite dressings reduce all aspects of radiation-induced skin reactions.

**PD-0270**

A survey of radiotherapy skin care practice across Europe and the United States of America

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**Purpose/Objective:** Radiation induced toxicity is a common adverse side effect of radiotherapy. Radiotherapy may cause varying degrees of physical skin reactions, and contribute to a patient’s overall quality of life. A recent Society and College of Radiographers (SCoR) survey of skin care practice in the UK highlighted a lack of convincing evidence to support skin care advice for radiotherapy patients in relation to prevention and management of skin reactions. The purpose of this research study was to investigate current skin care practice for radiotherapy patients across Europe and the United States of America (USA). The published literature was used as a guide to assess the appropriateness of current clinical guidelines.

**Materials and Methods:** A link to an online survey, using ‘SurveyMonkey’ was emailed to departments (N=737) across Europe and the USA. This survey was based on a questionnaire from the SCoR study, which was adapted, with permission, for a wider radiotherapy community. Each radiotherapy department manager was asked to select one radiation therapist per department to complete the survey. Data was collected and analysed using SPSS version 20.0 and Microsoft excel.

**Results:** One hundred and eighty one departments responded, giving a response rate of 25%. Results of the survey highlight disparities between clinical practice and research findings. Information provided to patients on how to manage their skin during radiotherapy is often inconsistent and outdated. A plethora of agents is used in a non-standardised manner.

Based on the results of this study, and current literature, an evidence-based skin care information leaflet for patients was devised.

**Conclusions:** A large variation was seen between departments with regard to current skin care practice. It highlights the need for further studies to be carried out in order to develop an evidence base for the skin care advice given to radiotherapy patients, and to eliminate non-standardised practice.

**PD-0271**

Dosimetric consequences due to shoulder position and how to increase the robustness for VMAT treatment planning

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**Purpose/Objective:** It is of importance to take the shoulder position into account when planning radiotherapy for head and neck cancer patients. The purpose of this study is: 1) to evaluate how interfractional variations of the shoulder position affect the dose distribution for RA compared to IMRT and 2) to develop an optimisation method for RA treatment planning in order to increase robustness to shoulder position variations.

**Materials and Methods:** One IMRT and two RA treatment plans (TPs) were made for a number of patients. The two RA TPs (RA anisotropic and RA isotropic) were prepared with and without taking the shoulders into account in the optimisation, respectively. The former was done with different methods e.g. using optimisation objectives on the delineated shoulders, by using avoiding sectors, or a combination of the two methods. The robustness of the different techniques and the different methods was investigated by simulating different shoulder positions in the treatment planning system. The body outline was edited to simulate when shoulders ‘falls down’ and moves up and the original TPs were applied on the corresponding structure sets. Changes in dose distribution and dosimetric parameters e.g. CTV volume covered by 95% of the prescribed dose (V95(CTV)), dose max to ORs etc. was used to investigate the robustness of the TPs for the simulated shoulder positions. For relevant cases the body outlines from CBCT-scans acquired during the course of treatment, were transferred to the original CT set, in order to investigate how the shoulder position affect the dose in clinical situations.

**Results:** The figure illustrates simulated cases where the shoulders ‘move up’ 1 cm and 1.5 cm and how this affects the dose distribution for the IMRT, RA isotropic and RA anisotropic TPs, respectively. The IMRT plan was created with fixed beam angle geometry that takes the shoulders into account. As expected the IMRT was robust for interfractional variation of the shoulder position e.g. V95(CTV)=100% for all simulated IMRT cases. The RA TPs were robust (e.g. V95(CTV)=100%) for small movements (1cm or less). If the shoulder...