



specificity and 39% sensitivity for PH.

Conclusion: In patients with suspected PH referred to a specialist centre, automated RV/LV thresholds may help rule-in and rule-out PH, with diagnostic utility when TTE is 'intermediate' for PH.

1. Swift, A., Dwivedi, K., Johns, C., Garg, P., Chin, M., Currie, B., Rothman, A., Capener, D., Shahin, Y., Elliot, C., Charalamopolous, T., Sabroe, I., Rajaram, S., Hill, C., Wild, J., Condliffe, R. and Kiely, D., 2020. Diagnostic accuracy of CT pulmonary angiography in suspected pulmonary hypertension. *European Radiology*, 30(9), pp.4918-4929. Association of Physicists in Medicine. *Med Phys* 1994;21(1):85–90.

SP10.6 Faster respiratory diagnosis pathway for GP patients

Myriam Jackson; Christopher Mills

United Lincolnshire Hospitals NHS Trust

Background: The Trust goal of implementing the NOLCP1 and FDS282 has led to the design and implementation of the Faster Respiratory Diagnosis pathway (FRd) which was implemented in June 2019.

Purpose: The pathway objectives includes chest x-rays from GP referrals being reported within 24 hours of being undertaken. Any abnormality, i.e. malignancy (or interstitial lung disease) the patient is referred by radiology for the appropriate CT scan preferably on the chest x-ray day of attendance, or at least within 48 hours. Once the CT has been reported, it is triaged by chest physicians the next working day.

Summary: Results from June 2019 to end December 2020, show that 96% of GP chest x-rays (requested as part of the FRd pathway or upgraded to the pathway) were reported within 24 hours of being undertaken. (Total GP chest x-ray requests 32,000+). In 2019, 53% of patients had their CT within desired timeframe, which increased to 63% in 2020 (delays were usually patient choice). The CT reports were available to the clinician within 48 hours for 74% of patients in 2019 increasing to 77% in 2020. The FRd pathway has reduced initial chest x-ray to results including CT being available to the chest consultant from 6-8 weeks' minimum to on average 5 days. Feedback from, patients, GPs and the chest physicians have been very positive. We hope to further reduce the time to initial CT and if required to CT guided biopsy. We are looking to model similar formats for other tumour sites.

The Lung Clinical Expert Group National Optimal Lung Cancer Pathway and Implementation Guide (NOLCP) 2017. 28 Day Faster Diagnosis Pathway (FDS28) accessed from the internet on 23 November 2020 <https://www.england.nhs.uk/cancer/early-diagnosis/>



Proffered papers: Clinical oncology – service

SP11.1 Radiotherapy Go Green and Drink Clean

Helen Barnes; Gillian Adair Smith

Royal Marsden NHS Foundation Trust

Background: Many patients receiving radiotherapy to the pelvis are required to drink a pre-defined volume of water each day to achieve a full bladder, often measured in cups. At our Trust, more than 60,000 plastic cups are used annually, by radiotherapy alone. These single use cups are environmentally unfriendly and an alternative solution to provide patients with a personalised reusable water bottle was explored. The project also aimed to improve compliance with bladder filling for radiotherapy, and so the impact on bladder volumes at the time of treatment was investigated.

Method: A grant application was made to the Trust's cancer charity to purchase custom designed water bottles, with 175 ml (1 cup) graduations on an 800 ml bottle. Bottles were given to patients at their pre-treatment appointment, with instructions on how to fill their bladder for treatment. Cup usage was calculated from orders, one-month pre and post implementation. Bladder volume at treatment, as a percentage of the CT planning volume, was recorded for the same time points and grouped into underfilled ($\leq 50\%$), small (51-80%), optimal (81-120%), large (121-150%) and overfilled ($\geq 151\%$).

Results: Cup usage halved from 12,000 cups to 6,000 cups. Percentage of bladder volumes in the optimal range increased from 47% to 54% and decreased in all other categories.

Conclusion: The introduction of water bottles increased bladder filling compliance and reduced plastic cup usage by half. The future will involve changing the remaining cups to a recyclable material to further reduce the environmental impact of radiotherapy preparation.



SP11.2 Clinical audit of prophylactic antiemetic provision for patients at high to moderate risk of radiation-induced nausea and vomiting

Verity Alden-Bennett¹; Bev Ball¹; Hannah Nightingale²; Pete Bridge¹

¹University of Liverpool; ²Christie Hospital NHS Foundation Trust

Background: Radiation-induced nausea and vomiting (RINV) is a common side effect of single fraction palliative radiotherapy. Patients experiencing RINV have significantly reduced quality of life and a prescription of prophylactic antiemetics, principally 5-HT₃ antagonists (Feyer 2011), is recommended. Treatments with a high emetogenic risk may also indicate concurrent dexamethasone. There is little clarity on which patients should receive medication and poor understanding of antiemetic guidance (Dennis 2012).

Method: A retrospective audit aimed to determine the extent to which patients at high and moderate emetogenic risk receiving single fraction radiotherapy were prescribed prophylactic antiemetic medication in line with the current evidence base.

Results: A total of 60 patients were included in the audit; of these patients, 50 were consented for the risk of nausea and/or vomiting. Prophylactic anti-emetics were only prescribed to 28 (46.7%) of all audited patients. Out of the 50 patients who provided informed consent, only 24 (48%) were prescribed an antiemetic prior to their treatment. Of the 32 patients who were not prescribed ondansetron, 10 were already on dexamethasone, 3 were inpatients and 1 patient was prescribed metoclopramide. An analysis of the 6-week post-treatment survival rate revealed that just over 20% (n=22) died before 6 weeks and may have not gained full benefit (Spencer 2018) from their radiotherapy.

Conclusion: Antiemetic prescribing for single fraction patients at moderate to high emetogenic risk at a large regional centre is under-utilised in relation to published evidence. Amended guidance and further audits are recommended to ensure this patient group is best supported.

1. Dennis, K., Zhang, L., Lutz, S et al. (2012) International patterns of practice in the management of radiation therapy-induced nausea and vomiting. *Int J Radiat Oncol Biol Phys.* 84(1), 49-60. 2. Feyer, P.C., Maranzano, E., Molassiotis, A., Roila, F., Clark-Snow, R.A., Jordan, K. (2011) Radiotherapy-induced nausea and vomiting (RINV): MASCC/ESMO guideline for antiemetics in radiotherapy: update 2009. *Support Care Cancer.* 19(1), 5-14. 3. Spencer, K., Parrish, R., Barton, R., Henry, A. (2018) Palliative radiotherapy *BMJ.* 360: k821

SP11.3 A retrospective study comparing set up errors with standard versus customised headrests for head and neck radiotherapy

Erin Anderson; Karen Pilling; Shahid Iqbal; Rachel L Brooks

Northern Centre for Cancer Care

Background: In response to advice from The National Institute for Health and Care Excellence (2) during covid-19, standard headrests (SHR) were introduced for head and neck radiotherapy. The SHR requires one mould room appointment compared to three appointments with customised head rests (CHR). Previous studies (1) found SHR to be equivalent to CHR at immobilising head and neck patients, particularly if several variations of the SHR exist. This study includes six variations of SHR.

Method: Two groups of ten patients treated between December 2019 and June 2020 were retrospectively analysed by one observer. Groups were stratified according to age, sex and tumour site. One group had CHR and the other had SHR. 547 cone beam computed tomography images (CBCT) were reviewed. A 6 Degree of Freedom match was performed then chin, shoulder and spine position was assessed using dosimetrist drawn structures. Structures out of the tolerance were recorded. A chi-squared test was used to compare the groups.

Results: The chin position count was 21 for CHR and 36 for SHR, p-value 0.046. The shoulder position count was 13 for CHR and 77 for SHR p-value 0.00. The spine position count was 3 for CHR and 21 for SHR, p-value 0.00. This means the headrests compared are not equivalent in terms of set up reproducibility.

Conclusion: Fewer hospital visits reduce patient exposure to COVID-19. However, CHR provides a more reliable level of immobilisation, the radiotherapy service will be reviewed in line with these findings.

1. Howlin, c., O'Shea, E., Dunne, M., Mullaney, L., McGarry, M. and Clayton-Lea, A., et al. (2015) A randomized controlled trial comparing customized versus standard headrests for head and neck radiotherapy immobilization in terms of set-up errors, patient comfort and staff satisfaction. *ICORG,* 08-09(21), pp.74-83.

2. Nice.org.uk. 2020. Overview | COVID-19 Rapid Guideline: Delivery Of Radiotherapy | Guidance | NICE. [online] Available at: [Accessed 4 December 2020].

SP11.4 Can lower dose CBCT protocols for radical bladder patients produce adequate images for soft tissue registration?

Samantha Brass¹; Robert Brass¹; Catherine Holborn²

¹Clatterbridge Cancer Centre; ²Sheffield Hallam University

This study clinically evaluates lower dose CBCT pelvis protocols for bladder patients to assess whether they can produce image quality suitable for bone and soft tissue image registration. This research was based on a study by Wood et al (2015) who successfully developed size-based pelvis CBCT protocols. Fourteen radical bladder patients were included for this study and seven were selected for scoring. Following the patient's planning CT scan a CBCT



mode was selected for the patient based on the maximum mAs per slice. Patients received an exposure using the selected size-specific CBCT mode in place of the standard 'Pelvis' mode twice per week. The image quality was assessed using a grading system of 1-5. Scores were statistically analysed and the computed tomography dose index (CTDI_w), the Dose-Length Product (DLP), effective dose and total lifetime cancer risk were also measured and calculated for each CBCT mode. The average scores for 6 of 7 patients for images produced using the project modes were ≤ 3 . The weighted CTDI was measured for each of the project modes as well as the standard Pelvis mode. It was shown that, relative to the standard pelvis mode, the CTDI could be reduced by 82%, 72% and 44% for patients in the small, medium and large categories respectively. This study found the lower dose CBCT pelvis protocol modes for bladder patients appropriate for clinical decisions. The images produced were deemed acceptable and the modes were implemented into the researchers department with no complications at the time.

1. Wood T.J et al (2015). Accounting for patient size in the optimization of dose and image quality of pelvis cone beam CT protocols on the Varian OBI system. *Br J Radiol* 2015; 88: 20150364.

SP11.5 To ring or not to ring: exploring patient perceptions of the end of radiotherapy treatment bell

Amy Taylor¹; Weston Park Hospital; Nicki Ingram¹; Weston Park Cancer Centre; Chi Ka Chan²

¹Sheffield Teaching Hospital NHS Trust; ²Sheffield Hallam University

Ringing the end of treatment bell (EoTB) has become a tradition in radiotherapy departments across the UK. For some however, there is a belief that the EoTB is an inappropriate way to mark the end of treatment, insensitive to those who have little prospect of cure. It is imperative that local practices respect the needs and preferences of patients within their care. The authors sought to explore patient perceptions on the EoTB in order to consider its propriety within department. Between October and December 2019, all patients (n=325) about to finish radiotherapy were invited to complete a questionnaire. The patients were asked their thoughts on why people rang the bell, to indicate their own intent at the end of their radiotherapy and provide the reasons that underpinned their intention. Thematic analysis explored patient perceptions and the number planning on ringing the bell was quantified. Of the 93 completed questionnaires, 65 patients indicated they would ring the bell (70%), 14 would not (15%) and 14 had not decided (15%). The motivation behind ringing the EoTB was altruistic, a means of; i) encouragement for other patients, ii) showing appreciation to Therapeutic Radiographers. The findings however demonstrated there is confusion about whether the bell signified finishing radiotherapy or their cancer journey. Overall patients were positive about the EoTB and favoured its presence in department. The bell was shown to be symbolic, but it is important department's consider how the EoTB is 'badged' to ensure there is no misconception on what the bell signifies.

SP11.6 An atlas for paediatric craniofacial growth and development in childhood cancer survivors

Siena Monaghan; Abigail Bryce-Atkinson; Marianne Aznar

The University of Manchester

Background: Radiotherapy can affect growth in childhood cancer survivors (CCS), leading to facial disfigurement(1)(2). These effects and their link to radiation dose can be difficult to quantify due to lack of defined measures of internal anatomy(3). Generally, measures are defined to relate to specific outcomes, hence measures vary greatly between studies. This work develops and validates an atlas (descriptive guide) of craniofacial measures to monitor growth and development in CCS.

Methods: A literature search was conducted to establish common anatomical measures. Measures relevant to craniofacial growth that could be clearly defined in 3D imaging were included. Each measure was illustrated in the atlas using CT and MR patient images. The atlas was validated by 7 observers, assessing intra- and inter-observer agreement for measurements in 4 patient cases. Standard deviation (SD) and intraclass correlation coefficients (ICC) of observer measurements were calculated.

Results: 21/37 measurements from literature were selected. Intraobserver variation showed a SD of 2.59mm, 2.25mm, 5.46mm and 2.61mm, meaning 3/4 cases showed reproducibility. Interobserver validation found an overall SD of 2.3mm, with ICC of mean 0.43 (95% range 0.09-0.77). 1 measure was excluded due to poor observer agreement, leaving 20 reproducible measures described in the atlas.

Conclusion: An atlas of 20 craniofacial measures was developed to improve our ability to assess craniofacial growth in CCS. The atlas is already being used to study craniofacial asymmetry in CCS, and holds potential for use in other fields such as dental/orthodontic interventions and growth-limiting diseases affecting craniofacial development.

1. Bluemke DA, Fishman EK, Scott WW. Skeletal complications of radiation therapy. *Radiographics*. 1994;14(1):111-21. 2. Sklar CA, Antal Z, Chemaitilly W, Cohen LE, Follin C, Meacham LR, et al. Hypothalamic-Pituitary and Growth Disorders in Survivors of Childhood Cancer: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2018;103(8):2761-84. 3. New research to help prevent facial disfiguration in children with cancer: Friends of Rosie; 2020 [Available from: <https://www.friendsofrosie.co.uk/new-research-to-help-prevent-facial-disfiguration-in-children-with-cancer/>]